American Association for Agricultural Education
Proceedings of the Annual National Research Conference
May 15 – 18, 2018
Charleston, South Carolina

Volume 45

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Session A – Wednesday 3:15-4:45

Discussant – M. Craig Edwards; Timekeeper – Brianna Shanholtzer

School-based Agricultural Education Teachers
Impact of Teacher Attire on Students' Views of Teacher Credibility, Attitude Homophily, and Background Homophily within School-based Agricultural Education Programs *Dr. Catherine W. Shoulders, Lesley Smith*
A Description of the Professional Identities of Arkansas Agriculture Teachers *Dr. Catherine W. Shoulders*
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Job Satisfaction of Agricultural Teachers in North Carolina *Dr. R. Jason Davis, Dr. Jim Flowers, Dr. Wendy Warner, Dr. Gary Moore, Dr. David Jones*

Impact of Teacher Attire on Students' Views of Teacher Credibility, Attitude Homophily, and Background Homophily within School-based Agricultural Education Programs

Dr. Catherine W. Shoulders, University of Arkansas

Lesley Smith, University of Arkansas

Abstract

School-based agricultural education teachers can face conflicting role obligations and role conflict when contradictory expectations accompany their positions, making the daily selection of what to wear difficult for these educators. The decision is crucial, however; dress sends strong messages of the profession to others, including students. We used a multiple case study design to examine the impact of teacher attire on students' perceptions of attitude homophily, background homophily, and teacher credibility. Findings indicated differing perceptions of business professionally, business casually, and casually dressed agriculture teachers between cases. Further, data suggested students' expectations for teacher attire varied by content matter, with agricultural mechanics content requiring more casual clothing. We recommend teachers wear business casual clothing most frequently in order to moderate between students' teacher-related and agriculturalist-related expectations, while shaping students' views regarding the professionalism of the agricultural, food, and natural resources industry.

Introduction/Conceptual Framework

The global agricultural, food, and natural resources (AFNR) industries are facing the challenge of supplying a growing population with safe, affordable food from limited resources (STEM Food and Ag. Council, 2014). As technology and social systems evolve, the business of agricultural production is requiring more expertise in an increasingly diverse array of disciplines. A robust human capital pipeline has been identified as the vehicle capable of building an AFNR workforce prepared to conquer this challenge. However, the industry has struggled to fill that pipeline with scientists prepared to work in agricultural positions. Universities have been producing one-twelfth of the graduates needed to fill the nation's AFNR positions, suggesting a need to increase the number of students interested in entering that human capital pipeline.

One of the barriers to recruiting students to AFNR degree programs is the lack of awareness students have regarding the scope of careers within AFNR industries (Coalition for a Sustainable Agricultural Workforce, n.d.; National Academy of Sciences, 2009). "The diverse and broader student body is generally unaware of the multi-dimensional and challenging nature of the agricultural disciplines and the exciting career opportunities open to them" (National Academy of Sciences, 2009, p. 4). The STEM Food and Ag. Council (2014) recognized "the growing need for young, talented people in a variety of fields and disciplines to consider embarking on a career in the food and agriculture industry" (p. 14) as a key issue compounding the global hunger problem, and recommended that institutions "raise awareness among young people about the abundance of professional opportunities in food and agriculture" (p. 52). The Coalition for a Sustainable Agricultural Workforce (n.d.) stated that "misconceptions steer students in the basic sciences away from careers in the agricultural sciences" (overview, para. 5).

School-based agricultural education programs can assist in filling the human capital pipeline, as agricultural education courses maintain a dedicated focus on career exploration and college and career readiness across the AFNR disciplines (DeLuca, Plank, & Estacion, 2006; Roberts, Harder, & Brashears, 2016). Smith (2010) found enrollment in school-based agricultural education classes to be associated with positive perceptions about agriculture. Dyer, Breja, and Wittler (2002) reported previous enrollment in a school-based agricultural education program to be one of the most important factors in students' completion of a postsecondary degree in a college of agriculture.

As the leader of the school-based agricultural education program, the agriculture teacher is an influential mentor in guiding students toward the various science-based careers within the AFNR industries (Terry & Briers, 2010). As representatives of the larger AFNR industry, agriculture teachers offer many students their first impressions of the skills needed for, knowledge required by, and culture found within AFNR careers. Included in the formation of these first impressions are the teachers' physical attributes and behaviors (Carney, Colvin, & Hall, 2007; Simons, 1995). Attributes can include aspects out of the teacher's control, such as age and gender, and those within the teacher's control, such as attire (Barrick, Shaffer, & DeGrassi, 2009). These first impressions can shape students' perspectives regarding the similarity between their own concepts of self and perceptions of occupations within AFNR, a powerful factor in occupational choice (Gottfredson, 1981).

There are different standards for dress that are often dependent on work environment and culture; sartorial choices display one's roles, authority, and status within a profession (Morris, Gorham, Cohen, & Huffman, 1996). While district policies differ, employee handbooks have been found to maintain expectations of professional dress for teachers (Workman & Freeburg, 2010). Simmons (1996) posited that teachers can garner respect for themselves and their profession through their clothing, stating, "without question, dress sends a strong message about who teachers are as individuals and as professionals" (p. 298). Workman and Freeburg (2010) echoed the importance of attire within the teaching profession, stating the high influence teachers' clothing had on the general public's perceptions of the teaching profession. Previous research has displayed the impact of attire on students' perceptions of teachers. The literature is replete with findings indicating teachers dressed in casual attire are preferred by students, who view them as approachable and flexible, but not well-respected (Butler & Roesel, 1989; Carr, Lavin, & Davies, 2009; Lukavsky, Butler, & Harden, 1995). Additionally, these casually dressed teachers are more likely to experience student misbehavior (Roach, 1997). Similarly, teachers dressed more professionally have been found to be less preferable and perceived as less connected to students, but overwhelmingly more competent (Butler & Roesel, 1989; Morris et al., 1996; Shoulders et al., 2017). Morris et al. (1996) stated, "the same formal clothing that serves to increase perceptions of credibility, intelligence, and competence, and to increase compliance, has been reported to have the effect of decreasing perceptions of likability or approachability" (p. 137).

Teachers can face conflicting role obligations and role conflict when contradictory expectations accompany their positions (Workman & Freeburg, 2010). Agriculture teachers not only represent the teaching profession, but also represent the AFNR industry. Careers within AFNR have historically been carried out in outdoor settings requiring manual labor, but currently encompass a vast array of scientific careers carried out within professional settings (National Research Council, 2009). Gordon (2010) stated that within educational subject areas in which sartorial expectations may conflict, the teacher must dress in a manner that displays the teacher's ability and willingness to engage in practices within the occupation. Shoulders et al. (2017) found that students' perceptions of agriculture teachers dressed in varying degrees of professional attire were dependent upon the students' previous experience within agriculture classes; students who had been enrolled in at least one high school agriculture course perceived agriculture teachers dressed less professionally as more competent to teach agricultural content. Further, they perceived those dressed more professionally to be less competent to teach agricultural content. These findings led Shoulders et al. (2017) to recommend that agriculture teachers actively select attire according to the messages they want to send to their students about the agriculture profession. They also recommended that further research be conducted "to determine how teacher attire impacts students' perceptions and expectations of the agriculture teachers" (p. 125). This study addresses their recommendation by examining the impact of teacher attire within the context of school based agricultural education programs on students' perceptions of agriculture teachers' credibility and perceptions of the similarity between their senses of self and their beliefs about the teacher as a representative of the AFNR industry.

Theoretical Framework

This study was guided by Gottfredson's (1981) theory of occupational aspirations and expectancy violations theory (EVT) (Burgoon & Hale, 1988). According to the theory of occupational aspirations, an individual's self-concept, including items such as appearance, gender, social class background, intelligence, and vocational interests, competencies and values, is shaped over time and guides the individual toward and away from occupations that align with or are misaligned with this self-concept. As a child ages into adolescence, "each of the developing self-concepts is used as an additional criterion by which to make more critical assessments of job-self compatibility" (Gottfredson, 1981, p. 549). The elimination of jobs that are viewed as misaligned with one's self-concept occur in stages:

> Occupations that are perceived to be inappropriate for one's sex are first eliminated from further consideration. Next, youngsters begin to rule out occupations of unacceptably low prestige because they are inconsistent with their social class self-concept. At the same time they rule out occupations requiring extreme effort to obtain in view of their image of their general ability level. Only in adolescence to youngsters turn to their more personal interests, capacities, and values as criteria for further narrowing their choices. Thus, the exploration of vocational alternatives in adolescence is largely within the set of occupations that were deemed compatible at earlier ages according to one's more visible social attributes…and one's sense of what is available with reasonable effort (Gottfredson, 1981, p. 549).

As occupations are further pursued, barriers related to accessibility cause individuals to choose between "sacrificing compatibility according to vocational interests, job level, or femininity/masculinity of the job" (Gottfredson, 1981, p. 549). Aspects further from the core of one's self-concept, such as vocational interests, are more readily given up than those that are more central to one self-concept, such as gender appropriateness of a job.

The process by which individuals pursue and eliminate potential occupations relies on occupational images (also termed occupational stereotype within the literature) (Gottfredson, 1981). Generalizations made about an occupation, including "the personalities of people in those jobs, the type of work they do, the type of lives they lead, the rewards and conditions of the work, and the appropriateness of the job for different types of people" form the image by which individuals determine compatibility between the occupation and their concept of self (Gottfredson, 1981, p. 547). Studies examining occupational images have found that occupations are perceived similarly by the general population,

> no matter what their sex, social class, educational level, ethnic group, area of residence, occupational preferences or employment, age, type of school attended, political persuasion, and traditional of beliefs, and regardless of the decade of the study or the specific way in which questions were asked (Gottfredson, 1981, p. 550).

However, ratings of occupations is dependent on homophily; individuals rate jobs perceived to be held by people similar to themselves as more favorable than those held by people less like them (Himmelweit, Halsey, & Oppenheim, 1952; Reiss, 1961).

As representatives of the AFNR industry, agriculture teachers offer students an opportunity to further define their occupational images of AFNR careers, as well as evaluate the homophily between themselves and AFNR occupations. According to EVT, the interaction between agriculture teachers and their students shape students' expectations of what agriculture teachers should know and do, which can influence their perceptions of other agriculture teachers (Burgoon & Hale, 1988), and whether their concepts of self are compatible with the occupation of agricultural education (Gottfredson, 1981). Interaction with other agriculture teachers who behave in a way that is different from the students' expectations can be viewed as positively or negatively:

> Clothing behavior is an area for obvious application of EVT given that we hold expectations for what appropriate attire is and what certain types of dress mean when they violate these social norms. There is little doubt that style of dress influences the attributions made about the wearer" (Dunbar & Segrin, 2012, p. 2)

The theory of occupational aspirations was utilized to guide this study's independent and dependent variables. The AFNR industry has been experiencing a shift in occupational image as its reliance on science-based and professional disciplines increases; a corresponding shift in how AFNR careers are viewed by those making occupational choices can reduce misconceptions about the industry and combat the shortage of qualified people interested in filling these positions. The value of attire on the general public's views about a profession (Dunbar & Segrin, 2012), the role of attire in shaping perceptions of homophily and expectations of teacher competence (Morris et al., 1996), the influence of homophily on occupational image

(Gottfredson, 1981), and the conflicting sartorial expectations of traditional agriculturalists, teachers, and scientific professionals (Dunbar & Segrin, 2012; Shoulders et al., 2017) warranted the examination of teachers' sartorial choices as an independent variable possible of influencing the dependent variables of student-teacher homophily and student perceptions of teacher credibility.

Expectancy violations theory was utilized to guide the design of the study. Because students' previous interactions with teachers in their home school based agricultural education programs shapes their expectations regarding the sartorial choices of agriculture teachers, we utilized a multiple case study design. Case studies are useful in instances when the phenomenon to be investigated is not sharply distinguishable from the context in which it is observed (Yin, 2014). Therefore, case studies are appropriate "when you want to understand a real-world case and assume that such an understanding is likely to involve important contextual conditions pertinent to your case" (Yin, 2014, p. 16). Because expectations of teacher attire are formed in part from previous interactions with agriculture teachers, and sartorial violations of those expectations can be viewed positively or negatively, we analyzed the impact of teacher attire on students' perceptions of homophily with the teacher and teacher credibility by school, seeking to generalize to the theoretical propositions within the theories of occupational aspirations and expectancy violations rather than to populations (Yin, 2014).

Methods

This study utilized a series of quasi-experiments within a multiple case study design. Four school based agricultural education programs, purposively selected to include only programs wherein multiple sections of the same agriculture class were taught, were recruited to participate. A thorough description of each case's context and treatment implementation follows the explanation of the purpose, objectives, treatments, instrumentation, data collection, and data analysis, which were uniform across all cases.

Purpose and Objectives

The purpose of this study was to determine the impact of teacher attire on students' perceptions of teachers' credibility and homophily between themselves and the teacher.

To meet this purpose, the following objectives were carried out for each of four cases:

1. Describe students' attitude homophily, background homophily, and perceptions of teacher credibility after experiencing a lesson delivered by a teacher dressed in business professional attire, business casual attire, or casual attire.
2. Determine differences between students' perceptions by treatment group.

Treatments

Two graduate assistants who were certified to teach high school agriculture but who did not have any previous interaction with students in the four sites served as guest instructors. The guest instructors were similar in age and in teaching experience, but were different genders. Once sites were selected, the guest instructors were randomly assigned to teach prepared lessons within each site. The same guest instructor taught the same lesson in multiple sections of the same class within a site, so attire was the only manipulated variable. In sites with two sections of the same class, guest instructors wore casual attire while teaching one section and business professional attire while teaching the other section. In sites with three sections of the same class, the guest instructor wore business casual attire to the third class. Form of attire was randomly assigned to each class within a site. Operational definitions for each form of attire was established through a review of literature (Morris et al., 1996) and was validated by an expert in apparel studies. See Table 1 for operational definitions of each form of attire.

Table 1

Operational Definitions of each Form of Attire for Male and Female Guest Instructors

Form of Attire	Operation for Male Guest Instructor	Operation for Female Guest Instructor
Business professional	Dress shirt with tie, dress slacks, jacket, brown or black shoes	Blouse and knee-length skirt and blazer, low-heeled brown or black shoes
Business casual	Dress shirt and khakis, brown shoes or boots	Dress shirt or blouse and khakis, flat shoes or boots
Casual	Polo or plain t-shirt, jeans, boots or flat casual shoes	Polo or plain t-shirt, jeans, boots flat casual shoes

Two 50-minute lesson plans were developed to meet the objectives within SBAE courses. One lesson was titled "How does ice cream get to our table?" and was aligned with The National Council for Agricultural Education's (2015) Career Pathway Content Standards AS.01 (Analyze historic and current trends impacting the animal systems industry), FPP. 03 (Select and process food products for storage, distribution and consumption), and FPP.04 (Explain the scope of the food industry and the historical and current developments of food products and processing). This lesson was designed to be taught in introductory agriculture courses and food science courses. For SBAE programs with multiple agricultural mechanics courses, a lesson plan titled "Repairing an Extension Cord" was created, and aligned with The National Council for Agricultural Education's (2015) Career Pathway Content Standards PST.01 (Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems), PST.02 (Operate and maintain AFNR mechanical equipment and power systems), and PST.03 (Service and repair AFNR mechanical equipment and power systems). Lessons each included a full materials and resources list, intended student outcomes and learning objectives, an interest approach with guiding questions, a lecture with PowerPoints and student worksheets, a scripted demonstration with guiding questions, a student activity with guiding questions, and a summary activity. Lesson plans were evaluated for face and content validity by a panel of experts in teaching and learning and curriculum development within agricultural education. One researcher observed each instance of guest instruction to confirm fidelity of treatment, both within attire and the lesson delivery.

Instrumentation

Following Morris et al.'s (1996) procedure for evaluating teacher attire, we used a combined instrument to measure students' perceptions of teacher credibility and homophily between themselves and the teacher. Teacher credibility was evaluated via 15 items with five-point bipolar descriptors. Five constructs are related to teacher credibility, and each were evaluated with the following descriptors: *competence* (expert/inexpert, reliable/unreliable, qualified/unqualified), *character* (selfish/unselfish, kind/cruel, sympathetic/unsympathetic), *sociability* (friendly/unfriendly, cheerful/gloomy, good-natured/irritable), *composure* (poised/nervous, relaxed/tense, calm/anxious), and *extroversion* (shy/outgoing, timid/bold, friendly/unfriendly) (Morris et al., 1996). Previous analysis of internal consistency within constructs yielded .85 for competence, .86 for character, .76 for sociability, .91 for composure, and .80 for extroversion.

The Measure of Perceived Homophily, which was developed by McCroskey, Richmond and Daly (1975) and updated in 1996 (McCroskey, McCroskey, & Richmond, 2007), was designed to measure perceived similarities between the source of information and the receiver (Rocca & McCroskey, 1999). The updated instrument measures three factors: attitude homophily, background homophily, and interpersonal attraction (McCroskey et al., 2007). Because of the necessity to maintain professional relationships between high school students and their teachers, we omitted questions related to interpersonal attraction from this study. Attitude homophily examines the perceived similarity between the attitudes of a source (in this case, the teacher) and a recipient (in this case, the student), and includes items such as, “This person shares my values.” Background homophily refers to the perceived similarity between the backgrounds between a source and a recipient, and includes items such as, “This person and I grew up in similar settings.” McCroskey et al.’s (2007) instrument included 17 items relating to attitude homophily and 10 items relating to background homophily. Their student-based tests of the instrument yielded internal consistency scores of .90 for attitude homophily and .84 for background homophily.

A panel of experts in agricultural education evaluated the combined instrument for face and content validity. Based on their recommendations, slight modifications were made to the attitude and background homophily scales to reduce respondent fatigue and eliminate items thought to be ambiguous or not applicable. The modified instrument yielded 10 items measuring attitude homophily and 7 items measuring background homophily.

A pilot test with 12 university freshmen was conducted to evaluate the validity and reliability of the combined instrument. Students were asked to view provided images of two individuals when completing the instrument. One image displayed a young, Caucasian male wearing jeans, a flannel shirt, boots, and a baseball hat while standing in a field, with his hands in his pockets. The other image displayed a young, Caucasian male wearing a large black jacket with a hood and sweatpants, gesturing aggressively to the camera, in a street with similarly dressed and mannered males behind him. The pilot test yielded internal consistency scores of .87 for attitude homophily and .88 for background homophily. Internal consistency scores for constructs within source credibility were as follows: .68 for competency, .95 for character, .77 for composure, .91 for extroversion, and .97 for sociability. Overall reliability for source credibility was .94. Divergent validity was calculated using dependent samples *t*-tests to assess perceived credibility and homophily between pilot test respondents and the individuals in the two provided images.

Significant differences were found in all three areas; for attitude homophily, $t(11) = 8.07$, $p < .005$; for background homophily, $t(11) = 2.65$, $p = .023$; and for credibility, $t(11) = 3.26$, $p = .008$, indicating high construct validity within the instrument.

Data Collection and Analysis

The instrument was administered to students via paper and pencil at the conclusion of each lesson. All sites yielded a 100% response rate. Data was analyzed via descriptive statistics, between treatment groups within each site. The magnitude of differences between groups were calculated and interpreted via effect sizes (Cohen, 1988).

Case A

Case A included three Survey of Agriculture classes at a high school in a town of 35,000 residents. The high school teaches approximately 4,000 students in grades nine through 12. Within the two-teacher agriculture program, consisting of one male agriculture teacher in the final ten years of his teaching career and one female agriculture teacher in the middle of her teaching career, the Survey of Agriculture courses are taught by the female agriculture teacher. After random assignment of treatments to classes, the male guest instructor taught the "How does ice cream get to our table?" lesson in business professional attire to a class of 13 students, in business casual attire to a class of nine students, and in casual attire to a class of 15 students.

Case B

Case B included two Survey of Agriculture classes and two Agricultural Mechanics classes at a high school in a town of approximately 3,200 residents. Approximately 600 students in grades nine through 12 are enrolled. The single-teacher SBAE program is led by a male agriculture teachers in the final five years of his teaching career. After random assignment of treatments to classes, the male guest instructor taught the "How does ice cream get to our table?" lesson in business professional attire to a Survey of Agriculture class of 11 students and in casual attire to a Survey of Agriculture class of 11 students. Additionally, the male guest instructor taught the "Repairing an extension cord" lesson in business professional attire to an Agricultural Mechanics class of 16 students and in casual attire to an Agricultural Mechanics class of 10 students.

Case C

Case C included three Survey of Agriculture courses at a high school at the outskirts of a larger city of approximately 500,000 residents. The high school enrolls 533 students in grades 10 through 12. The two-teacher SBAE program is led by two male teachers, one in the middle of his teaching career and the other in the final 10 years of his career. After random assignment of treatments to classes, the female guest instructor taught the "How does ice cream get to our table?" lesson in business professional attire to a class of 13 students, in business casual attire to a class of 14 students, and in casual attire to a class of 13 students.

Case D

Case D included two Food Science courses and two Survey of Agriculture courses at a high school serving a town of close to 2,500 residents. The high school enrolls approximately 400 students. The two-teacher SBAE program includes one female agriculture teacher entering the middle of her teaching career and one male agriculture teachers entering the final 10 years of his teaching career. After random assignment of treatments to classes, the female guest instructor taught the “How does ice cream get to our table?” lesson in business professional attire to a Food Science class of six students and a Survey of Agriculture class of 10 students. She also taught the same lesson in casual attire to a Food Science class of 14 students and a Survey of Agriculture class of 25 students.

Results

Case A

Students experiencing the lesson wherein the guest instructor wore business professional attire reported the most favorable perceptions of the instructor’s credibility (Table 2). The guest instructor received the highest scores in attitude and background homophily from the group who saw him wear business casual attire. The instructor received the lowest scores in each area when dressed casually, but the difference between scores was as low as .01. Effect sizes were calculated via partial eta squared; the effect size for attitude homophily was .06, for background homophily was .02, and for credibility was .04. According to Cohen (1988), each of these effect sizes is negligible.

Table 2

Mean Scores on Students’ Perceptions of Guest Instructors’ Attitude Homophily, Background Homophily, and Source Credibility for Each Treatment within Case A

	Attitude Homophily	Background Homophily	Source Credibility
Business Professional	3.39	3.05	4.31
Business Casual	3.40	3.14	4.07
Casual	3.21	3.01	4.06

Case B

Agricultural Mechanics Classes

Students experiencing the lesson when the guest instructor wore casual attire indicated higher attitude and background homophily with the instructor than those that engaged with the guest instructor while he wore business professional attire (Table 3). Additionally, the guest instructor was perceived as more credible when wearing casual attire than when wearing business professional attire. Effect sizes were calculated using Cohen’s *d*, attitude homophily and credibility yielded high effect sizes (Cohen, 1988), with scores being .79 and .93, respectively. Background homophily yielded a small effect size of .21.

Table 3

Mean Scores on Students’ Perceptions of Guest Instructors’ Attitude Homophily, Background Homophily, and Source Credibility for Each Treatment within the Agricultural Mechanics Courses in Case B

Attire	Attitude Homophily	Background Homophily	Source Credibility
Business Professional	2.73	3.01	3.71
Casual	3.45	3.10	4.38

Survey of Agriculture Class

Students experiencing the lesson when the guest instructor wore business professional attire indicated higher perceptions regarding attitude homophily, background homophily, and credibility of the instructor than did students experiencing the lesson with the casually dressed guest instructor (Table 4). Effect sizes were calculated using Cohen's *d*, and were negligible, with attitude homophily scoring .08, background homophily scoring .18, and credibility scoring .05.

Table 4

Mean Scores on Students' Perceptions of Guest Instructors' Attitude Homophily, Background Homophily, and Source Credibility for Each Treatment within the Survey of Agriculture Courses in Case B

Attire	Attitude Homophily	Background Homophily	Source Credibility
Business Professional	2.90	3.03	4.10
Casual	2.85	2.90	4.05

Case C

Students experiencing the lesson when the instructor dressed in business casual attire noted highest perceptions on all three constructs (Table 5). The instructor received the lowest scores in both homophily constructs when dressed casually, but received the lowest source credibility scores when dressed in business professional attire. Effect sizes were calculated using partial eta squared; attitude homophily revealed a negligible effect size of .04, background homophily revealed a similarly negligible effect size of .09, and credibility revealed a slightly higher, yet still negligible effect size of .17.

Table 5

Mean Scores on Students' Perceptions of Guest Instructors' Attitude Homophily, Background Homophily, and Source Credibility for Each Treatment in Case C

Attire	Attitude Homophily	Background Homophily	Source Credibility
Business Professional	3.08	3.05	3.80
Business Casual	3.29	3.07	4.41
Casual	2.85	2.90	4.05

Case D

Students experiencing the lesson when the guest instructor wore business professional attire reported highest perceptions of attitude homophily and source credibility (Table 6). However, students perceived the greatest background homophily with the guest instructor when she wore casual attire. Effect sizes were calculated using Cohen's *d*, and yielded small effect sizes for attitude homophily (.25) and credibility (.38), and a medium effect size for background homophily (.56).

Table 6

Mean Scores on Students' Perceptions of Guest Instructors' Attitude Homophily, Background Homophily, and Source Credibility for Each Treatment in Case D

Attire	Attitude Homophily	Background Homophily	Source Credibility
Business Professional	3.22	2.68	4.07
Casual	3.09	2.91	3.75

Conclusions and Recommendations

Within Case A and C, the guest instructor received highest scores in both forms of homophily when dressed in business casual attire. Within Case C, he was also viewed as most credible when wearing business casual attire. However, within Case A, he was viewed as most credible when wearing business professional attire, which supports previous studies that concluded more professional attire led to increased student perceptions of teacher credibility (Butler & Roesel, 1989; Carr et al., 2009; Lukavsky et al., 1995, Morris et al., 1996).

Case B included two separate groups; one taught students about ice cream production in Survey of Agriculture Classes, while the other taught students how to repair extension cords in Agricultural Mechanics classes. While these students had the same background elements influencing their expectations of agriculture teachers, their perceptions of the same guest instructor were opposite one another. Agricultural Mechanics students perceived the guest instructor as most like them in both background and attitude and most credible when he was dressed in casual attire. Alternately, the Survey of Agriculture students perceived the guest instructor as most like them in both areas of homophily and most credible when he was dressed in business professional attire. These findings suggest that as occupational roles shift, so do students' expectations of agriculture teachers' attire (Workman & Freeburg, 2010). Gordon (2010) recommended that teachers dress in a manner that displays the teacher's ability and willingness to participate in occupational practices; the findings herein support this recommendation.

Case D was the only one wherein students' perceptions of the guest instructor's attitude and background homophily differed. Business professional attire yielded the highest attitude homophily scores, while casual dress yielded the highest background homophily scores. Perceptions of credibility were found to be highest among students engaging with the instructor when he was dressed in business professional attire. While these findings, in part, support those of previous studies associating high credibility with professional attire (Burler & Roesel, 1989; Morris et al., 1996; Shoulders et al., 2017; Workman & Freeburg, 2010), students' differing perceptions of attitude and background homophily may imply that students feel they share similar values as the professionally-dressed agriculture teacher, but may not feel as though their backgrounds are like those of the credible agriculturalist. The theory of occupational aspirations posits that misalignment between one's self-concept and occupational image can cause elimination of the occupation as a career option (Gottfredson, 1981), suggesting these students may struggle to see themselves as capable of following in the occupational footsteps of their agriculture teacher.

Students perceptions in all three areas differed between cases, as did the effect sizes of each of the scores. These findings support the tenets of EVT; previous experiences with teachers in school based agricultural education programs shape students' perceptions of what a credible agriculture teacher looks like (Burgoon & Hale, 1988). Therefore, teachers should carefully consider their attire, as they play a role in shaping students' perceptions of those within AFNR careers. Further, their attire can influence whether students perceive AFNR occupations as compatible with their own concepts of self (Gottfredson, 1981).

When offered as an option, business casual attire produced highest scores most frequently. Additionally, business casual attire allows teachers to reach a "middle ground" between professional and casual attire, both of which have been shown to elicit negative perceptions among students in differing areas, and allows teachers to participate in the classroom responsibilities of the teacher as well as the occupational tasks of the agriculturalist. Lastly, business professional attire aligns with societal expectations of professional or scientific agricultural careers. These conclusions lead to our most definitive recommendation: SBAE teachers should dress in business casual attire when the educational situation allows. While specific lessons within agricultural contexts will require sartorial exceptions, business casual attire provides an avenue through which students can see themselves as professional agriculturalists and teachers can be perceived as credible, without one sacrificing the other. Finally, consistency among agriculture teacher dress can lead to higher, more consistent expectations regarding agriculture teachers as professional educators.

References

Barrick, M. R., Shaffer, J. A., & DeGrassi, S. W. (2009). What you see may not be what you get: Relationships among self-presentation tactics and ratings of interview and job performance. *The Journal of Applied Psychology, 94*(6), 1394–1411.

Burgoon, J. K., & Hale, J. L. (1988). Nonverbal Expectancy Violations: Model Elaboration and Application to Immediacy Behaviors. *Communication Monographs, 55,* 58-79.

Butler, S., & Roesel, K. (1989). The influence of dress on students' perceptions of teacher characteristics. *Clothing and Textiles Research Journal, 7*(3), 57-59.

Carney, D., Colvin, C., & Hall, J. (2007). A thin slice perspective in the accuracy of first impressions. *Journal of Research in Personality, 41*(5), 1054-1072.

Carr, D., Lavin, A., & Davies, T. (2009). The impact of business faculty attire on student perceptions and engagement. *Journal of College Teaching & Learning, 6*(1), 41-50.

Coalition for a Sustainable Agricultural Workforce (CSAW) Executive Summary. (n.d.). Retrieved from: https://www.crops.org/files/science-policy/testimony/csaw-executive-summary.pdf

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

DeLuca, S., Plank, S., & Estacion, A. (2006). Does career and technical education affect college enrollment? Columbus, OH: National Dissemination Center for Career and Technical Education.

Dunbar, N. E., & Segrin, C. (2012). Clothing and Teacher Credibility: An Application of Expectancy Violations Theory. *ISRN Education, 2012,* 1-12. doi:10.5402/2012/140517

Dyer, J. E., Breja, L. M., & Wittler, P. S. (2002). Predictors of student retention in colleges of agriculture. Proceedings of the 27th Annual National Agricultural Education Research Conference, 490-501.

Gordon, H. (2010). Career and technical education administrators' perceptions of secondary teachers' attire as indicated by selected professional attributes. *Journal of Career and Technical Education*, *25*(1), 47-61.

Gottfredson, L. W. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology*, *28*(6), 545-579. doi: 10.1037/0022-0167.28.6.545

Himmelweit, H. T., Halsey, A. H., & Oppenheim, A. N. (1952). The views of adolescents on some aspects of the social class structure. *The British Journal of Sociology, 3,* 148-172.

Lukavsky, J., Butler, S, & Harden, A. J. (1995). Perceptions of an instructor: Dress and students" characteristics. Perceptual and Motor Skills, 81, 231-240.

McCroskey, L. L., McCroskey, J. C., & Richmond, V. P. (2007). Analysis and Improvement of the Measurement of Interpersonal Attraction and Homophily. *Communication Quarterly, 54*(1). 1-31.

McCroskey, J. C., Richmond, V. P., & Daly, J. A. (1975). The development of a measure of perceived homophily in interpersonal communication. *Human Communication Research, 1*, 323-332.

Morris, T. L., Gorham, J., Cohen, S. H., & Huffman, D. (1996). Fashion in the Classroom: Effects of Attire on Student Perceptions of Instructors in College Classes. *Communication Education, 45*(2). 135-148.

National Academy of Sciences. (2009). *Transforming Agricultural Education for a Changing World.* Washington, DC: National Academies Press.

Reiss, A. J. (1961). *Occupations and social status.* New York: Free Press.

Roach, K. (1997). Effects of graduate teaching assistant attire on student learning, misbehaviors and ratings of instruction. *Communication Quarterly, 45*(3), 125-141.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication. 29-48. Retrieved from: http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf

Rocca, K. A., & McCroskey, J. C. (1999). The interrelationship of student ratings of instructors' immediacy, verbal aggressiveness, homophily, and interpersonal attraction. *Communication Education, 48*(4), 308-316. doi: 10.1080/03634529909379181.

Shoulders, C. W., Sellick, S. A., Southward, L., & Blythe, J. M. (2017). An Exploration of How Attire Shapes High School Students' Perceptions of Agriculture Teachers. *Journal of Agricultural Education. 58*(2), 111-127. Doi: 10.5032/jae.2017.02111.

Simmons, G. J. (1996). Teachers should dress for success. *Clearing House, 69*(5), 297-298.

Simons, T. (1995). Interviewing job applicants: How to get beyond first impressions. *Cornell Hotel and Restaurant Administration Quarterly, 36*(6), 21-27.

Smith, E. (2010). High school students' perceptions of agriculture and agricultural careers as delineated by presence of an agriculture program and rural/urban categorization. Unpublished undergraduate honors thesis, Cornell University.

STEM Food and Ag. Council (2014). *STEM Annual Report* (No. 1).

Terry, R., & Briers, G. (2010). Roles of the secondary agriculture teacher. In R. Torres, T. Kitchel, & A. Ball (Eds.), *Preparing and Advancing Teachers in Agricultural Education* (pp. 86-98). Columbus, Ohio: Curriculum Materials Service, The Ohio State University.

The National Council for Agricultural Education. (2015). Agriculture, food, and natural resources career cluster content standards. Retrieved from https://www.ffa.org/sitecollectiondocuments/council_afnr_career_cluster_content_standards.pdf.

Workman, J. E. & Freeburg, B. W. (2010). Teacher Dress Codes in Employee Handbooks: An Analysis. *Journal of Family and Consumer Sciences, 102*(3), 9-15.

Yin, R. K. (2014). *Case Study Research: Design and Methods* (5th ed.). Thousand Oaks, CA: SAGE Publications.

Impact of Teacher Attire on Students' Views of Teacher Credibility, Attitude Homophily, and Background Homophily within School-based Agricultural Education Programs

Discussant, M. Craig Edwards
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Theoretical/Conceptual Framework

The study's conceptual and theoretical bases, as described, appeared suitable for the phenomenon and its variables of interest. Such was well-explained with sufficient depth, coherence, and conceptual construction.

Methodology

A multiple case design, as described by the researchers, was appropriate with the intent to test several prescribed teacher attire interventions not only within the cases, i.e., multiple sections of the same course taught in a given SBAE program, but also across different cases or programs. Table 1 was very descriptive and additive to understanding the guest instructors' "form[s] of attire," which served as the investigation's treatment (reference p. 6 of the manuscript). In addition, the discussant recommends developing a table that summarizes gender of guest instructors, attire worn, courses and lessons taught, number of students instructed within each class, as well as select characteristics of programs and teachers to further illustrate the investigation as a "series of quasi-experiments." Referencing Campbell and Stanley (1963), or another relevant source, regarding a research design described nearest to what was employed, is also suggested before submitting the work for journal review. The researchers work product was strengthened due to their having assessed the study's treatment for sufficient fidelity and reporting effect sizes of observed differences as measured by construct means.

Conclusions

The researchers' conclusions and recommendations seemed appropriate based on the findings offered. Their recommendations may be of interest to teacher educators, and especially for those in agricultural education, who advise or "coach" preservice students about appropriate work attire and students' perceptions likely triggered regarding teacher credibility and aspects of occupational-related homophily.

As should have been done, the authors referenced literature presented at the manuscript's outset as supporting the study's conceptual framework <u>and</u> its theoretical basis within their conclusions. In case of the latter, Gottfredson's (1981) related work as well as expectancy violations theory (EVT), as attributed to Burgoon and Hale (1988), were revisited. In addition, connections were made to other literature vetted in the manuscript's introduction/conceptual framework section.

Selected Questions for Discussion and Further Research or Future Practice

1) Would a test of attire regarding an animal science lesson, e.g., demonstrating surgical castration of a calf, colt, lamb, or pig, yield results more similar to students' perceptions of the

agricultural mechanics lesson ("repairing an extension cord") or to the other content areas studied? 2) Would surgical castration, for example, imply or represent veterinary medicine to students, i.e., skillfully performing tasks that DVMs may do? 3) Moreover, what would be the influence on students' perceptions of the tools/instruments used, professionalism of the teacher's actions, including vocabulary spoken such as saying "testicles" versus less scientific or technical terms? 4) "Repairing an extension cord" would seem to be rather innocuous are almost a *clean task* or *skill* compared to any number of other agricultural mechanics practices. What are the researchers' thoughts regarding the likelihood of students having similar perceptions for practices *not so clean* but conducted frequently in an agricultural mechanics laboratory?

A Description of the Professional Identities of Arkansas Agriculture Teachers

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Abstract

After decades of research and professional development in agricultural education on teacher knowledge, needs, behaviors, satisfaction, and attrition, calls for additional research and reform have remained fairly consistent. One potential factor influencing the rate at which these challenges are overcome is teacher professional identity, which shapes how teachers interpret and respond to knowledge delivered through professional development. Shoulders and Myers (2011) suggested the unique circumstances of agricultural education lead teachers to maintain a professional identity different than that of other educators, but little research has been conducted with regard to the professional identities of agriculture teachers. Using the theories of constructivism and planned behavior, this study utilized a researcher-adapted survey to describe the professional identities of Arkansas agriculture teachers. Findings indicated teachers identified as agriculture teachers more so than agriculturalists or educators, the professional identity of the agricultural educator was significantly different than that of the educator or the agriculturalist, and length of teaching experience was not related to professional identity score. We recommend teacher educators include the development of professional identity as a component of all professional development experiences. Recommendations for further research include qualitative investigation into the ways in which agriculture teachers' professional identities manifest in the agriculture program.

Introduction

Just as is the case within any profession, continuous improvement is a common thread among all those working within agricultural education. Agriculture teachers work to improve their knowledge in subject matter expertise and pedagogical content in an effort to improve student success (Barrick & Garton, 2010; National Research Council, 2010; Rice & Kitchel, 2017). Administrators offer opportunities and resources for agriculture teachers to attend professional development events and foster collaborations that can help them gain the tools needed to positively impact student learning while maintaining successful careers (Anderson, Barrick, & Hughes, 1992). Agricultural educators within postsecondary institutions frequently create professional development events and examine methods through which they can maximize the impact these events can have on teachers' behaviors in the classroom (Anderson et al., 1992). However, after decades of research on teacher knowledge, needs, behaviors, satisfaction, and attrition, calls for additional research and reform have remained fairly consistent. The profession has been facing a shortage of qualified teachers since the 1960s (Camp, 2000), with the most recent supply and demand report stating a national shortage leading to 769.5 open agricultural education teaching positions (Smith, Lawver, & Foster, 2017). The integration of science, technology, engineering, and math (STEM) into agriculture classes was announced as a high priority by the National Research Council in 1998, and continued to receive print space within the American Association for Agricultural Education's National Research Agenda for 2016 through 2020 within its priority for efficient and effective agricultural education programs

(Thoron, Myers, & Barrick, 2015). Research on teaching methods, such as inquiry based instruction (Blythe, DiBenedetto, & Myers, 2015; Myers, Thoron, & Thompson, 2009; Parr & Edwards, 2004), and on professional development opportunities, such as the National Agriscience Teacher Ambassadors Academy (Blythe et al., 2015; Myers et al., 2009) and CASE (Ulmer, Velez, Lambert, Thompson, Burris, & Witt, 2013; Witt, Ulmer, Brashears, & Burley, 2014), have continued as the call for STEM integration has been echoed by researchers and educators throughout the decades. The collective voice appears to put forth one resounding message: we are improving, but there is more to be done.

Professional development opportunities are offered by individual K-12 school districts, university agricultural educators and scientists, professional organizations, and technical specialists within agricultural companies. These events can focus on technical content or pedagogical content, all with the common goal of improving the teaching and learning occurring within K-12 agriculture classrooms. While not all professional development events are created to intentionally align with data-supported professional development characteristics, theories are available to assist deliverers in ensuring the impact of their event.

Richardson (1996) noted that effective constructivist professional development programs include the following six characteristics:

1. The participating teachers' beliefs and understandings are a major element of the content of the staff development process.
2. The goal of the process is not to introduce a specific method or curriculum to be implemented by the teachers. Instead the goal is to facilitate conversations that allow the participants to understand their own beliefs and practices, consider alternatives, and experiment with new beliefs and practices.
3. Conversations about beliefs and practices are brought together with considerations of the moral dimensions of teaching and schooling.
4. During the course of the process, the discussions among staff developer and teachers move away from the domination by the staff developer toward teacher control of the agenda, process, and content.
5. The staff developer is knowledgeable about the current research and practice; however, he or she is not seen as the only "expert". A collaborative process is facilitated that allows the teachers to recognize and value their own expertise.
6. The staff development process is long term, and it is expected that teachers change at very different rates. (p. 113)

Congruently, Desimone (2011) stated research supports the five following characteristics as necessary for effective professional development:

1. Content focus: Professional development activities should focus on subject matter content and how students learn that content.
2. Active learning: Teachers should have opportunities to get involved, such as observing and receiving feedback, analyzing student work, or making presentations, as opposed to passively sitting through lectures.

3. Coherence: What teachers learn in any professional development activity should be consistent with other professional development, with their knowledge and beliefs, and with school, district, and state reforms and policies.
4. Duration: Professional development activities should be spread over a semester and should include 20 hours or more of contact time.
5. Collective participation: Groups of teachers from the same grade, subject, or school should participate in professional development activities together to build an interactive learning community. (p. 69)

Within both of these lists is the notion that the teacher's previous beliefs and values are taken into consideration within the professional development. Beliefs and values, along with individual and social factors such as background characteristics and socially established attitudes in specific contexts, make up one's professional identity (Simonneaus, 2000). It is through their professional identity that teachers interpret and decide how to act upon knowledge learned in professional development (Desimone, 2011). Shoulders and Myers (2011) suggested the unique circumstances of agricultural education lead teachers to maintain a professional identity different than that of other educators. Because professional identity is displayed within social contexts pertaining to the profession, it can influence teachers' receptiveness to and motivation to adopt behaviors promoted within professional development (Desimone, 2011; Shoulders & Myers, 2011). Therefore, the professional identity of agriculture teachers could interact with their professional development experiences, particularly within Desimone's (2011) listed realms of coherence and collective participation. Shoulders and Myers (2011) identified agriculture teacher professional identity as "an unexplored area that holds potential solutions to increasing changes in teacher behavior" (p. 106), and recommended researchers investigate the role professional identity plays within agricultural education and teacher professional development. This study responds to their call by examining the professional identities of agriculture teachers in Arkansas.

Theoretical and Conceptual Frameworks

This study was guided by the theories of constructivism and planned behavior (Ajzen, 1991). Constructivism is founded on the premise that knowledge is developed alongside experience, and the two cannot be separated (Keiny, 1994). Because knowledge is only known through experience, teachers in professional development knit an unending tapestry of understanding that combines their previous experiences and knowledge with the information delivered through the current professional development.

Within the theory of planned behavior, the constructivist notion of knowledge development is woven within an individual's attitude toward a behavior, the subjective norm regarding the behavior, and the individual's perceived control over the behavior. A teachers' attitude toward a behavior is influenced by his or her previous knowledge and experience, combined with the shared knowledge developed through social experiences (including previous professional development) (Doolittle & Camp, 1999). Professional identities are created through these social experiences, and are therefore also displayed in the settings shared by these individuals (Shoulders & Myers, 2011). This study was guided by the notion that professional identities influence the professional development experiences of teachers, thereby impacting their behavioral intentions.

Teachers make professional decisions, such as those within instruction, classroom management, and teacher collaboration, through the identity that they develop within the social and internal contexts of their discipline, school, and background characteristics (Peressini, Borko, Romagnano, Knuth, & Willis, 2004; Simonneaus, 2000). Established features of professional identity include the following:

1. Professional identity is an ongoing process of interpretation and re-interpretation of experiences;
2. Professional identity implies both person and context. A teacher's professional identity is not entirely unique.
3. A teacher's professional identity consists of sub-identities that more or less harmonize. The notion of sub-identities relates to teachers' different contexts and relationships. The more central a sub-identity is, the more costly it is to change or lose that identity.
4. Agency is an important element of professional identity, meaning that teachers have to be active in the process of professional development. (Beijaard, Meijer, & Verloop, 2004, p. 122)

Shoulders and Myers (2011) compiled research identifying several characteristics of agriculture teachers that could cause them to develop a professional identity different than that of other teachers, leading them to experience professional development differently as well. They noted that agriculture teachers often enter the profession out of a love for and previous experience within the agriculture industry, whereas other teachers enter the profession with little experience within an industry directly related to their discipline. The traditionally male-dominated nature of agricultural education can also cause separation between the professional identity of agriculture teachers and other teachers, as other educational contexts have employed female teachers more frequently. Also potentially contributing to a unique professional identity among agriculture teachers are the conflict between previously developed core sub-identities related to production-oriented agriculture challenged by educational reform focused on STEM integration and modern agriculture. Differences in teaching methods and agricultural education's unique pride in delivering "hands on learning", as well as rooted societal beliefs about the values and practices of the agricultural education program, can also further the divide between the identities of agriculture teachers and other teachers (Shoulders & Myers, 2011).

While professional identity has remained a little-explored topic within agricultural education, researchers have focused on teacher professional identity within other contexts. Conducting a qualitative analysis of student teacher portfolios, Antonek, McCormick, and Donato (1997) found that the reflection occurring through the portfolio guided the development of two foreign language preservice teachers' professional identities. In 1994, Goodson and Cole analyzed the life history interviews of seven teachers, concluding that teachers' development of professional identity depends on their notions of the professional community in which they work, and therefore, institutions should facilitate teachers' personal and professional development. Beijaard, Verloop, and Vermunt (2000) administered a survey to 80 secondary school teachers to describe teachers' perceptions of how their professional identities are formed. They concluded that teachers perceive their professional identities differently from one another based on the discipline in which they taught, teachers' professional identities had changed from when they were beginning teachers, and professional identity changes were dependent on the subject area in which the teachers were employed. Supporting Desimone's (2011) and Richardson's (1996) recommendations, Pennington and Richards (2016) concluded language teacher education should address teacher identity to guide language educators in the development of their professional identities as they construct knowledge to ensure the two are congruent with one another.

The established differences between agriculture teachers and teachers of other subjects led to Shoulders and Myers' (2011) call for research investigating agriculture teachers' professional identities. Professional development is viewed through the identities of teachers, and these events are frequently delivered to groups of teachers representing a variety of disciplines. Knowledge regarding the professional identity of agriculture teachers, and how it may differ from those of other teachers, could provide professional development deliverers information necessary to maximize behavioral change following professional development, allowing these efforts to lead to greater impact on long-standing calls for educational change.

Purpose and Objectives

The purpose of this study was to determine the professional identities of Arkansas agriculture teachers. To meet this purpose, the following objectives were created:

1. to describe Arkansas agriculture teachers' professional identities as educators, agriculturalists, and agricultural educators;
2. to determine the difference between teachers' professional identities as educators, agriculturalists, and agricultural educators; and
3. to describe the correlation between length of teaching experience and professional identity.

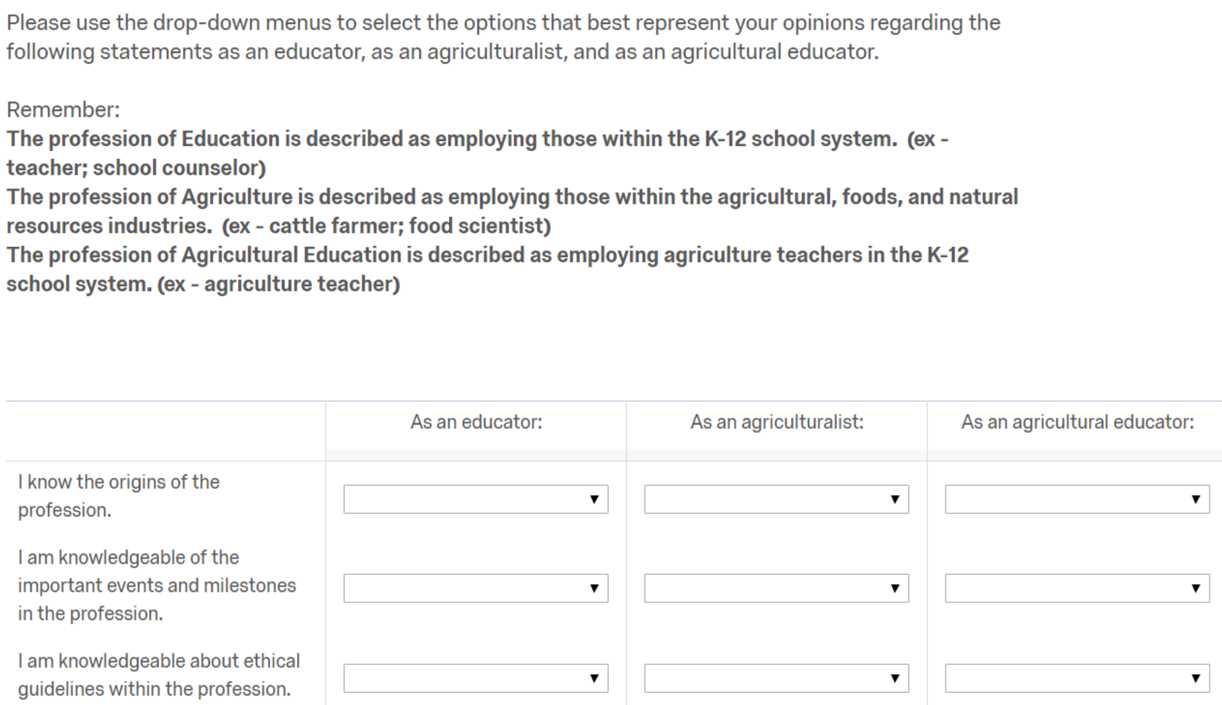
Methods

This study utilized a descriptive design to meet the aforementioned objectives. Agriculture teachers employed in Arkansas were recruited to complete a researcher-adapted survey to examine their professional identities. Details regarding the design and methods of the study are provided below.

Instrument

We developed a questionnaire, referred to here as the Professional Identity Scale in Agricultural Education (PISAE), through the adaptation of Woo's (2013) Professional Identity Scale in Counseling (PISC). The 54-item PISC evaluates the professional identities of counselors based on six sub-constructs, which were developed through a literature review: Engagement Behaviors (14 items), Knowledge of the Profession (11 items), Professional Roles and Expertise (nine items), Attitude (nine items), Philosophy of the Profession (seven items), and Professional Values (four items). The instrument utilizes a subject-centered scale to "reflect differences among the subjects in terms of their standing along the scale's dimension" (Dawis, 1987, p. 481). Respondents indicate their agreement to items on the PISC using a six-point Likert-type scale, with anchors at the ends (*not at all in agreement* and *totally in agreement*) and the midpoint (*neutral/uncertain*). Internal consistency calculations on the original instrument yielded Cronbach's alpha scores above 0.7 on all sub-constructs, with the exception of Professional Values ($\alpha = 0.44$). Convergent validity was established by comparing scores with the Professional Identity and Values Scale (Healey, 2009), yielding moderate and high positive correlations within each of the sub-constructs (Woo, 2013). Divergent validity was established by comparing scores with the Marlowe-Crowne (20) (Strahan & Gerbasi, 1972), an instrument designed to "detect socially desirable response distortions" (Woo, 2013, p. 56). Resulting low and nonsignificant correlations with between the two scales indicated the PISC was resistant to the risk of respondents answering items in a socially desirable manner.

For this study, the PISC (referred to herein as the PISAE to reflect adaptations) was altered to measure respondents' professional identities as educators, agriculturalists, and agricultural educators. Within the electronic survey, respondents were asked to indicate their agreement with each item three times, one for each of the aforementioned professional identities (Figure 1).


Please use the drop-down menus to select the options that best represent your opinions regarding the following statements as an educator, as an agriculturalist, and as an agricultural educator.

Remember:
The profession of Education is described as employing those within the K-12 school system. (ex - teacher; school counselor)
The profession of Agriculture is described as employing those within the agricultural, foods, and natural resources industries. (ex - cattle farmer; food scientist)
The profession of Agricultural Education is described as employing agriculture teachers in the K-12 school system. (ex - agriculture teacher)

	As an educator:	As an agriculturalist:	As an agricultural educator:
I know the origins of the profession.	▼	▼	▼
I am knowledgeable of the important events and milestones in the profession.	▼	▼	▼
I am knowledgeable about ethical guidelines within the profession.	▼	▼	▼

Figure 1. Sample PISAE survey screen.

Reference to counseling or counselors was replaced with the term "profession" so teachers could respond to the item for the three separate professional identities (see Figure 1). While some items did not require any adaptation (for example, "I engage in certification/licensure renewal processes"), others included terms requiring adaptation (for example, in the item "I know the origins of the counseling profession," the term "counseling" was removed). In order to enhance face validity of the PISAE, a drop-down, 5-point Likert-type scale was used for each question, allowing participants to respond quickly to an item for all three identities on one screen.

Three cognitive interviews were conducted with former agriculture teachers, two being researchers within agricultural teacher education, with differing lengths of teaching experience to ensure face and content validity. A pilot test including the Spring 2017 preservice teachers entering their final semester at the University of Arkansas (N = 7) was conducted to evaluate the PISAE's internal consistency within each sub-construct for each professional identity (Table 1). Scores indicated all sub-constructs were reliable.

Table 1.

Pilot Test Cronbach's α Scores for Each Sub-construct and Professional Identity

Sub-construct and Professional Identity	**α**
Knowledge of the Profession	
Educator	0.788
Agriculturalist	0.979
Agricultural Educator	0.989
Philosophy of the Profession	
Educator	0.649
Agriculturalist	1.000
Agricultural Educator	1.000
Professional Roles and Expertise	
Educator	0.724
Agriculturalist	1.000
Agricultural Educator	0.971
Attitude	
Educator	0.855
Agriculturalist	1.000
Agricultural Educator	0.994
Engagement Behaviors	
Educator	0.783
Agriculturalist	1.000
Agricultural Educator	1.000
Interaction	

Educator	0.686
Agriculturalist	1.000
Agricultural Educator	1.000

Participants

The population for this study included all school based agriculture teachers employed in Arkansas (*N* = 227). The electronic instrument was sent via an emailed invitation and link distributed through the Arkansas agricultural education listserv. Reminders were sent once per week for one month. A total of 72 responses were received, yielding a 31.7% response rate. In order to control for nonresponse error, we performed demographic comparisons (including gender, length of teaching experience, and geographical region of employment) between respondents and nonrespondents (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). Fifty-three respondents were male, while 19 were female. A chi-square goodness of fit test was conducted to determine whether gender proportions among respondents were representative of the population. The minimum expected frequency was 18. The chi-square goodness of fit test indicated that the two genders were similarly distributed in the respondents as in the general population ($x^2(1) = .07$, $p = .79$). A one-sample *t*-test was run to determine whether length of teaching experience in the respondents was different from that in the population. There were no outliers in the data, as assessed by inspection of a boxplot. Mean number of years teaching in the sample ($M = 15.39$, $SD = 10.92$) was not significantly different than in the population, $t(64) = 1.09$, $p = .28$. Of the 72 respondents, 23 taught in the Eastern District, 30 taught in the Northwest District, and 19 taught in the Southern District. A chi-square goodness of fit test was conducted to determine whether respondents taught in districts at the same proportion as those in the general population. The minimum expected frequency was 19.6. The test indicated that the teaching districts were similarly distributed among respondents as in the population ($x^2(2) = .34$, $p = .84$). Because no demographic differences were found between respondents and nonrespondents, we determined findings were generalizable to the population.

Data Analysis

Data was collected using Qualtrics and analyzed in SPSS v.23. To meet Objective 1, descriptive statistics including means and standard deviations were used. Additionally, frequencies were used to describe teachers' primary professional identities. Objective 2 was met via a one-way repeated measures ANOVA. The third objective was met via Pearson's correlations.

Findings

Objective 1 sought to describe Arkansas agriculture teachers' professional identities as educators, agriculturalists, and agricultural educators. Table 2 displays means and standard deviations for each sub-construct for each professional identity, as well as the total mean scores for each professional identity. Because not all respondents completed each section of the instrument, the number of respondents for each section is also included.

Table 2.

Respondents' Mean Scores for Each Sub-Construct for each Professional Identity

	Educator Professional Identity			**Agriculturalist Professional Identity**			**Agricultural Educator Professional Identity**		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Knowledge	64	27.86	4.50	64	29.05	3.66	72	31.21	3.12
Philosophy	62	16.84	2.15	61	16.82	2.17	67	17.30	2.73
Roles	56	25.66	3.38	55	25.69	2.73	63	26.95	2.61
Attitude	54	45.52	4.92	53	49.19	3.19	60	49.10	3.22
Engagement	52	38.12	6.48	51	41.57	4.79	58	43.22	4.82
Interaction	47	24.85	5.24	46	26.00	4.02	53	27.57	4.38
Total	72	177.88	20.38	72	186.06	15.74	72	192.68	16.60

Respondents displayed the highest mean score for the agricultural educator professional identity and the lowest mean score for the educator professional identity. With the exception of Attitude, the agricultural educator identity received the highest mean scores in each sub-construct as well. The agriculturalist identity yielded a mean score of just 0.09 points higher than the agricultural educator identity in the Attitude sub-construct. It should be noted that respondents also completed the agricultural educator questions most frequently.

Because the original instrument was developed to determine the professional identity of counselors via total score, with higher scores aligning with a more developed professional identity, teachers' primary professional identities were determined by identifying each respondent's highest scoring identity. Questions not completed were given a score of 0, as we assumed nonresponse was the result of teachers not identifying with that identity enough to be motivated to complete the questions within. Those with equal scores for more than one identity were counted in all categories in which they yielded top scores; therefore the *n* of primary professional identities is higher than 72. The majority of teachers identified as agricultural educators (*n* = 64). Eighteen respondents identified as agriculturalists, while seven identified as educators.

Finally, teachers were asked to list the career they would pursue if they were not currently employed in agricultural education. Responses were coded by the researcher into three categories: education-related, agriculture-related, and other. Forty-eight teachers responded to this survey item; 40 indicated they would pursue an agriculture-related career, while six indicated they would pursue employment outside of both agriculture and education. Only two respondents indicated they would continue teaching in a discipline other than agriculture.

Objective 2 sought to determine the difference between teachers' professional identities as educators, agriculturalists, and agricultural educators. A one-way repeated measures ANOVA was employed. Outliers were removed, leading to an *n* of 49. Professional identity was normally distributed for each profession, as assessed by a Shapiro-Wilk's test ($p > .05$). Mauchly's test of sphericity indicated that the assumption of sphericity had been violated, $x^2(2) = .72$, $p = .001$. Therefore, a Huynh-Feldt correction was used. Epsilon was .81. Professional identity was statistically different for the three professions, $F(1.61, 77.34) = 32.77$, $p = .0005$, $n^2 = .41$. Teachers identified significantly more as agriculturalists ($M = 186.06$) than as educators ($M = 177.88$). The mean difference was 8.18 (95% confidence interval, 3.17 to 13.20), $p = <.005$. Teachers' agricultural educator identities were 14.80 +/- 2.09 points higher than their educator identities (95% confidence interval, 9.61 to 19.99), a statistically significant difference, $p = < .0005$. Their agricultural educator identities were also significantly higher than their agriculturalist identities, displaying a mean difference of 6.61 points (95% confidence interval, 3.45 to 9.75).

Objective 3 sought to describe the correlation between length of teaching experience and professional identity. Pearson's correlation data was linear with no outliers, as was determined by a scatter plot. All variables were normally distributed, as assessed by a Shapiro-Wilk's test ($p > .05$). No significant correlations were found between number of years teaching agriculture or any other subject and any of the professional identities.

Conclusions, Implications, and Recommendations

This study described the educator, agriculturalist, and agricultural educator professional identities of Arkansas agriculture teachers. Findings indicated the professional identity of the agriculture teacher is different than that of the educator or the agriculturalist. Agriculture teachers in Arkansas identified as agriculture teachers moreso than they did the other two professions. The significant differences found between teachers' mean scores for each of the professional identities supports Shoulders and Myers' (2011) position that agriculture teachers develop and maintain professional identities that are different from those of other educators. These findings also support research identifying educational discipline as a factor influencing professional identity (Beijaard et al., 2000; Peressini et al., 2004; Simonneaus, 2000), and extends those conclusions to include agricultural education. Because of the valuable role professional identity plays in teachers' interpretations of professional development experiences, we recommend teacher educators plan professional development in a way that facilitates the acknowledgement of differing professional identities within groups of teachers from diverse disciplines. This recommendation follows similar calls made in other disciplines (Goodson & Cole, 1994; Pennington & Richards, 2016). Further, in professional development events planned specifically for agriculture teachers, teacher educators should assist teachers in understanding how the knowledge delivered aligns with their own professional identities as agriculture teachers, as well as how they can frame that knowledge to be accepted by teachers and administrators within their own schools. Desimone (2011), Beijaard et al. (2004), and Richardson (1996) each offered guiding characteristics of professional development and professional identity that can assist those planning professional developent in including professional identity as a key component of their educational plans.

The findings herein also suggest that agriculture teachers hold professional identities different from those held by agriculturalists, a notion somewhat contradicting the data wherein the majority of the respondents indicated they would pursue careers within the agriculture industry if they were not teaching agriculture. Shoulders and Myers (2011) suggested agriculture teachers' professional identities were different from those of other teachers, in part, because of their frequent previous first-hand connections with the agriculture industry. The findings here suggest that agriculture teachers either identified as agriculturalists previously and evolved away from these original agriculturalist identities as they gained new educational experiences, or never identified as agriculturalists, perhaps leading them to pursue careers in education. Further research investigating how agriculture teachers develop their professional identities during their preservice teacher education experience, as well as research exploring the differences in professional identity between preservice teachers with and without firsthand experience in the agriculture industry, can assist in better understanding the differences between the professional identities of agriculturalists and agricultural educators.

Findings indicated teachers' professional identities for each of the three professions was not associated with length of teaching experience. Beijaard et al. (2000) found that while the professional identities of teachers did change over time, that change was dependent upon the discipline in which the teacher was employed. The findings herein suggest that agricultural education may be a discipline in which length of teaching experience has less influence on professional identity than is found in other disciplines, although the reasons for this difference remain unknown. Researchers should investigate the reasons why agricultural educators are resistant to change within their professional identities, as the evolution of professional identity over time is considered part of the development process of successful teachers (Antonek et al., 1997; Beijaard et al., 2004). There is reason to believe focusing on teachers' development of professional identity could assist in impacting the challenges within agricultural education that have led to decades-long calls for change, such as teacher attrition and STEM integration.

While this study provides new information for researchers and practitioners in the area of agriculture teacher professional identity, its assumptions and limitations also provide opportunity for further research. While the PISC was established as a valid and reliable instrument to evaluate counselors' professional identities, it relied on previous qualitative literature to understand how professional identity was expressed within counselors' work. The PISAE quantitatively described agriculture teachers' professional identities, but we do not yet know how these identities are expressed though teachers' behaviors. We recommend qualitative research be conducted with agriculture teachers, students, parents, and administrators to further understand how professional identity influences the behaviors of agriculture teachers, as well as how these behaviors align with scores on the PISAE. Further, because the PISC accurately portrayed the professional identities of counselors, we assumed the PISAE would yield similarly accurate portrayals of other professions. We recommend researchers utilize appropriate parts of the

PISAE to examine the professional identities of educators and agriculturalists to ensure the instrument is valid in portraying the identities of professionals in these fields.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Anderson, T. J., Barrick, R. K., & Hughes, M. (1992). Responsibilities of teacher education for Vocational teacher professional development programs. *Journal of Agricultural Education, 33*(2), 43–50. doi: 10.5032/jae.1992.02043

Antonek, J. L., McCormick, D. E., & Donato, R. (1997). The student teacher portfolio as autobiography: Developing a professional identity. *Modern Language Journal, 81*(1), 15–27.

Barrick, R. G., & Garton, B. L. (2010) Frameworks for agriculture teacher preparation. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.), *Preparing and Advancing Teachers in Agricultural Education* (pp. 30-41). Columbus, OH: The Ohio State University.

Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' Professional identity. *Teacher and Teacher Education, 20*, 107–128. doi: 10.1016/jtate.2003.07.001

Beijaard, D., Verloop, N., & Vermunt, J. D. (2000). Teachers' perceptions of professional identity: An exploratory study from a personal knowledge perspective. *Teaching and Teacher Education*, *16*, 749–764.

Blythe, J. M., DiBenedetto, C. A., & Myers, B. E. (2015). Inquiry-based instruction: Perceptions of National Agriscience Teacher Ambassadors. *Journal of Agricultural Education*, *56*(2), 110-121. doi: 10.5032/jae.2015.02110

Camp, W. G. (2000). *A national study of the supply and demand for tachers of agricultural education in 1996-1998.* Alexandria, VA: Association for Career and Technical Education. Retrieved from https://files.eric.ed.gov/fulltext/ED458358.pdf

Dawis, R. V. (1987). Scale construction. *Journal of Counseling Psychology, 34*, 481-489.

Desimone, L. M. (2011). A primer on effective professional development. *Phi Delta Kappan, 92*(6), 68-71.

Doolittle, P. E., & Camp, W. G. (1999). Constructivism: The career and technical education perspective. *Journal of Vocational and Technical Education, 16*(1). Retrieved http://scholar.lib.vt.edu/ejournals/JVTE/v16n1/doolittle.html

Goodson, I. F., & Cole, A. L. (1994). Exploring the teacher's professional knowledge: Constructing identity and community. *Teacher Education Quarterly, 21*(1), 85–105.

Healey, A. C. (2009). *Female perspectives of professional identity and success in the counseling Field* (Doctoral dissertation). Retrieved from ProQuest. (UMU No. 3393006).

Keiny, S. (1994). Constructivism and teachers' professional development. *Teaching & Teacher Education, 10*(2), 157–167.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43-53. doi: 10.5032/jae.2001.04043

Miller, L. W., & Smith, K. L. (1983). Handling nonresponse issues. *Journal of Extension, 21*, 45 50.

Myers, B. E., Thoron, A. C., & Thompson, G. W. (2009). Perceptions of the National Agriscience Teacher Ambassador Academy toward integrating science into school-based agricultural education curriculum. *Journal of Agricultural Education, 50*(4), 120-133. doi: 10.5032/jae.2009.04120

National Research Council. (2010). *Preparing teachers: Building evidence for sound policy.* Committee on the Study of Teacher Preparation Programs in the United States, Center for Education. Division of Behaviors and Social Sciences Education. Washington, DC: The National Academies Press.

Parr, B., & Edwards, M. C. (2004). Inquiry-based instruction in secondary agricultural education: Problem-solving – an old friend revisited. *Journal of Agricultural Education, 45*(4), 106-117. doi: 10.5032/jae.2004.04106

Pennington, M. C., & Richards, J. E. (2016). Teacher identity in language teaching: Integrating\ personal, contextual, and professional factors. *RELC Journal, 47*(1), 5-23. doi: 10.1177/0033688216631219

Peressini, D., Borko, H., Romagnano, L., Knuth, E., & Willis, C. (2004). A conceptual framework for learning to teach secondary mathematics: A situative perspective. *Educational Studies in Mathematics, 56*(1), 67–69.

Rice, A. H. & Kitchel, T. (2017). Shaping pedagogical content knowledge for experienced Agriculture teachers in the plant sciences: A grounded theory. *Journal of Agricultural Education, 58*(4), 50- 64. doi: 10.5032/jae.2017.04050

Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), *Handbook of Research on Teacher Education* (2nd ed) (pp. 102-119). New York, NY: Simon and Shuster Macmillan.

Shoulders, C. W., & Myers, B. E. (2011). Considering professional identity to enhance agriculture teacher development. *Journal of Agricultural Education, 52*(4), 98-108. doi: 10.5032/jae.2011.04098

Simonneaus, L. (2000). Influence of cultural and disciplinary identity on the way teachers in agricultural education in France relate to knowledge in biotechnology. *New Genetics and Society, 19*(1), 23–48.

Smith, A. R., Lawver, R. G., & Foster, D. D. (2017). National agricultural education supply and Demand study. 2016 Executive Summary. Retrieved from aaaeonline.org/resources/documents/dsd2016summary.pdf

Strahan, R., & Gerbasi, K. (1972). Short, homogenous version of the Marlow-Crowne Social Desirability Scale. *Journal of Clinical Psychology, 28*, 191-193.

Thoron, A. C., Myers, B. E., & Barrick, R. K. (2016). In Roberts, T. G., Harder, A., & Brashears, . T. (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp: 41-48). Gainesville, FL: Department of Agricultural Education and Communications.

Ulmer, J. D., Velez, J. J., Lambert, M. D., Thompson, G. W., Burris, S., & Witt, P. A. (2013). Exploring science teaching efficacy of CASE curriculum teachers: A post-then-pre assessment. *Journal of Agricultural Education, 54*(4), 121-133. doi: 10.5032/jae.2103.04121

Witt, P. A., Ulmer, J. D., Brashears, T., & Burley, H. (2014). A comparison of student engaged time in agriculture instruction. *Journal of Agricultural Education, 55*(2), 16-32. doi: 10.5032/jae.2014.02016

Woo, H. R. (2013). *Instrument construction and initial validation: Professional identity scale in counseling (PICS).* (Doctoral dissertation). Retrieved from: http://ir.uiowa.edu/etd/2663

A Description of the Professional Identities of Arkansas Agriculture Teachers

Discussant, M. Craig Edwards
Oklahoma State University

Theoretical/Conceptual Framework

The study's theoretical basis, as described, was a conflation or intersection of constructivism and Ajzen's theory of planned behavior (ToPB). To that point, the author stated: "Within the theory of planned behavior, the constructivist notion of knowledge development is woven within an individual's attitude toward a behavior, the subjective norm regarding the behavior, and the individual's perceived control over the behavior." However, the discussant was unclear about which domain of constructivism was implied, cognitive, social, radical, or rather was the intent aspects of two or all three domains? Should any attention be given to explaining in the manuscript the researcher's decision to couch constructivism as a theory, especially due to some scholars arguing it may be more appropriately viewed as a philosophy or philosophical perspective?

Methodology

The study's methods, as explained, appeared to be appropriate. However, was the instrument construct (or "sub-construct") "Interaction," as stated in Table 1, the same as "Professional Values" (reference pp. 5 and 6 of the manuscript). Was the latter subsumed within "Interaction"? What was the researcher's rationale for not reporting post hoc reliability estimates of the instrument's (sub-)constructs, i.e., indicators of internal consistency, especially because two from the pilot study were reported as below .70? Or was the study's threshold or floor for acceptable reliability .60 and not .70? If yes, the discussant recommends one or more citations be provided supporting that rationale if submitting the manuscript for journal review. Further, it is recommended the size of the screenshot presented on page six of the manuscript be increased to 12 point font to improve readability.

Conclusions

The researcher's conclusions and implications seemed appropriate based on the findings offered. Several of the author's recommendations and implications may be of interest to students considering similar studies or other teacher educators seeking to know their teachers' perceptions of professional identity, especially as such knowledge may inform the delivery and content of professional development offerings, as noted by the researcher. The call to understand how teachers may express their professional identities through actualized teaching behaviors is particularly interesting.

If the author intends to pursue journal publication, the discussant recommends explicitly drawing connections between her conclusions and the study's theoretical bases, i.e., constructivism and Ajzen's (1991) theory of planned behavior, as discussed in the manuscript. Connections were made to some of the other literature reviewed in the manuscript's introduction section.

Selected Questions for Discussion and Further Research or Future Practice

1) Could more be extracted from the study's data regarding the role of subjective norms (Ajzen, 1991) and observed differences in teachers' perceptions about their professional identities?

2) What if a fourth professional identity option had been "FFA advisor" or "FFA teacher"? Any speculation about what proportion of respondents would have populated that "identity," if offered as a choice?

3) Does the finding of no significant relationships, i.e., at $p < .05$, between the respondents' years of teaching, whether agriculture or another subject, and their perceived professional identities imply such views are likely stable across a career span, at least, among Arkansas agriculture teachers?

4) What was the researcher's reason for using the word or term "agriculturalist" instead of "agriculturist"?

Why Did They Leave? An Examination of Idaho Agricultural Educator Attrition

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Abstract

A national shortage of agriculture teachers has led to increased pressure for stakeholders in agricultural education to recruit and retain quality teachers. This phenomenological study was conducted with teachers (n = 12) in Idaho who completed at least one year teaching and left the teaching profession before completing ten years of service. Semi-structured interviews were conducted to obtain data related to the shared experience of participants who had all made the choice to leave agricultural education as a profession. Results indicated the emergence of four core themes related to the decision to leave; teacher self-efficacy, lack of support, external factors outside of teaching, and altruism. The results of this study allow us to make recommendations to help mitigate some of the difficulties facing teachers who have the potential to leave. Among recommendations are a strengthening of preservice instruction to enhance teacher self-efficacy and communicating with stakeholders and an increased focus on altruistic factors which may help teachers remain in the profession.

Introduction

There are not enough agricultural educators to fill demand (Smith, Lawver, & Foster, 2016). According to the American Association for Agricultural Education (AAAE), a lack of qualified individuals resulted in the closure of numerous programs throughout the country in 2015 (Smith, et. al., 2016). Addressing the teacher shortage is a high priority for the agricultural education profession and requires examining both recruitment of new teachers and retention of current agricultural educators (Roberts, Harder, & Brashears, 2016).

How many teachers are leaving the profession? According to the National Commission on Teaching and America's Future (NCTAF), in the five years preceding 2003, 46% of all new teachers had left the profession, with 14% leaving after the first year, as shown in Figure 1 (Gray, Tale, & O'Rear, 2015).

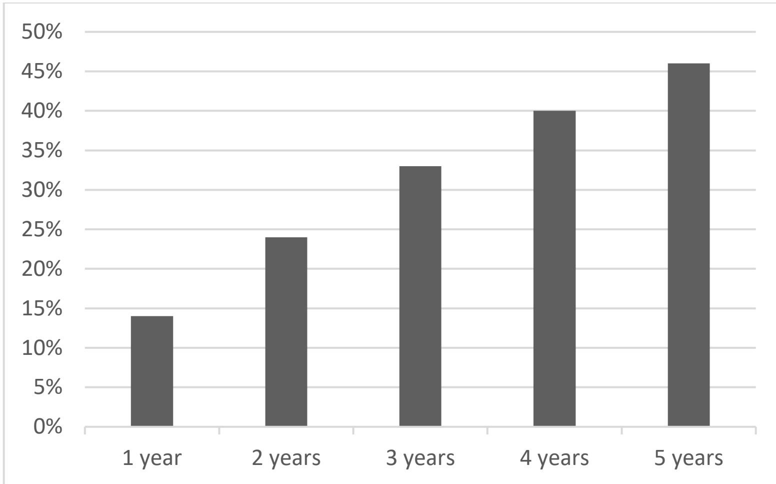

Figure 1. NCTAF reported teacher attrition rates from 1999-2003.

Teacher attrition is a difficult statistic to capture, as reporting and definitions vary widely across published literature. The National Center for Education Statistics (NCES) reported the following attrition rates for the time period ending in 2013, as shown in Figure 2 (Draper, 2003). Based on the data from NCTAF and NCES, over time, teacher attrition seems to be declining over the ten year timeframe.

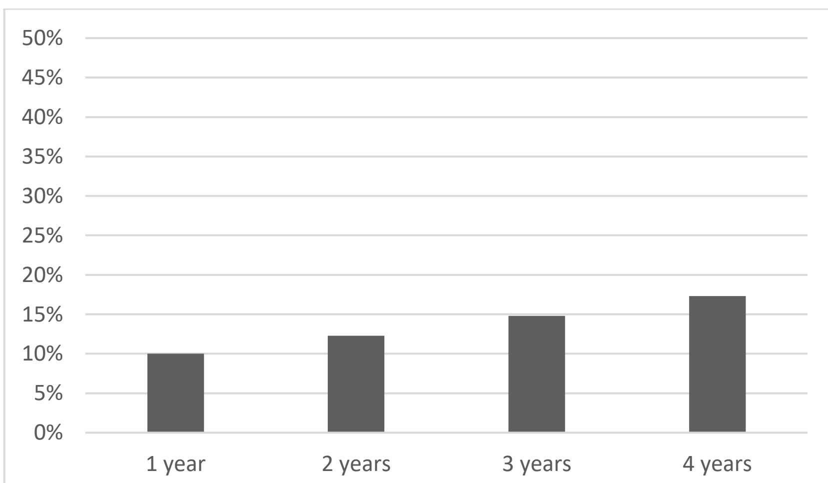

Figure 2. NCES reported teacher attrition rates from 2009-2013

Why do agricultural educators leave the profession? Ball and Torres (2010) noted "the most frequently cited reason for leaving teaching is retirement, followed by the decision to pursue a position other than a K-12 teacher" (p. 276). Other researchers have examined individual teacher attrition for decades and have cited working conditions, job dissatisfaction, workload, administrator relations, student behavior issues, organizational climate, and poor compensation as factors influencing the decision to leave education for another position (Farber, 2015; Ingersoll, 2011). There are additional factors which have been examined in regard to teacher retention as a whole. Ingersoll (2011) describes the relationship between age and turnover as a "U shape", with more teachers leaving when they are younger or in their early years of teaching. Understanding factors related to leaving the profession is an important first step in making system-wide modifications that will improve teacher retention (Farber, 2015).

A teacher shortage in agricultural education has existed for almost 50 years (Drawbaugh, 1968). Historically, Career and Technical Education (CTE) teachers had attrition rates nearing 50% by the end of six years of teaching (Heath-Camp, & Camp, 1990). New agricultural educators face a well-documented struggle upon entering the profession (Boone & Boone, 2009; Myers, Dyer, & Washburn, 2005). The difficulties of a regular classroom teacher are compounded for school based agricultural educators (SBAE) as they manage added responsibilities of facilitating a variety of laboratory spaces, advising the FFA chapter, supervising student projects, and managing stakeholder contributions and expectations (Boone & Boone, 2009; Myers, et. al., 2005). It is no wonder that early career agricultural educators have increased stress, struggle with work-life balance, and often feel overwhelmed by their job responsibilities (Myers, et. al., 2005). The feelings of job-related stress are not unique to new teachers, Torres, Lawver, and Lambert (2009) found stress to be a factor for agriculture teachers at all levels of seniority.

Researchers in agricultural education have noted a high sense of teacher self-efficacy may be a major factor in keeping teachers in the classroom (Hasselquist, Herndon & Kitchel, 2017; Langley, Martin, & Kitchel, 2014; McKim & Velez, 2015; Wolf, 2011). The self- beliefs of a teacher, or perceived teacher self-efficacy, must withstand the difficulties and complexities inherent to teaching. Agricultural education in high schools, by the nature of the agriculture program, brings an additional set of responsibilities, and, therefore, possible difficulties for teachers. A high sense of teacher self-efficacy can be instrumental to a beginning agricultural educator's success and, therefore, retention in the profession. Self-adequacy concerns, teaching task concerns, and teaching impact concerns, all factors related to teacher self-efficacy, were the focus areas noted by Hedges and Knobloch (2006) in their guide for teacher mentors. Swan, Wolf, and Cano (2011) examined a cohort of individuals from their student teaching experience through their third year of teaching. The teachers in their study reported lower levels of teacher self-efficacy at the conclusion of their first year when compared to the the end of their student teaching experience. Teachers did report a small increase in their level of teacher self-efficacy from their first to second year, possibly suggesting that their perseverance through the first year enhanced their capabilities and therefore teaching performance. Woolfolk-Hoy and Hoy (2009) summarized the importance of teacher self-efficacy as it applies to new teachers:

> The self-efficacy theory predicts that teachers with a high sense of efficacy work harder and persist longer even when students are difficult to teach, in part because these teachers believe in themselves and in their students. (p. 168)

Lemons, Brashears, Burris, Meyers, and Price (2015) qualitatively examined Idaho teachers who had left the profession. They found teachers were passionate about their career but left due to workload and social burdens, the promise of better opportunities, and a disconnect between expectations of the profession. They explained "the majority of participants described their exit as being the result of a particular set of circumstances 'at the right time'" (p. 27). Our study was designed to examine the experiences of Idaho teachers who chose to leave the profession, allowing for a comparison to other states and an examination of factors which may be addressed with preservice and induction programs in Idaho.

Theoretical Framework

Chapman's (1984) model of teacher retention was used as a foundation for the development and execution of this study. Chapman noted the important factors related to teacher job satisfaction and attrition were personal characteristics, educational preparation, quality of initial experience, initial commitment, external influences, and integration, as shown in Figure 3.

Chapman (1984) developed the model as a more specific application of the general tenets of Krumboltz's (1979) social learning theory of career decision making, arguing that there are factors unique to teaching which should be taken into consideration. We used the model to help frame the semi-structured interview questions, ensuring respondents were given the opportunity to speak to their initial commitment to teaching, educational preparation, quality of first employment experience, integration factors, and external influences through questions listed on the interview protocol.

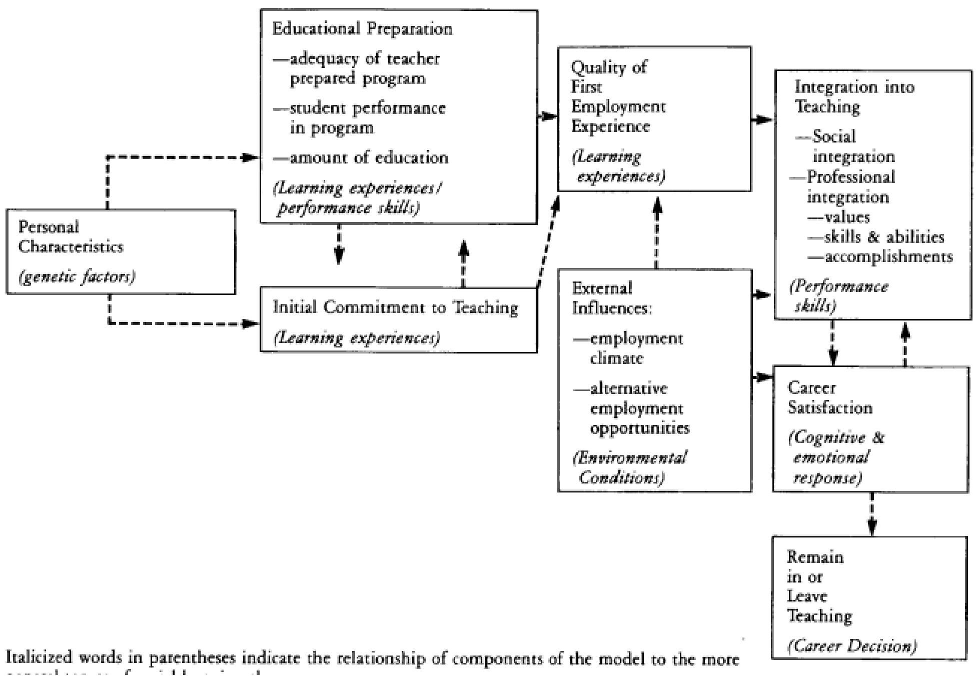

Figure 3. Chapman's (1984) model of teacher retention.

The purpose of this qualitative phenomenological study was to examine the experiences of Idaho agricultural educators which led to their departure from the profession. All participants in this study shared an experience; they had at some point decided to become a school-based agricultural educator in Idaho, and had also made the decision to leave the profession before completing 10 years of service. The research question we found most appropriate to examine this phenomenon was: What factors led school-based agricultural educators to leave the profession?

Methods

This study was conducted using the qualitative guidelines of a phenomenology set forth by Creswell (2007). Creswell stated that phenomenological research is in order when "it is important to understand several individuals' common or shared experiences…to develop a deeper understanding about the features of the phenomenon" (Creswell, 2007, p. 60). Examining the shared experiences of those who chose not to continue teaching agriculture to gain more knowledge related to teacher retention was the main focus of this study.

To establish trustworthiness, we addressed the factors of credibility, transferability, dependability, and confirmability. Credibility was established through the use of peer debriefing and member checking, following the guidelines of Lincoln and Guba (1985), and triangulation of data (Creswell, 2007; Yin, 2010). To meet the condition of transferability, we employed field notes and collected ancillary information as descriptive data related to study participants (Denzin & Lincoln, 2008). Dependability and confirmability were established by maintaining an audit trail for reference of all coded data to raw sources (Lincoln & Guba, 1985; Yin, 2010)

The participants for this study were selected through a careful analysis of the Idaho agricultural education directory from 2004-2016. Names appearing on the list as a teacher were compared for each year, and those who were not on a subsequent list were flagged for further examination. Idaho had 129 full-time agricultural education positions at the time of this study. In the research window, there were 72 changes which resulted in a teacher leaving agricultural education in Idaho. Of those changes, 24 were retirements, 5 moved to another state but continued teaching agriculture, and 43 left the profession entirely.

From the list of those who left the profession entirely, a contact list for potential participants was generated. Participants were contacted through email or phone call to secure agreement for completing the interview process. Approximately one-third of the individuals indicated they did not want to participate, many indicating that the experience was a "low-point" for them that they did not want to remember or discuss. Contact information for 18 individuals was unavailable or they refused to respond to initial contacts. From those willing to participate, a purposive group ($n = 12$) were selected to complete the interview process. Experts recommend conducting interviews with five to 25 individuals when exploring factors surrounding a phenomenon (Polkinghorne, 1989). Selection was based on having a wide range of preparation types, backgrounds, length of time in the classroom, and region of the state. The subjects selected for this study had a variety of teaching experience and background as shown in Table 1.

Table 1.

Subject Characteristics and Teaching Background

Participant Number	Gender	Type of Preparation	Year Began Teaching	# Years Taught	Pseudonym
1	Male	Alternative	2011	1	J.D.
2	Male	Alternative	2013	1	Matt
3	Female	Traditional	2003	5	Kaley
4	Female	Traditional	2004	8	Allie
5	Female	Alternative	2015	1	Sally

6	Male	Traditional	2015	1	Chaz
7	Female	Alternative	2011	3	Deborah
8	Female	Traditional	2006	1	Summer
9	Male	Traditional	2008	4	Heath
10	Male	Alternative	2014	2	James
11	Male	Traditional	2010	3	Hector
12	Male	Traditional	2006	6	George

Data collection occurred via telephone interviews ranging in length from 18:34 to 29:45 minutes. The interviews were semi-structured and followed an interview protocol designed to gather the essential information related to both Chapman's (1984) model of teacher retention and the phenomenon under investigation. We used reflexive journaling to collect and identify potential researcher bias (Lincoln & Guba, 1985; Denzin & Guba, 2008). The use of analytical and reflexive field notes in coding initial information served as measures related to establishing the trustworthiness of this study.

Recorded interviews were transcribed verbatim. Each transcript was analyzed and each unique statement was separated into a singular data point. From the twelve interviews, n = 834 data points were generated and assigned a unique number for audit purposes. Three members of the research team worked together to code information and triangulate findings. The identified data points were first coded using open coding procedures following the constant comparative method as set forth by Glaser (1965). After open coding was completed, we utilized the procedures set forth by Strauss and Corbin (1998) to complete an axial coding process and condense the open codes into themes.

Findings

Open coding of the transcripts identified 41 initial codes. Following further examination through axial coding, four themes emerged to participants' shared experiences. We classified these themes as: Teacher Self Efficacy Issues, Lack of Support, External Factors, and Altruism.

Theme 1: Teacher Self-Efficacy Issues

Many participants reported feelings of inadequacy and uncertainty prior to becoming a teacher, and/or highlighted self-doubts that plagued them during their time in the classroom. These self-efficacy issues were prominent as teachers discussed their decision to leave the profession. Within the category of efficacy, three subthemes emerged: initial doubts, concerns about preparation, and concerns about capabilities in managing the responsibilities of an agricultural educator.

Some efficacy concerns were evident when participants' described their preservice experience. George said he got his teaching degree because "I didn't think I would teach, but I wouldn't regret it as a second choice." Allie talked about her teaching degree by saying "it was something to fall back on, I needed a plan B and I didn't think I would be a good teacher to be perfectly honest." Deborah best captured the comments in this subtheme with the comment, "I actually didn't seek to become an ag teacher, I didn't think I'd be good."

Teacher self-efficacy concerns were not limited to an initial commitment to teaching, When participants discussed entering their first teaching experience many expressed feeling underprepared. Hector said "as far as the day-to-day classroom teaching, I don't feel like I was very prepared, but I made do," Summer said "I didn't feel like I was totally confident within myself when I went into the classroom."

It is important to note that the teacher self efficacy concerns related to preparation came from both traditional and alternatively certified teachers. Heath, a traditionally prepared teacher, summed up his efficacy when he entered the classroom by saying "I learned during student teaching, but I just didn't feel like I was ready enough to do a good job." The feeling of being underprepared was the singular reason one alternatively certified participant noted for leaving agricultural education after his first year of teaching. Matt shared that a lack of confidence in his teaching abilities led him to schedule a meeting with the school administration for the following conversation:

> I had to tell them [the administrators] that, just because of my own feelings of, um, not being good, that I wasn't doing justice to the kids' educations and other things. So I told them they probably needed to find someone who could be better for the students after that school year. I think they would have liked me to stay, and I loved the job, but I just felt like I completely sucked at it.

The pressures of the job also had an impact on teacher self-efficacy for study participants. Respondents noted concerns and lack of ability related to paperwork, classroom management, and lesson planning. These comments were not related to the fact that the workload existed, rather participants noted a lack of confidence in their ability to complete tasks. Heath said that one of the largest factors contributing to his decision to leave was "I thought I'd hit burnout and wouldn't be able to maintain all the hours I needed to put in." Chaz said "when you first start to be an ag teacher it's an overwhelming transition, I knew it would consume me," while George said the job "just burned me up". Kaley summarized the sentiments of other participants related to managing the responsibilities of an agricultural educator when she said:

> I felt so down on myself. Probably at least once a week I drove home and said, I am not going to do this next year, this is so hard. I was just completely overwhelmed. I knew I couldn't do it.

Theme 2: Lack of Support

A lack of personal and programmatic support emerged as another theme related to teacher decisions to leave. Respondents shared their desire for community and administrator support for their program, and for a network of people to support them both professionally and personally. Although several of the participants noted having moderate levels of support, most respondents felt unsupported on all levels.

Several participants were very candid about the lack of support which existed for their program at the school and community level. Hector said, "The previous teacher had burned a lot of bridges with administrators so I was responsible for rebuilding that connection." Deborah shared that trying to find support for her program, "was pretty much an uphill battle the whole way." Heath shared his thoughts on administrator program support, saying, "I had a very unsupportive administration from the principal to the superintendent, all the way through they were very unsupportive of what the agricultural kids were doing. We weren't sports so we didn't matter." Heath also highlighted the connection between community and administrative support saying, "Not having a good advisory to voice what the program needed certainly didn't help either."

Community support for the program was also mentioned by participants. James shared "the community support wasn't there like I thought it should've or could've been." Chaz echoed "there was not a strong connection between the community and the program." Some teachers noted the feeling of being "stifled" by the lack of program support. According to Matt "it's hard to build a program when no one wants to help."

Administrator professional support also played a large role in the decision for some of the participants to leave. Chaz said "probably the biggest challenge was working with the administration," and continued to say, "just finding the middle ground between what should happen in an ag program and what the administration wanted was very challenging." Summer shared that her administrators were "just not willing to understand what an ag program was about." Sally suggested that lack of administrator support was a huge contributor to her decision to leave, saying, "It kind of boiled down to me making a decision between working hard for administrators who didn't value me or what I did or deciding to work for myself." James expressed his frustration with administration:

> When it came right down to it, the things he [administrator] told me I would be able to do with the program didn't happen. He [administrator] just didn't have the attitude to and to work toward the goals we had set with me. I felt like I had been lied to and actually didn't have the support I thought I had.

Participants also noted the importance of having a personal support system. Summer shared "I was kind of stuck alone out in the middle of nowhere...I didn't feel like I fit in." She continued to share her feelings of isolation by saying, "in my undergraduate, we had some feeling of collaboration between those of us in the same cohort, but after I got our teaching it was like I was losing friends, they didn't really reach out to me." Sally said that she sought guidance from other teachers, saying she would, "reach out [for support] and it was just like, just nothing."

Other participants shared feelings of not fitting in to the agricultural education community, and almost all participants shared the need for mentors. The three participants who stayed teaching for the longest duration (8, 6, and 5 years) all noted their identification of quality mentors. Allie, who stayed in the classroom for eight years before deciding to leave, said:

> Thank God, another teacher reached out to me to help, I know others are not so lucky. Having those people I knew I could turn to likely helped me stay in the program much longer than I would have if they weren't there.

George, who was in the classroom for six years, echoed these comments:

> What I think can help the new teachers most is to find a strong mentor teacher. I wish I would have gotten a better support system going more quickly. I tried to surround myself with people who were really smart that knew more than me, that would kind of coach and mentor me, and that's how I got started actually teaching and running the program.

Kaley, who taught for five years, said:

> We were told over and over again in our preparation to beg, borrow, and steal. To find people who would share their knowledge with us, and when I got to my classroom, I tried to reach out… that's where my survival came from.

Theme 3: External Factors

Not all of the factors teachers mentioned were within the scope of education. Although these factors comprised a relatively small number of data points, they are worth discussing as a reason participants chose to leave the profession. The items mentioned in this theme are classified in Chapman's (1984) model of teacher retention as external factors, things not related to the profession, support, or preparation as a teacher.

Kaley's eventual choice to leave the profession came from a desire to stay home with her children, noting "I will probably come back once my kids are older." Financial concerns were the most prevalent external factor contributing to the decision to leave. George said "I have a lot of friends that have quit school teaching because they find a job," and said that he came to the realization, "it ain't worth what they pay me to keep doing what I'm doing." He concluded his remarks about the decision by saying, "I would still be teaching today if Idaho rewarded and paid their teachers better." Allie shared her feelings about watching her friends move through different professions, and noted:

> It was hard from year five through seven as all these kids I had graduated college with were getting pay raises or promotions. I knew if I stayed as a teacher, I was pretty much a teacher and not going to get any of the huge pay raises or promotions.

Sally's financial decisions came as a result of her alternative certification. She said, "It was at the point where I either needed to invest money to get the certification or figure something else out, and I just didn't have the money to pay for my certification out of pocket."

Theme 4: Altruism

Despite the struggles teachers faced in the classroom, participants in this study indicated a strong sense of altruism with their desire to contribute to agriculture through education. This altruism was a deterrent for many as they weighed the decision to leave. Almost all of the participants interviewed shared things about the job that they enjoyed. Some participants focused more on their enjoyment of teaching, others enjoyed student interaction, and some felt they had a connection with specific parts of the program. Allie shared "Being an ag teacher is by far one of the best jobs in the world." Hector said "I'm grateful for the time I had as a teacher, if I wasn't actively looking for a way out of the situation, I would have probably kept teaching." Many participants shared the connection they had to being an agricultural educator was an extension of their own high school agricultural education experiences. Heath said "I got to see my former ag teacher's passion for agricultural education, and then I got to witness that as a teacher, it helped push me forward." When asked why she had a hard time leaving the profession, Kaley said "the FFA kept me going, kept me motivated I guess, I wanted to be the kind of inspiration I had from my FFA advisor."

Most participants shared that their time in the classroom allowed them to feel as though they were helping students succeed. James said, "You can't beat having relationships with good people and good students and students who care about you, and themselves, and other students. It's much more rewarding work than what I do now." George commented, "I enjoyed watching kids grow, seeing progress." Sally said that her greatest joy was knowing her class was, "a place where students were confident enough to do something, even confident enough to experiment and try new things." J.D. stated that his desire to help students succeed was a result of his high school experience:

> I had the opinion in high school that teachers just wanted to assign homework. I was committed to being the kind of teacher that would help make student lives easier. That's one of the reasons it was hard to leave, I knew I was making a difference.

The desire to positively impact lives was the reason for at least one participant's struggle in leaving. Deborah said:

> Leaving is one of the hardest things I've ever had to do. The teacher before me wasn't there long, and I felt like I was abandoning kids I had promised to care for. There were just so many other things that factored in, it broke my heart to leave. One of my pride points is that when I left those kids really carried the chapter for the next two years.

It is interesting to note that, although they had left the school-based agricultural education classroom, almost all of the teachers interviewed were still working with youth or agriculture in some fashion. Sally runs an equine youth leadership camp, Kaley volunteers as the president of a local FFA alumni chapter, George still coaches wrestling at the school he left, and J.D. substitutes and notes that he is still in the agriculture classroom often. This continued involvement with youth punctuates the altruistic nature of study participants.

Conclusions/ Discussion/ Implications

This study allowed us to examine the shared experience surrounding a decision to leave school-based agricultural education. Participants in this study chose to leave the profession for many reasons, and often could not point to a single factor. Rather, this study allowed us to identify similarities in experiences and hone in on several factors which contributed to the choice to leave the profession. Among the factors contributing to the decision to leave were a low sense of teacher self-efficacy, lack of support, and external factors. Altruism and a desire to help students succeed through agricultural education was noted as a deterrent to leaving the profession for most participants. The four themes identified in this study were closely parallel to the needs of beginning teachers noted by Hedges and Knobloch (2006).

An important consideration should also be taken when understanding the participants in this study. Approximately one-third of potential participants declined to be interviewed, several of whom cited a reluctance to discuss the conditions surrounding their departure from the profession. We can only speculate about their experiences and the reasons they would cite for both leaving the profession and declining the interview. Further investigation of these individuals could provide insight into reasons which are not accounted for in this study. We recommend candid exit interviews with all SBAE be conducted by agricultural education leaders in each state.

We can make several recommendations for teacher educators based on our findings. The hesitancy to enter the classroom and self-doubt upon entering the profession had a large impact on the participants in this study. Researchers have previously noted the impacts of teacher self-efficacy on retention (Hasselquist, et. al., 2017; Langley, et. al., 2014; McKim & Velez, 2015; Woolfolk-Hoy & Hoy, 2009, Wolf, 2011). Participants in this study substantiated the role of teacher self-efficacy in relation to preparation, initial teaching experience, and ability to maintain the quality of work required.

Preparation of new teachers, whether in a 4-year degree program or an alternative certification program, should enhance the individual's sense of teacher self-efficacy. Woolfolk-Hoy and Hoy (2009) highlighted the importance of facilitating teacher success in the day to day tasks of teaching as a method for improving teacher self-efficacy, noting "efficacy grows from real successes with students, not just from the moral support or cheerleading of administrators and colleagues" (p. 168). Efficacy is cyclical, greater efficacy leads to an increased capability and persistence, thus increasing overall performance. Conversely, lower efficacy leads to less effort, and therefore poorer teaching outcomes, which further decrease efficacy (Woolfolk-Hoy & Hoy, 2009). Preservice preparation should focus on purposeful experiences designed to help teacher candidates feel successful in their role as a teacher, to enhance their teacher self-efficacy.

Early identification of individuals with a self-reported low sense of teacher self-efficacy should become a goal of both teacher educators and administrators making hiring decisions. In this study, we found numerous cases of participants for whom teaching was not their first choice, and those who acknowledged a lack of proficiency early in their teaching experience. These individuals doubted their capabilities from the beginning, yet still entered the classroom, a place they already didn't see themselves belonging. Have we become so focused on addressing the shortage of agricultural educators that we are willing to overlook those for whom agricultural education is not an appropriate career path? Do teacher educators feel a responsibility for filling the need for educators at the expense of quality? We recommend purposeful and early detection for those with low teacher self-efficacy in preservice programs. This allows for remediation of those who desire to continue in a school based agricultural education role. With targeted interventions, these individuals may increase their capabilities, and therefore their level of teacher self-efficacy, allowing them to confidently enter the classroom and a greater chance of persistence. These efforts could also allow teacher educators to assist in appropriate career counseling for those who are not best suited in desire or skill to enter the classroom.

Proper training for preservice and induction level teachers on how to communicate effectively with administrators at the local and district level and how to garner support from community members could help new teachers find the support they need for their programs. With a heightened ability to communicate, perhaps new teachers will have the skills needed to overcome a lack of programmatic support. Personal support can and should be provided through connections with quality mentors and instruction on how to build a personal support system as new teachers navigate their first few years. Lemons (et. al., 2015) commented on the importance of finding supportive people for participants of their study, saying "a network of supportive people is critical to success and longevity" (p. 27).

Teacher induction programs should be developed which inherently require new teachers to reach out and build a network of mentors. Preservice teachers should be required to network with in-service teachers in order to foster a culture of support and mentorship. Special care should be taken to assist in mentoring and community building with alternatively certified teachers, who may not have been exposed to their colleagues in agricultural education prior to entering the profession. The three teachers in our study who taught five or more years all mentioned a strong support system and effective mentorship as factors which contributed to their retention past some of the most critical attrition timelines. It is also worth noting that these teachers were traditionally prepared through a university program, which could have had an impact on both their teacher self-efficacy, and their ability to feel connected to the profession.

While we cannot mitigate all personal factors, we can increase awareness of their impact on a career in agricultural. Researchers have stressed the importance of early career in-service training on topics like work-life balance, time management, and coping with stress (Sorensen & McKim, 2014). We encourage inclusion of these topics in both in-service and preservice forums, allowing new teachers to be informed about the workload and job requirements, and providing coping tools before they are overwhelmed. Several participants noted personal finances as a reason for leaving, while we cannot affect change on an individual level, additional efforts should be taken by teacher educators, in-service teachers, and teacher organizations to influence policymakers related to appropriate teacher compensation.

The profession would benefit from the opposite view of this research study; asking the question, why do agricultural educators stay in the profession? With contrasting viewpoints from both 'leavers' and 'stayers' in agricultural education, we can further enhance recruitment and retention programs. Of specific interest is the sense of altruism for teachers who stay. Where exactly is the tipping point for these teachers? We also recommend additional research into the differences between the experiences of traditional and alternatively certified teachers, especially in regard to teacher induction, mentoring, and integration into the profession of agricultural education. The experiences of teachers in this study are limited to teaching in Idaho, we recommend a replication of this study which would be more transferable to regional or state experiences.

It is both promising and heartbreaking that so many participants, even those that didn't initially see themselves in a teaching role, truly loved the profession they left. Others have noted that leaving the profession does not necessarily mean that the individual was not happy with some or all of the job requirements (Lemons, et. al., 2015). We can utilize the altruistic nature of those who have left the profession in two ways. First, recruiting teachers who are passionate about teaching and making a difference could allow teacher education programs and those recruiting for alternative entry to attract teachers into the profession. Second, allowing an emphasis on the altruistic components of the job may allow for retention of individuals at the point when they are considering a departure from the profession. By taking lessons from the findings from this study, we could be well on our way to helping those who struggle and understanding how to increase the number of altruistic new teachers who choose to stay.

References

Ball, A. L., & Torres, R. M. (2010). Recruiting and retaining highly qualified teachers of agriculture. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.) *Preparing and Advancing Teachers in Agricultural Education* (pp. 269-282). Columbus, OH: The Ohio State University Curriculum Materials Service.

Boone Jr, H. N., & Boone, D. A. (2009). An assessment of problems faced by high school agricultural education teachers. *Journal of Agricultural Education*, *50*(1), 21-32. doi: 10.5032/jae.2009.01021

Chapman, D. W. (1984). Teacher retention: The test of a model. *American Educational Research Journal*, *21*(3), 645-658. doi: 10.3102/00028312021003645

Creswell, J. W. (2007). *Qualitative enquiry and research design: Choosing among five approaches*. Thousand Oaks, CA: Sage.

Denzin, N. K., & Lincoln, Y. S. (Eds.). (2008). *Collecting and interpreting qualitative materials* (Vol. 3). Thousand Oaks, CA: Sage.

Draper, S. M. (2003). The teacher retention crisis. In J. B. Hunt , & T. G. Carroll (Eds.) *No Dream Denied: A Pledge to America's Children* (pp. 8-12). Washington, DC: National Commission on Teaching and America's Future

Drawbaugh, C. (1968). What's new in teacher education in agriculture? *Journal of the American Association of Teacher Educators in Agriculture, 9*(2), 7-10. doi: 10.5032/jaatea.1968.02007

Farber, K. (2015). *Why great teachers quit and how we might stop the exodus*. Skyhorse Publishing, Inc.

Glaser, B. G. (1965). The constant comparative method of qualitative analysis. *Social problems, 12*(4), 436-445.

Gray, L., Tale, S., & O'Rear, I. (2015). *Public School Teacher Attrition and Mobility in the First Five Years: Results from the First Through Fifth Waves of the 2007-08 Beginning Teacher Longitudinal Study.* Washington, D.C.: National Center for Educational Statistics

Hasselquist, L., Herndon, K., & Kitchel, T. (2017). School culture's influence on beginning agriculture teachers' job satisfaction and teacher self-efficacy. Journal of Agricultural Education, 58(1), 267-279. doi: 10.5032/jae.2017.01267

Heath-Camp, B., & Camp, W. G. (1990). Induction experiences and needs of beginning vocational teachers without teacher education backgrounds. *Occupational Education Forum, 19*(1), 6-16.

Hedges, L. E., & Knobloch, N. A. (2006). *Supervising and Mentoring the Beginning Teacher.* Columbus, OH: The Ohio State University Curriculum Materials Service

Ingersoll, R. M. (2001). Teacher Turnover and Teacher Shortages: An Organizational Analysis. *American Educational Research Journal, 38(3), 499-534.*

Krumboltz, J. D. (1979). A social learning theory of career decision making. In A. M. Mitchell, G. B. Jones, and J. D. Krumboltz (Eds.), *Social learning and career decision making* (pp. 19-49). Cranston, RI: Carroll Press.

Langley, G. C., Martin, M., & Kitchel, T. (2014). Novice agriculture teachers' general self-efficacy and sense of community connectedness. Journal of Agricultural Education, 55(4), 1-11. doi: 10.5032/jae.2014.04001

Lemons, L. L., Brashears, T. M., Burris, S., Meyers, C., & Price, M. A. (2015). Factors contributing to attrition as reported by leavers of secondary agriculture programs. *Journal of Agricultural Education. 56*(4). 17 - 30. doi: 10.5032/jae.2015.04017

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Thousand Oaks, CA: Sage.

McKim, A. J. & Velez, J. J. (2015). Exploring the relationship between self-efficacy and career commitment among early career agriculture teachers. *Journal of Agricultural Education, 56*(1), 127-140. doi: 10.5032/jae.2015.01127

Myers, B. E., Dyer, J. E., & Washburn, S. G. (2005). Problems facing beginning agriculture teachers. *Journal of Agricultural Education*, *46*(3), 47. doi: 10.5032/jae.2005.03047

Polkinghorne, D. E. (1989). Phenomenological research methods. *Existential-phenomenological perspectives in psychology: Exploring the breadth of human experience*, 41-60.

Roberts, T. G., Harder, A., & Brashears, M. T. (2016). American Association for Agricultural Education national research agenda: 2016-2020. *Gainesville, FL: Department of Agricultural Education and Communication*.

Smith, A. R., Lawver, R. G., & Foster, D. D. (2017). *National Agricultural Education Supply and Demand Study, 2016 Executive Summary*. Retrieved from:http://aaaeonline.org/Resources/Documents/NS D2016Summary.pdf

Sorensen, T. J., & McKim, A. J. (2014). Perceived Work-Life Balance Ability, Job Satisfaction, and Professional Commitment among Agriculture Teachers. *Journal of Agricultural Education*, *55*(4), 116-132. doi: 10.5032/jae.2014.04116

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research techniques*. Thousand Oaks, CA: Sage.

Swan, B. J., Wolf, K. J., Cano, J. (2011). Changes in teacher self-efficacy from the student teaching experience through the third year of teaching. *Journal of Agricultural Education, 52*(2), 128-139. doi: 10.5032/jae.2011.02128.

Torres, R. M., Lawver, B. G., & Lambert, M. D. (2009). Job-related stress among secondary agricultural education teachers: A comparison study. *Journal of Agricultural Education 50*(3), 100-111. doi: 10.5032/jae.2009.03100.

Wolf, K. J. (2011). Agricultural education perceived teacher self-efficacy: A descriptive study of beginning agricultural education teachers. *Journal of Agricultural Education*, *52*(2), 163-176. doi: 10.5032/jae.2011.02163.

Woolfolk-Hoy, A., & Hoy, W. (2009). *Instructional Leadership: A Research-Based Guide to Learning in Schools.* Boston, MA: Pearson.

Yin, R. K. (2010). *Qualitative research from start to finish*. New York, NY: The Guilford Press.

Why Did They Leave? An Examination of Idaho Agricultural Educator Attrition

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Theoretical/Conceptual Framework

The study's theoretical basis was Chapman's (1984) model of teacher retention as deduced from Krumboltz's social learning theory of career decision making. Additional explanation of the model's "important factors" would have informed better the reader's understanding of its applicability to the study. Such is recommended for any future journal submission. Perhaps a file transmission issue but the figure provided to describe the key elements of Chapman's model was entirely too small; consider presenting it in landscape page format to improve readability.

Methodology

Most of the requisite procedures expected of a phenomenological study were mentioned, including references to well-known authors/researchers of the qualitative/interpretive paradigm: Denzin and Lincoln (2008), Glaser (1965), Lincoln and Guba (1985), Polkinghorne (1989) in regard to conducting phenomenology studies, Strauss and Corbin (1998), and Yin (2010). It is recommended the investigators also consider consulting and referencing Moustakas' (1994) text, *Phenomenological Research Methods.* Inclusion of Table 1 containing selected characteristics of the study's participants was informative.

More description of the researchers' reflexivity was needed. For example, in the case of most teacher educators of agricultural education, very few taught SBAE for up to 10 years, i.e., the outside range of the study's intended population, or even as long as the most experienced interviewee who had eight years of teaching service. And what about the researchers' own perceived experiences as SBAE teachers, especially in regard to self-efficacy and reasons for exiting the profession, sans the author identified as employed at a high school? A discussion of *bracketing* in this regard may be helpful when improving this section in preparation for journal review.

Conclusions

The researchers' conclusions read as mostly appropriate based on the findings offered, including the study's four themes, as supported by a number of participants' quotations. However, they should consider presenting the discussion text as a separate section and not conflated with the study's conclusions and implications. Several of their recommendations and implications may be of interest to students considering similar studies or teacher educators from other states seeking to understand their teachers' reasons for leaving the profession. If the authors intend to pursue journal publication, the discussant recommends explicitly drawing connections between their conclusions and the study's theoretical basis, i.e., Chapman's model (1984), as detailed in the manuscript. Connections were made to some of the other literature reviewed in the manuscript's introduction section. The discussant remains unclear about the *essence* of the interviewees' *lived experiences* regarding the phenomenon studied. Does Polkinghorne (1989) support stating such?

Selected Questions for Discussion and Further Research or Future Practice

1) If helping prospective SBAE teachers to improve their self-efficacy as practitioners stands to increase the likelihood of longer career spans, what additional early field-based experiences or *interventions* should occur during preservice preparation? What about during the student teaching internship and the cooperating/mentor teachers' potential roles, especially in regard to interns perceiving higher self-efficacy as teachers of SBAE in the future?

2) How transparent or *affirmative* should teacher educators be in "counseling" preservice students, credentialed teacher aspirants, or even early-career inservice instructors away from pursuing teaching agriculture as a career based on either expressed or observed deficits of self-efficacy or -confidence?

3) The discussant was not quite sure what to make of the researchers' admission that one-third of the potential interviewees (~14 of 43) refused to participate in interviews to discuss their reasons for leaving teaching. And, moreover, said their teaching experience "was a 'low point' for them that they did not want to remember or discuss." The researchers' stated views on avoiding *speculation* notwithstanding (refer to p. 10 of the manuscript), anything they can add to help readers contextualize a rather profound "finding" in all but name?

Job Satisfaction of Agricultural Education Teachers in North Carolina

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Abstract

Expansion of schools spawned by population growth and changes in the agricultural education curriculum have helped to increase the number of agricultural education programs and the need for agricultural education teachers in North Carolina. Lack of compensation and salary increases, along with public criticism of teachers have created a unique situation that warrants the investigation of the current levels of job satisfaction of North Carolina agricultural education teachers. Job satisfaction levels have been used as a predictor of an individual's decision to leave or end employment. The purpose of this study was to determine the overall levels of job satisfaction of teachers, to compare intrinsic and extrinsic job satisfaction levels, and to investigate relationships or differences between factors related to job satisfaction. This study used a descriptive research design. The instrument was developed by combining the Minnesota Satisfaction Questionnaire-MSQ short form with demographic variables to help determine the relationship between these variables and the level of job satisfaction of the respondents.

Introduction

Job satisfaction is a complex phenomenon attributed to every vocation on earth (Aziri, 2011). Studies on job satisfaction are valued for both their humanistic and financial benefits (Worrell, 2004). Studies have examined the levels, determinants, and factors associated with levels of job satisfaction from every vocation ranging from nursing to sales, but more often in careers where high rates of attrition are common. These studies have all attempted to identify the factors associated with job satisfaction. When employees are satisfied, generally they care more about their work, are more committed, have higher retention rates, and are more productive (Bravendam Research Incorporated, 2002). Within the field of agricultural education, demands both in and out of the classroom have led many to question the level of job satisfaction among agricultural education teachers as a way to address issues facing the profession (Chenevey, Ewing, & Whittington, 2008).

Job satisfaction has been described in a variety of ways. Hoppock (1935) offered one of the earliest descriptions of the concept. He described job satisfaction as any number of combinations of psychological, physiological, and environmental circumstances contributing to an employee's positive feeling of his or her work. Smith, Kendall, and Hulin (1969) defined job satisfaction as simply a feeling an individual has about his or her job. Locke (1976) depicted job satisfaction as "the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values" (p. 1342). Vroom (1982) defined job satisfaction as a worker's emotional orientation toward current job roles in the workplace.

Spector (1997) viewed job satisfaction as “the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs” (p. 2).

The definition of job satisfaction has evolved, however, one common thread has remained: all of these various definitions allude to the belief that job satisfaction is a work-related positive affective reaction (Worrell, 2004). Much like the definition of job satisfaction, varying opinions exist regarding the causes and factors associated with job satisfaction. Wexley and Yukl (1984) reported job satisfaction is the combination of many factors, including personal traits and job characteristics. The presence or absence of these factors could determine one’s job satisfaction level. These factors can be grouped into two categories: internal to the person (intrinsic) or external to the job (extrinsic). These levels have been strongly linked to job satisfaction and therefore warrant investigation (O’Driscoll & Randall, 1999). Examples of intrinsic factors may include recognition, advancement, and responsibility. Extrinsic factors, however, are external to the job such as salary and increased paperwork.

Previous research has concluded that agriculture teachers were fairly or moderately satisfied with their job (Flowers & Pepple, 1988; Grady, 1985; Jewell, Beavers, Malpeidi, & Flowers, 1990). Contrary to this finding, agriculture teachers commonly leave the profession within the first five years of teaching (Kantrovich, 2007). Teachers who leave the profession often attribute some degree of job dissatisfaction as their reason for leaving the profession (Flowers & Pepple, 1988). Teacher attrition is a common concern among the leadership in the profession and many states scramble to fill agricultural teaching positions produced by growth and expansion in agricultural education programs, loss of current teachers, and shortages of agricultural education graduates (Camp, 2000). Furthermore, demands on teachers have changed. In the past ten years, educational reform, mandated testing programs, and budget cuts have all contributed to changes in the educational profession (Brown, 2016). In addition to changes in the profession, students, teaching practices, and societal influences are different than they were even a decade ago, therefore warranting a reinvestigation of the job satisfaction levels of agricultural teachers in North Carolina (Brown, 2016).

The supply of agricultural teachers compared to the demand is not only a concern in North Carolina, but a national concern as well. The National Agricultural Education Supply and Demand Study of 2014 reported that there is an increased demand for new programs and additional teachers (Foster, Lawver, & Smith, 2015). The same study reported 7,424 school-based agricultural education programs, which employed 10,874 teachers. When the report was compiled in September of 2014, there were 1,366 new hires (Foster et al., 2015). Despite this growth, 27 states reported a teacher deficit and not enough teachers available to fill positions, which resulted in the loss of 67 teaching positions and 45 programs.

While the teaching profession nationwide faces challenges, the teaching profession in North Carolina faces its own unique set of challenges. The media have shared that many teachers and the public have a negative perception of North Carolina public education, which has resulted in many teachers leaving the profession to pursue other opportunities (Scott & Smith, 2013). Over the past ten years, the state of North Carolina and its education system have experienced a tremendous amount of change. This change has come in the form of more technology, increased security, and increased standards and testing (Brown, 2016). The effects of a growing population and a recession have decreased revenues for education. In many instances, this has resulted in less funding for textbooks, teacher assistants, extracurricular activities, and school supplies and more far reaching effects, such as increased class size.

In 1997, North Carolina worked to raise teacher salaries to the national average as part of a movement to increase the state's educational rankings (Hinchcliffe & Johnson, 2016). By 1999, North Carolina had increased teacher pay and was ranked 19th nationally. Within a few years, North Carolina's economy was slowed by an economic recession, cuts in federal funding, and lower state tax revenues. These factors resulted in a fall in the state's teachers' pay ranking to 47th nationally in 2013-2014 (Hinchcliffe & Johnson, 2016). In 2016, when salaries were adjusted for inflation, the average North Carolina teacher salary had decreased by more than 13% since 1999. The study found the average teacher salary in North Carolina is $47,985, nearly $10,000 below the national average of $58,064 (Hinchcliffe & Johnson, 2016).
Many blame the state government of North Carolina's actions and its lack of investment in teaching (Brennan, 2015). In 2015, North Carolina initiated a proposal for a 7% pay increase for teachers; however, this raise did not impact the salaries of all teachers employed throughout the state. Instead, beginning teachers received the bulk of the raise, and more experienced teachers with more than 20 years of experience received little more than 1%. The North Carolina legislature, meanwhile, failed to raise teacher salaries for a number of years prior to 2015, removed incentives for master degree pay in 2013, attempted to end teacher tenure, and did not reinstate the teacher yearly increase in salary based on years of experience. These actions by North Carolina have all contributed to the perception of dissatisfaction among teachers within the state's education system (Brennan, 2015). One Texas school system has even attempted to capitalize on the dissatisfaction of North Carolina teachers by publicly recruiting North Carolina teachers by offering substantially higher salaries (Cassella, 2014).

Teachers have also borne the intense scrutiny and criticism of the public, reformers, and civic leaders. The negative attention has created a perception among the public that teachers are the sole source of students' low test scores and minimal achievement gains, and not the student, parental or community support (Wagoner, 2015). These critics often view the profession of teaching as teaching a few lessons, grading assessments, and taking long vacations. However, these perceptions are a misrepresentation of the profession, which is comprised of numerous additional duties outside of the actual act of teaching including; student afterschool activities, counseling, correspondence, meetings, additional training, and documentation (Sidebotham, 2015).

Purpose/Objectives

A thorough examination of agricultural educators' job satisfaction levels has not been performed in North Carolina in 25 years. Since the last significant examination, the state's educational policy changes, increased teacher demands, and public perceptions have created a unique scenario, which warrants a timely examination of job satisfaction levels. These factors threaten the supply of teachers and the sustainability of the profession. As such, the purpose of this study was to investigate and describe the levels of intrinsic, extrinsic, and overall job satisfaction of North Carolina high school agriculture teachers who taught in the spring of 2016 and remained in the teaching profession during the fall semester of 2016.

The research objectives for this study were to:

1. Investigate the level of intrinsic, extrinsic and overall job satisfaction of North Carolina high school agriculture teachers as measured by the Minnesota Satisfaction Questionnaire (MSQ) short form.
2. Examine the relationship between the intrinsic, extrinsic, and overall level of job satisfaction of North Carolina agriculture teachers and specific variables; salary, age, experience level in number of years in teaching, highest educational level completed, and the number of placement changes.

Theoretical Framework

Research in the field of job satisfaction has been based on the theories of motivation (Aziri, 2011). The following theories lay a theoretical framework for this study: Maslow's hierarchy of needs theory (which proposed that needs and wants are the driving force of human interaction) and Herzberg's motivational-hygiene theory (which states that internal and external factors affect job satisfaction and that they can be measured). By determining and measuring the factors associated with agricultural teachers' job satisfaction, adjustments can be made to the work environment to increase satisfaction and decrease dissatisfaction.

Maslow (1943) saw human motivation in terms of needs that humans work to meet. Maslow believed people possessed a set of motivational systems unrelated to rewards or unconscious desires, which contrasted the philosophical theories of his day (Huitt, 2007). He theorized people were motivated by needs, which he grouped into tiers: physiological, safety, social, love, esteem, and growth (McLeod, 2014). The needs of each of these tiers ranged from the basic primal human needs of food and shelter to feeling loved and accepted. Maslow believed the desire to satisfy needs is what motivates human behavior. In Maslow's hierarchy of needs theory, human psychology is more than a mindless mechanism; it is a complex set of desires that change as needs are met or not met (Maslow, 1943).

Herzberg (1987) believed satisfaction was a complex interaction of people and perceptions in an effort to get someone to do something. Researchers have attempted to theorize what makes an individual satisfied with his or her job and to what point does dissatisfaction lead to a departure or decrease in productivity. Theorists in the study of job satisfaction have placed job satisfaction and dissatisfaction at opposite ends of the continuum or scale (Herzberg, 1968). An individual's gravitation toward either of these poles is determined by the presence or absence of factors in his or her working environment (Gruneberg, 1979).

Herzberg's motivation-hygiene theory attempts to explain how job satisfaction (or satisfiers) and job dissatisfaction (or maintenance factors) operate independently from one another because they are driven by different factors (Herzberg, Mausner, & Snyderman 1959). Herzberg believed that satisfaction and dissatisfaction are not on the same continuum and are therefore not opposites (Pardee, 1990). Motivators, or satisfiers, allude to the more intrinsic qualities of the job: challenge, accountability, recognition, advancement, growth, and responsibility. Hygiene factors, or dissatisfiers, are the qualities that are linked to the environment of the job: pay, security, supervision, and physical working conditions (Herzberg, 1966). Motivational factors are those aspects of the job that make people want to perform. Factors associated with satisfaction and commonly attributed to motivation are achievement, recognition, and promotion. Herzberg theorized individuals are encouraged more by motivators than by maintenance factors.

As with Maslow's theories, higher level needs such as esteem and self-actualization correspond with Herzberg's motivator factors, and lower level needs like survival, safety, and social needs correspond with Herzberg's hygiene factors. Hygiene factors must be met to avoid dissatisfaction in the same way that Maslow's lower level needs are met before the motivator factors can lead to motivation and thus job satisfaction (Major, 2012). Herzberg suggested that motivator or intrinsic factors contributed to job satisfaction due to the employee's need for growth and self-actualization (Herzberg, 1966). Similarly, hygiene or extrinsic factors contribute to job dissatisfaction due to the individual's need to elude the negative.

Methodology

This study used a descriptive research design. The study incorporated aspects of a quantitative exploratory survey research method as a snapshot in time of the perspectives of the respondents. The instrument for this study consisted of the Minnesota Satisfaction Questionnaire (MSQ) short form and demographic variables found in the literature that were believed to be associated with job satisfaction. The population frame of this study consisted of all high school agriculture teachers employed in North Carolina during the 2016-2017 school year teaching agriculture courses in the fall (N=370) and who were teaching in North Carolina in the spring semester of 2016. Newly hired teachers in the fall of 2016 were not included in the population because they had not been teaching long enough to assess their levels of job satisfaction at the time that data were collected. Names and contact information were obtained from the North Carolina agriculture teacher directory located on the North Carolina FFA website and verified by the state leaders in agricultural education. Efforts were made to eliminate all participants that did not meet the parameters of the population frame of this study. This population would be considered a sample of North Carolina agricultural teachers in time.

The Minnesota Satisfaction Questionnaire (MSQ) short form was utilized for the second portion of the questionnaire. This instrument was designed by Weiss, Dawis, England, & Lofquist (1967) through the Work Adjustment Project to address the adjustment problems relevant to vocational rehabilitation services. The instrument was developed to measure an employee's satisfaction with his or her job and the degree to which vocational needs and values are satisfied on the job. The instrument is gender neutral, may be administered to groups or individuals, and is written on a 5th grade reading level (Weiss et al., 1967). The MSQ is a commonly used instrument to examine job satisfaction. Content validity of the instrument was assumed due to extensive use in the profession. The MSQ short form was also selected based on its ability to be given to individuals to determine an overall job satisfaction score, an intrinsic job satisfaction score, and an extrinsic job satisfaction score (Weiss et al., 1967). Reliability coefficients of the MSQ short form ranges for various occupational groups were reported by Weiss et al. (1967) at .84 to .91 for the intrinsic scale, .77 to .84 for the extrinsic scale, and .87 to .92 for the overall satisfaction scale.

The short form of the MSQ consists of 20 questions from the long-form that represent the intrinsic and extrinsic scales of the instrument (Minnesota Satisfaction Questionnaire, 2010). For each of the 20 questions on the MSQ portion of the survey, the developers of the MSQ provided the respondents a 5 point Likert type scale comprised of the following choices: *1-extremely satisfied, 2-very satisfied, 3-satisfied, 4-somewhat satisfied, and 5-not satisfied.* Higher levels of job satisfaction are typically associated with higher numeric values. Therefore, during the analysis of the data, these scores were reverse coded to provide higher numeric values for higher levels of job satisfaction. Factor analysis of the 20 items results in three factors: intrinsic, extrinsic and overall satisfaction. Intrinsic satisfaction was measured by 13 of the 20 items, and the 7 remaining questions measured the extrinsic factors. All 20 items were used to measure overall satisfaction (Weiss et al., 1967).

The questionnaire was distributed through an email message sent to high school agriculture teachers who were listed in the North Carolina Agricultural Education Directory and who had taught in the state the spring semester prior to this study and were teaching at the beginning of the school year (N=370). Five email addresses were returned as undeliverable. These five respondents were removed from the study, which yielded 365 accessible participants. The initial email message included a message asking for their participation in the study, a description of the purpose of the study, and a link to the questionnaire. The message also explained that when the participants click on the link to the questionnaire, they have agreed to participate in the study. The questionnaires were self-administered with directions stated on the first page of the instrument. The web-based system Qualtrics was utilized to collect data.

There were three attempts to obtain data from the population. The questionnaire was sent to respondents twice at one-week intervals. This resulted in a 50% response rate. After another week a third message was sent to non-respondents, resulting in 51 more responses, and a total of 234 responses for a final response rate of 64%.

Non-response error was addressed by comparing early and late respondents (Linder, Murphy, & Briers, 2001). Responses to the first two email messages (n=183) were classified as early respondents, and responses to the third and final email message were classified as late responses (n=51). Mean scores were compared on overall, intrinsic, and extrinsic job satisfaction for the early and late respondents. No difference was found between the early and late respondents on any of the scales; therefore, the results of the study can be generalized to the population of the study (Miller & Smith, 1983).

Data for this study were analyzed using the Statistical Package for Social Science-SPSS 24. Responses to the demographic questions in the survey were summarized using frequencies and percentages. Questions on the MSQ form were separated into intrinsic and extrinsic scales and summarized using mean scores and standard deviations.

Findings

Participants' responses to items on the teacher profile section of the instrument were used to describe the population. The demographic characteristics examined in this study included: gender, ethnicity, age, educational level, entry method into teaching, marital status, income, teaching experience and number of placement changes from one school to another.

The educational level of the respondents of this study was almost evenly split between those with bachelor degrees 105 (46%) and those with master's degrees 117 (50%). The remaining 4% of teachers were divided between those who have obtained a 6^{th} year certificate and those who have obtained a doctoral degree. The average number of years of teaching experience of the teachers in this study was 11.2 years (SD=9.1). The total years of teaching experience of the respondents ranged from 1 to 38 years. Almost half of the respondents (47%) had ten years or less of teaching experience, and the largest group (39%) were those with five years of experience or less. The mean number of placement changes of the respondents to this study was 1.04 (SD=1.26). The number of placement changes ranges from 0 to as many as 7 changes during the career of the teacher. The largest group, however, was the group of respondents with 0 placement changes (48%).

In general, the population for this study reflects the demographics of the agricultural educators of the state as a whole; predominately white and teaching in rural school settings. Almost half of the teachers were below the age of 34 (49%) with over half (54%) of the respondents having advanced degrees beyond a bachelor's degree.

This study focused on the intrinsic and extrinsic factors that North Carolina high school agricultural education teachers perceived about their present employment as measured by the Minnesota Job Satisfaction Questionnaire (MSQ) short form. Respondents were asked to report how satisfied they were with different aspects of their job. Teachers were asked to rate their level of job satisfaction for the 20 items on the MSQ short form. For the purpose of this study, the following interpretation scale was used: 1-1.50 = *not satisfied*, 1.51-2.50 = *somewhat satisfied*, 2.51-3.50 = *satisfied*, 3.51-4.50 = *very satisfied*, 4.51-5 = *extremely satisfied*. The respondents to this questionnaire averaged a mean intrinsic job satisfaction score of 4.16 (SD=0.52), which was classified as very satisfied. The respondents' mean extrinsic score was 3.26 (SD=0.84), which was classified as satisfied. The overall level of job satisfaction for the respondents to this survey was 3.83, which was classified as a very satisfied level of job satisfaction. Table 1 displays the 20 items of the MSQ short form, their mean scores, and standard deviation per each item, categorization as either intrinsic or extrinsic, and ranking from highest to lowest mean scores.

Table 1

Intrinsic, Extrinsic & Overall Job Satisfaction Levels of North Carolina Agricultural Education Teachers

Intrinsic Job Satisfaction Items of the MSQ	**Mean**	**Standard Deviation**
The chance to do things for other people	4.57	0.64
The way my job provides for steady employment	4.56	0.67
The chance to do different things from time to time	4.45	0.72
The chance to do something that makes use of my abilities	4.42	0.73
Being able to keep busy all the time	4.38	0.84
Being able to do things that don't go against my conscience	4.15	0.90
The chance to be "somebody" in the community	4.14	0.89
The chance to try my own methods doing this job	4.07	0.91
The feeling of accomplishment I get from the job	4.07	0.91
The chance to do work alone on the job	4.04	0.96
The way my co-workers get along with each other	3.88	1.08
The freedom to use my own judgment	3.82	1.03
The chance to tell people what to do	3.36	0.86
Total Intrinsic Job Satisfaction	**4.16**	**0.52**
Extrinsic Job Satisfaction Items of the MSQ		
The working conditions	3.79	1.13
The way my boss handles his/her workers	3.59	1.25
The competence of my supervisors in making decisions	3.55	1.24
The praise that I get for doing a good job	3.43	1.21
The way policies are put into practice	3.01	1.17
The chances for advancement at my job	2.83	1.07
My pay and the amount of work that I do	2.61	1.19
Total Extrinsic Job Satisfaction	**3.26**	**0.84**
Overall Job Satisfaction	**3.83**	

Note: 1= *Not Satisfied*, 2 = *Somewhat Satisfied*, 3 = *Satisfied*, 4 = *Very Satisfied*, and 5 = *Extremely Satisfied.*

Once sorted by mean scores, the intrinsic items' mean scores of the MSQ could be ranked into three subgroups: those that related to the nature of teaching, personal motivators, and management. Among the intrinsic factors, the items relating to the nature of the job of teaching ("The way my job provides for steady employment," "The chance to do different things from time to time," and "Being able to keep busy all the time") yielded the highest mean scores and were categorized as extremely satisfied and very satisfied. Personal motivators related to intrinsic job satisfaction such as "The chance to be somebody in the community" and the "Feeling of accomplishment I get from the job" received a very satisfied interpretation. Items "The chance to do work alone on the job" to "The chance to tell people what to do," were categorized as management type items. Although these items' mean scores were not as high as other items in the intrinsic category, they were still classified very satisfied to satisfied.

The seven remaining items of the MSQ measured the extrinsic level of job satisfaction for the respondents. The extrinsic items measured the respondents' attitudes and perceptions of pay, economic security, and tangible rewards. Items in the extrinsic category based on mean scores could be classified in two categories: those items that relate to administrative factors and those that relate to compensation. Those items that related to compensation received the lowest mean job satisfaction scores of the instrument. The respondents rated the extrinsic factors on the instrument lower than the intrinsic factors. Most of the items would be interpreted as satisfied, but not at the level of job satisfaction shown for the intrinsic items of the questionnaire. For the extrinsic factors, "The way my boss handles his or her worker," received the highest score with a mean score of 3.59 (SD=1.25). It should be noted 24% of the respondents ranked this item somewhat or not satisfied. The lowest mean score for any of the measures of the MSQ short form was "The pay for the amount of work that I do," which received a mean score of 2.61 (SD=1.19). For this item, 54% of the participants were somewhat satisfied or unsatisfied as compared to 28% of the participants that ranked this item very or extremely satisfied.

The second objective of the study was to examine the relationship between the intrinsic, extrinsic, and overall level of job satisfaction of North Carolina agriculture teachers and specific variables; salary, age, experience level in number of years in teaching, highest educational level completed, and the number of placement changes. Table 2 displays the relationships between job satisfaction and selected demographic variables.

Table 2

Relationships Between Teacher Job Satisfaction and Selected Demographic Variables

Demographic Variable	**Overall**	**Intrinsic**	**Extrinsic**
Years of Teaching Experience	.085	.164	-.019
	(p=0.207)	(p=0.015)	(p=0.784)
Age	-.022	.029	-.079
	(p=0.741)	(p=0.671)	(p=0.244)
Educational Level	.016	.041	-.015
	(p=0.816)	(p=0.543)	(p=0.822)
Placement Changes	-.138	-.066	-.201
	(p=0.042)	(p=0.335)	(p=0.003)

Teaching experience (r = .16) was positively related to intrinsic job satisfaction (p=.015), but the relationship was considered negligible (Davis, 1971). Further, this variable accounted for only 3% of the variance in intrinsic job satisfaction. As shown in Table 2, there were no statistically significant relationships between teaching experience, age of the teacher, and overall, intrinsic, and extrinsic job satisfaction levels. The number of placement changes or number of times that a teacher has changed school locations was related to job satisfaction for both overall (p = 0.042) and extrinsic (p = 0.003) job satisfaction. Overall job satisfaction was negatively related to teacher placement changes. As the number of placement changes increased, the job satisfaction level decreased. The relationship between job satisfaction and placement changes was also considered negligible (Davis, 1971). This variable accounted for less than 1% of the variance in extrinsic job satisfaction. There were no statistically significant relationships between the number of placement changes and intrinsic job satisfaction.

Conclusions and Recommendations

Job satisfaction is not a problem for the agriculture teachers in North Carolina. The overall mean job satisfaction score generated by all of the items of the MSQ was 3.83, which was interpreted as very satisfied. Intrinsic items on the MSQ short form yielded a mean score of 4.16, which was interpreted as very satisfied. Extrinsic items on the questionnaire were rated slightly lower than intrinsic items. Extrinsic items resulted in a mean score of 3.26, which was interpreted as satisfied. Demographic variables do not explain variations in job satisfaction levels of North Carolina agriculture teachers. There were no reported significant relationships between salary, age, experience in years of teaching, highest educational level completed, or the number of placement changes. The listed variables do not explain the job satisfaction levels of the agriculture teachers.

Knowledge of the job satisfaction levels of agriculture teachers and the factors that attribute to these scores are beneficial on many levels. First, teachers that are satisfied with their current jobs provide better education for students. Research has shown that compensation and other hygiene factors are motivators to a point, but the intrinsic factors of being able to make decisions and recognition for teachers' work should be a priority to all administrators.

This study reported higher mean scores of intrinsic items on the questionnaire compared to the extrinsic items. Many of the extrinsic items such as compensation and administration are beyond the control of the teachers in this study and may not change for the foreseeable future. The findings of this study should be shared not only with state agricultural education staff and teacher educators, but also with education policy makers and school administrators. The agricultural education teachers in this study reported a very high level of overall job satisfaction; therefore North Carolina may be used as a model for other states addressing similar changes in growth, economics, and educational policies.

Based on the conclusions of this study there are several recommendations to strengthen research in agricultural education and job satisfaction. Firstly, a periodic assessment every 5 to 10 years of job satisfaction is necessary to determine the needs of teachers, increase satisfiers, and decrease dissatisfiers. Studies on job satisfaction should be periodically held to intelligently direct time, labor, and resources unless warranted by special events or a situational change. Secondly, this study was only a snapshot in time of job satisfaction of the respondents at a particular time. In the future, a longitudinal study of a group of teachers throughout their career should be conducted to determine changes in job satisfaction with age and tenure and to determine if there is a pattern to job satisfaction. Thirdly, the demographic variables used in this study were not strong predictors of intrinsic, extrinsic, and overall job satisfaction levels of agriculture teachers in North Carolina. Future research should look to other variables as potential predictors of job satisfaction such as: the total number of agriculture teachers at the school, number of children that the teacher has, the age of the children, extra workload required for school facilities such as livestock barns, greenhouses, and land labs, and the number of weekends spent working. Finally, future investigations into job satisfaction should also explore why some agriculture teachers leave the profession and others remain to determine if there are factors that affect teachers' decisions to leave.

References

Aziri, B. (2011). Job satisfaction: A literature review. *Management Research and Practice, 3*(4), 77-86.

Bravendam Research Incorporated (2002). Effective management through measurement: Special report. Retrieved from www.employeesatisfactions.com

Brennan, R. (2015). Teacher attrition continues to plague North Carolina. *Education Week*. Retrieved from www.edweek.org

Brown, K. (2016). Carolina curious: Public education and ten years of change. from: http://www.wfdd.org/story/carolina-curious-public-education-and-ten-years-change

Camp, W. G. (2000). *A national study of the supply and demand for teachers of agricultural education in 1996-1998*. Blacksburg, VA: Virginia Polytechnic Institute and State University.

Cassella, M. (2014). Houston school district aiming to recruit North Carolina's teachers. *The Charlotte Observer*. Retrieved from http://www.charlotteobserver.com/news/local/education/article9143855.html

Chenevey, J. L., Ewing, J. C., & Whittington, M. S. (2008). Teacher burnout and job satisfaction among agricultural education teachers. *Journal of Agricultural Education, 49*(3). 12-22. doi: 10.5032/jae.2008.03012

Davis, J. A. (1971). *Elementary survey analysis*. Prentice Hall: Englewood Cliffs, NY.

Davis, K. & Newstrom, J. W. (1989). *Human behavior at work: Organizational behavior* (8th ed.). New York: McGraw Hill.

Flowers, J. & Pepple, J. D. (1988). Assessment of the morale of beginning vocational agriculture teachers in Illinois. *Journal of the AATEA, 29*(2), 2-6.

Foster, D., Lawver, R. G., & Smith, A. R. (2015). *Ag teacher supply and demand overview*. Retrieved from: www.naae.org/teachag

Gruneberg, M. M. (1979). *Understanding job satisfaction*. London: Macmillan.

Herzberg, F. (1966*). Work and the nature of man*. New York: The World Publishing Company.

Herzberg, F. (1968). One more time: How do you motivate employees? *Harvard Business Review*, 53 – 62. .

Herzberg, F., Mausner, B., & Snyderman, B. B. (1959). *The motivation to work.* New York: John Wiley & Sons.

Hinchcliff, K., & Johnson, C. (2016). After inflation, N.C. Teacher pay has dropped 135 in the past 15 years. *WRAL*. Retrieved from www.wral.com/after-nc-teacher-pay-has-dropped-13-in-past-15years.15624302/

Hoppock, R. (1935). *Job satisfaction*. Oxford, England: Harper.

Huitt, W. (2007). Maslow's hierarchy of needs. *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved from http://www.edpsycinteractive.org/topics/regsys/maslow.html

Jewell, L. R, Beavers III, K. C., Malpiedi, B. J., and Flowers, J. L. (1990). Relationships between levels of job satisfaction expressed by North Carolina vocational agriculture teachers and their perceptions toward the agricultural education teaching profession. *Journal of Agricultural Education, 31*(1), 52-57. doi: 10.5032/jae1990.01052

Kantrovich, A. J. (2007). *A national study of the supply and demand for teachers of agricultural education: 2004-2006*. Retrieved from https://www.naae.org/teachag/2007%20Supply%20Demand%20Study%20.pdf

Linder, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, *42*(4), 43-53. doi: 10.5032/jae.2003.03078

Locke, E. A. (1976). The nature and causes of job satisfaction. *Handbook of Industrial and Organizational Psychology*, Rand McNally, pp. 1297-1350.

Major, A. E. (2012). Job design for special education teacher. *Current Issues in Education*, *15*(2), 1-8.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*, 370-396.

Maslow, A. H. (1954). *Motivation and personality.* New York: Harper.

Maslow, A. H. (1970). *Motivation and personality (2nd ed.).* New York: Harper & Row.

McLeod, S. A. (2014). Maslow's Hierarchy of Needs. Retrieved
from http: www.simplypsychology.org.maslow.html

Miller, L. E., & Smith, K. L. (1983). Handling non-response issues. *Journal of Extension*, 21(5), 45 – 50.

Minnesota Satisfaction Questionnaire (MSQ) (2010). Retrieved from www.vpr.psych.umn.edu

O'Driscoll, M. P., & Randall, D. M. (1999). Perceived organizational support, satisfaction with rewards, and employee job involvement and organizational commitment. *Applied Psychology: An International Review*, *48*(2), 197-209.

Pardee, R. L. (1990). *Motivation theories of Maslow, Herzberg, McGregor and McCelleand-A literature review of selected theories dealing with job satisfaction and motivation.* Retrieved from http://eric.ed.gov/

Scott, M. Swortzel, K. A., & Taylor, W. N. (2005). The relationship between selected demographic factors and the level of job satisfaction of extension agents. *Journal of Southern Agricultural Education Research, 55*(1), 102-115.

Sidebotham, J. (2015). Here's what people think teachers do all day – And what they actually do. *Business Insider*. Retrieved from http://www.businessinsider.com/heres-what-people-think-teachers-do-all-day-and-what-they-actually-do-2015-9

Smith, P. C., Kendall, L. M., & Hulin, C. L. (1969). *The measurement of satisfaction in work and retirement.* Chicago: Rand McNally.

Spector, P. E. (1997). *Job satisfaction: Application, assessment causes and consequences*. Thousand Oaks, CA: Sage Publications.

Vroom, V. H. (1982). *Work and motivation* (Rev. ed). Malabar, FL: Robert E. Krieger Publishing Company.

Wagoner, L. (2015) *Losing its Luster*. Retrieved from: www.ncpolicywatch.com/2015/12/09losing-its-luster/

Weiss, D. J., Dawis, R.V., England, G.W., & Lofquist, L.H. (1967). *Manual for the Minnesota satisfaction questionnaire*. The work adjustment project. Industrial Relations Center. University of Minnesota. Retrieved from www.http://vpr.psych.umn.edu/assets/pdf/Monograph%20XXII%20-%20Manual%20for%20the%20MN%20Satisfaction%20Questionnaire.pdf

Wexley, K. & Yukl, G. (1984). *Organizational behavior and personnel psychology*. Homewood, IL: Richard D. Irwin.

Worrell, T. G. (2004). *School psychologists' job satisfaction: Ten years later* (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Blacksburg VA.

Job Satisfaction of Agricultural Education Teachers in North Carolina

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Theoretical/Conceptual Framework

The study's theoretical basis regarding measurement of North Carolina's agricultural education teachers' job satisfaction was well-grounded as it relied on Maslow's (1943, 1954, 1970) hierarchy of needs theory, as well as Herzberg's (1966, 1968), and Herzberg's, Mausner's, and Snyderman's (1959) motivational-hygiene theory. The authors' explanation of the theories and related applicability to the investigation was clear and easy to understand.

Methodology

Explanation of the design, target population, including related decision rules for inclusion/ exclusion of subjects, sampling frame, data collection procedures, accessible and responding sample, accounting for non-response error, item scaling and coding, as well as data analysis was clearly described. All appeared appropriate and in accord with the study's "descriptive research design," as indicated by the researchers. Using the Minnesota Satisfaction Questionnaire (MSQ) short form (20 items) to measure the dependent variables of interest inclusive of teachers' "overall job satisfaction," "intrinsic job satisfaction," and "extrinsic job satisfaction" sufficiently mirrored the constructs posited to determine teachers' satisfaction with their current employment (refer to the paper's "theoretical framework" section). The instrument's content validity and face validity, as well as its reliability estimates, were well-established and considered acceptable based on a number of earlier studies employing it. Of note, a similar study using the same instrument had been conducted on the same target population more than 25 years ago; however, a "then-and-now" comparison was not made.

Conclusions

The researchers' conclusions read as appropriate based on the findings offered. Some of their recommendations may be of interest to students considering similar studies or teacher educators from other states seeking to measure their teachers' levels of job satisfaction or for those conducting a national study on the same. If the authors intend to pursue journal publication of their work, the discussant strongly recommends explicitly drawing connections between their conclusions and the theoretical bases introduced to support understanding the phenomenon of job (dis)satisfaction for the population studied.

Selected Questions for Discussion and Further Research

1) Are teacher educators, state staff members, as well as a public school officials sufficiently accounting for the extent that SBAE teachers report being satisfied, i.e., motivated, by "doing things for other people" when recruiting, in-servicing, and hiring, respectively?

2) What may be the *threshold* or *tipping point* for NC agriculture teachers becoming

exceptionally dissatisfied, i.e., leading to low morale and job exit, when weighing their “pay” against “the amount of work” they do? Witness this year’s “teacher walkouts” in Arizona, Colorado, Kentucky, Oklahoma, and West Virginia.

3) What are likely to be valuable or “strong predictors” of job (dis)satisfaction for SBAE teachers in NC or in other states? Might the distances between teachers’ schools and their home communities or that of spouses or life partners be important to consider?

Discussant – Ed Osborne; Timekeeper – Isabella Damiani

Student Motivation
Conceptualizing the Process for Supporting Students' Psychological Needs and Motivation within School Based Agricultural Education Programs- A Mixed Methods Study *Dr. Amanda Bowling, Dr. Anna Ball*
Student Motivations to Engage in Curricular Leadership Education: A Grounded Theory Approach *Haley Q. Clement, Catlin M. Pauley, Aaron J. McKim, Jonathan J. Velez, Jon C. Simonsen*
A Measure of Motivation to Learn Science Through Plant and Animal Science Classes *Steven Boot Chumbley, Mark S. Hainline, J. Chris Haynes, Trent Wells*
Creating Relevancy in Scientific Information: An Analysis of the Impact of Motivational Salience and Involvement on Visual Attention *Laura M. Fischer, Courtney A. Meyers, R. Glenn Cummins, Courtney D. Gibson, & Matt Baker*

Conceptualizing the Process for Supporting Students' Psychological Needs and Motivation within School Based Agricultural Education Programs: A Mixed Methods Study

Dr. Amanda Bowling, The Ohio State University
Dr. Anna Ball, University of Missouri

The purpose of this study was to identify the processes School Based Agricultural Education (SBAE) teachers utilize to support the psychological needs and motivation of students. Through an exploratory sequential design, quantitative instruments were first utilized to gauge the motivational climate and the teachers' tendencies to be autonomy supporting or controlling. Grounded theory interviews and observations were utilized to determine the actions and processes of needs support. Through the convergent analysis a substantive theory was formed. Within the theory, teacher motivational beliefs emerged as the context to which the needs support process was fostered and supported the need for relatedness, which emerged as the central phenomenon. Within the process, teachers also utilized extrinsic and intrinsic motivational strategies, along with the intracurricular nature of SBAE programs to strengthen student motivation. Students experienced a range of outcomes including support for the need of competence, support and thwart for the need of autonomy, and a range of extrinsic and intrinsic motivational outcomes. It is recommended that SBAE teachers intentionally incorporate strategies which mirror the desired motivational and needs based student outcomes.

Introduction

Positive Youth Development (PYD) programs focus on developing mutually beneficial relationships that will have effects on the self, family, community, and society (Lerner, Phelps, Forman, & Bowers, 2009). Additionally, PYD programs strive to develop self-identities; initiative; basic emotional, cognitive, and physical skills; competence; social connections; and motivation (Hansen, Larson, & Dworkin, 2003). School-Based Agricultural Education (SBAE) programs, as a subset of PYD, utilize a tripartite model to positively develop their youth participants. Engagement in PYD programs, such as SBAE programs, can positively affect the youth who participate in them in numerous ways, including developing a positive self-identify, decreasing delinquent behavior, and increasing positive relationships (Hansen et al., 2003). Additionally, successful PYD programs develop social, emotional, cognitive, behavioral, and moral skills; are youth-centered; develop interpersonal and social competence; and provide positive adult support (Eccles & Templeton, 2002; Larson & Walker, 2010). Through the inherent structure of and activities within, PYD programs can support youths' psychological needs of competence, autonomy, and relatedness (Dawes & Larson, 2011; Larson & Rusk, 2010; Larson & Walker, 2010). As PYD programs meet these needs, they also increase youths' intrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2002). If PYD programs develop intrinsic motivation, youth can experience sustained motivation and engagement (Larson & Rusk, 2010). Within the present body of literature, researchers have identified specific PYD program structures that foster intrinsic motivation, including allowing youth to feel challenged, giving youth a sense of control, developing deep attention in the activity, and assisting youth to experience high motivation (Larson & Rusk, 2010). Although research has identified program structures that foster intrinsic motivation, experts have not investigated the specific day-to-day practices that adult educators and leaders utilize (Larson, Walker, Rusk, & Diaz, 2015).

When narrowing the scope of psychological needs support to a specific PYD program, evidence exists that SBAE programs can positively influence youth through increasing competence, relatedness, and autonomy. Research indicates participation in SBAE programs can foster social competence (Phelps, Henry, & Bird, 2012) and positive peer groups and friendships (Witt, Doerfert, Ulmer, Burris, & Lan, 2013). In terms of developing autonomy, Ball, Bowling, and Bird (2016) found that during Career Development Event (CDE) preparation SBAE teachers would provide choices (autonomy) to students in regard to the content studied and the ways in which it was taught. Additionally, students experience volition when participating in general FFA civic engagement activities (Bird, 2012). However, when participating in specific service activities such as the National FFA Days of Service, a lack of perceived choice existed (Roberts, Terry, Brown, & Ramsey, 2016).

Although researchers have identified effective programmatic structures and their associated benefits, they have not identified the effective practices of PYD and SBAE youth practitioners. A great deal of research has focused on designing and evaluating PYD programs, but researchers have not investigated effective practices of the educators and leaders (Larson et al., 2015). Additionally, Larson et al. (2015) state that, "daily practice is not documented, systemized, or made available in centralized sources" (p. 3). Further, there exists a need for research to determine how youth practitioners make decisions regarding motivational strategies within their programs' contexts (Larson et al., 2015). Larson and Rusk (2010) state, "If it [intrinsic motivation] can mobilize deep, sustained, self-directed attention to learning and development, we need to know what activates it" (p. 101). This call to identify effective practices of youth practitioners when developing intrinsic motivation illuminates a dearth in the literature. Beyond this literature gap, the potential benefits youth can experience from sustained intrinsic motivation illustrates the need to identify effective strategies which support the psychological needs of competence, relatedness, and autonomy.

Theoretical Framework/Philosophical Perspective

This study utilized a theoretical framework and philosophical perspectives to guide the various mixed methods components (Creswell, 2015). Self-Determination Theory (SDT; Ryan & Deci, 2002) served as the theoretical framework for the quantitative portion. SDT asserts that the psychological needs of competence, relatedness, and autonomy are universal, innate needs all humans strive to fulfill (Ryan & Deci, 2002). Through the fulfillment of the psychological needs, well-being and life satisfaction are sustained (Leversen, Danielsen, Birkeland, & Samdal, 2012; Tian, Chen, & Huebner, 2014). Additionally, supporting psychological needs helps to sustain intrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2002).

For the qualitative portion of this study, we utilized a philosophical perspective to identify our assumptions regarding how knowledge is discovered, the nature of the world, and how the knowledge of participants can best be captured (Creswell, 2015). Our philosophical perspective, underlined by our pragmatist epistemology, framed the qualitative ontology and methodology utilized. Due to the sequential nature of the study, it is nearly impossible to separate the theoretical framework and the philosophical perspective. Thus, we used the quantitative theoretical framework of SDT as a lens within the philosophical perspective in which we viewed the research problem, questions, and data. Additionally, due to the vast nature of the numerous theories that examine motivation, it is imperative to provide a lens in which to view motivation and within this lens the characteristics of psychological needs and intrinsic motivation. Although we utilized SDT as a lens, all data emerged from the knowledge of the participants.

Purpose and Research Objectives/Questions

The purpose of this study was to identify the strategies, actions, and processes teachers utilized to support students' psychological needs within all facets of SBAE programs. This study aligns with Priority 5 of the American Association for Agricultural Education National Research Agenda 2016-2020 (Roberts, Harder, & Brashears, 2016).

Objectives:
1. Describe students' psychological needs support within SBAE programs.
2. Describe the autonomy-supporting orientation of the SBAE teachers.

Qualitative Central Question: How are psychological needs supported within SBAE programs?

Convergent Question: What actions and processes that the SBAE teachers utilize within and outside of the SBAE classroom support the students' psychological needs?

Methods

This study utilized a mixed-methods exploratory sequential design quant ➔ QUAL (Tashakkori & Teddie, 2010). To begin, quantitative data was collected through online questionnaires. The quantitative findings then helped to select students to be interviewed, identified potential areas of observation, and developed probing interview questions. Qualitative data was then collected through the use of grounded theory interviews and field observations.

Purposive sampling was utilized to identify SBAE teachers (*n* = 5) who best embodied a total SBAE program within Missouri (Creswell, 2013). SBAE teachers were selected who taught for five or more years, utilized of a variety of curriculum resources, earned the Top 10% FFA chapter award, had multiple state qualifying CDE teams, and met the state recommended Supervised Agricultural Experience (SAE) project visits. Within the five participating schools, FFA rosters were acquired and all FFA members (*n* = 368) were recruited to participate. The consenting sample who provided a completed questionnaire resulted in the final usable data sample of *n* = 222 with a response rate of 60%. The average student participant was female (*n* = 120; 54.05%), a freshman (*n* = 106; 47.75%), had not attended any FFA conventions (*n* = 109; 49.10%), had not held an FFA office (*n* = 178; 80.18%), had not competed in CDEs (*n* = 126; 56.76%), and identified agriculture as a potential future career (*n* = 62; 27.93%).

The Basic Psychological Needs Scale (BPNS; Deci, & Ryan, 2006) was utilized to capture the degree to which students' psychological needs were satisfied and consisted of the constructs: relatedness, competence, and autonomy. The BPNS instrument included a seven-point Likert scale with the anchors: *1: not at all true, 4: somewhat true, and 7: very true*. Students reflected on their experiences within and life away from the SBAE program. The Problems in Schools instrument (PIS; Deci, Schwartz, Sheinman, & Ryan, 1981) was utilized to measure the degree to which teachers tended to be autonomy supportive versus controlling. The PIS instrument included a seven-point Likert scale that included the anchors: *1: very inappropriate, 4: moderately appropriate, and 7: very appropriate*. The PIS instrument asked the teachers to read, reflect, and respond to pre-developed school-based scenarios.

To address content validity, we consulted a panel of experts (*n* = 4). The PIS instrument had a reported Cronbach's alpha of 0.73 for the highly controlling construct, 0.71 for the moderately controlling construct, 0.63 for the moderately autonomous construct, and 0.80 for the highly autonomous construct. A secondary study found that the moderately autonomous construct did not correlate with an autonomy supportive orientation (Reeve, Bolt, & Cai, 1999). Thus, the moderately autonomous construct was withheld from the data analysis. For the BPNS instrument, a pilot study was conducted (*n* = 26). The Cronbach's alpha for all three constructs was above .70. Reliability estimates were calculated for the current studies sample. The PIS instrument (*n* = 5) had a Cronbach's alpha of 0.55 for the highly controlling construct and above .70 for all other constructs. While the sample size is limited, caution should be utilizing when interpreting data from the highly controlling construct. The BPNS instrument (*n* = 221) had a Cronbach's alpha of 0.60 for the autonomy construct and above .70 for all other constructs. Due to the exploratory nature of this study, the autonomy construct was deemed acceptable by meeting the threshold of 0.60 (Hair, Anderson, Babin, & Black, 2010; Nunnally, 1967).

To begin quantitative data collection, the PIS instrument was delivered online to the SBAE teachers. Following the completion of the PIS instrument, the BPNS instrument was delivered online to the SBAE teachers for students to complete during their SBAE class. To analyze the quantitative data, mean and standard deviation were calculated for the students' psychological needs support. To begin analyzing the teacher quantitative data, means were calculated for the autonomy and controlling constructs. The teacher orientation means were then inputted into the following equation: Teacher Orientation = 2(Highly Autonomous *M*) – 1(Moderately Controlling *M*) – 2(Highly Controlling *M*) (Reeve et al., 1999).

Next, a single researcher conducted 28 hours of field observations. For each teacher participant, one half-day (4 class periods) of classroom observations were conducted. Additionally, one FFA activity per teacher was observed. These activities included monthly FFA meetings, community service projects, agriculture advocacy events, and CDE practices. Observations were video recorded and field notes were conducted using observational organizers.

Next, one-on-one, semi-structured interviews were conducted with all teacher participants (*n* = 5) and purposefully sampled student participants (*n* = 15). Students were purposefully sampled for maximum variation within age, sex, needs support, and amount of FFA participation. All interviews were audio recorded and transcribed verbatim. Memoing was conducted following each interview and interview questions evolved as the theory emerged (Corbin & Strauss, 2015). A variety of validation strategies were utilized to uphold validation and trustworthiness (Lincoln and Guba, 1985). To maintain intra-rater reliability of the observational organizer, the observations were cross-checked for internal consistency.

Due to the research design, the interviews were primary data sources. The classroom and FFA activity observations were ancillary data sources. Constant comparative analysis and open, axial, and selective coding was utilized for all interviews (Corbin & Strauss, 2015). We triangulated and analyzed the interview data, memos, codes, and categories to develop an emerging theory. We then utilized line by line coding to analyze the observational data and allowed categories to emerge. Following the selective coding process, we triangulated the observational categories to further develop and adjust the emerging theory. Following these analyses, we triangulated and interpreted the qualitative and quantitative results to address the convergent research question (Creswell & Clark, 2011).

Quantitative Results

Quantitative research objective one sought to describe students' psychological need support within and outside SBAE programs (see Table 1). Competence within and outside the SBAE program was slightly supported (SBAE M = 4.52, SD = 0.96; Outside M = 4.71. SD = 0.90). Relatedness within and outside the SBAE program was slightly supported (SBAE M = 4.87, SD = 0.86; Outside M = 5.04, SD = 0.87). Autonomy within and outside the SBAE program was slightly supported (SBAE M = 4.70, SD = 1.00; Outside M = 4.97, SD = 0.85).

Table 1
Description of Psychological Need Support Within and Outside SBAE Program (n = 222)

Psychological Need	Context	*M*	*SD*
Competence	SBAE Program	4.52	0.96
	Outside SBAE Program	4.71	0.90
Relatedness	SBAE Program	4.87	0.86
	Outside SBAE Program	5.04	0.87
Autonomy	SBAE Program	4.70	1.00
	Outside SBAE Program	4.97	0.85

Quantitative research objective two sought to describe the autonomy-supporting orientation of the SBAE teachers. Table 2 displays the algebraic sum of the teachers' orientation. It was found that two teachers possessed a highly controlling orientation (T3 = −4.25; T5 = −5.47), two teachers possessed a moderately controlling orientation (T1 = −2.25; T4 = −3.75), and one teacher possessed a moderately autonomous orientation (T2 = −0.01).

Table 2
Means and algebraic sum of teachers' orientation (n = 5)

	Highly Controlling	Moderately Controlling	Highly Autonomous	Algebraic Sum
T1	3.38	4.75	4.63	-2.25
T2	3.13	3.75	5.00	-0.01
T3	4.13	5.25	4.63	-4.25
T4	5.00	6.25	6.25	-3.75
T5	3.86	3.75	3.00	-5.47

Qualitative Results

The qualitative central question was how are the psychological needs supported within the SBAE program? It emerged that the psychological needs of competence, relatedness, and autonomy were supported in a variety of ways. We also determined that relatedness emerged as the central phenomenon of the study and influenced the ability of the other needs to be supported. It also emerged that the beliefs teachers held, motivational strategies utilized, and intracurricular nature of SBAE programs influenced students' psychological needs support.

Context: Teacher Beliefs

It emerged that teachers possessed a variety of motivational beliefs. To begin, teachers believed schools produce students who harbor compliance, not motivation, due to extrinsic grades, procedures, and policies. Teachers believed the extrinsic nature of grades causes students to experience pressure. Kyle stated, “Again, it comes down to every individual student of how much a grade truly pressures them, but of those that it does, I think it’s a lot of pressure.” The teachers acknowledged the constant accountability initiated by assessments and grades caused an overall decrease in motivation and created a lack of concern for maintaining grades. Further, teachers believe the extrinsic nature of schools has developed cookie cutter students who lack the desire to work independently. Kyle stated, “They like structure. They like to be told what to do because I think in education we tell them exactly what to do from a very young age.”

While schools are viewed as extrinsic bounded systems, teachers credited the inherent nature and goals of SBAE programs as a way for students to learn and grow beyond the schools’ extrinsic nature. Teachers believed the role of SBAE programs was to prepare students to be successful beyond high school and that education goes far beyond the classroom. Teachers also believed the career focus of SBAE programs allowed students to focus less on accountability, and more on developing knowledge and skills necessary to be successful in their future endeavors.

Teachers revealed very specific differences within their beliefs about their roles as teachers and FFA advisors. Teachers believed their main role as a teacher was to facilitate learning through the presentation of curriculum. Thus, teachers perceived that they needed to control the learning environment and believed in the need to utilize teacher-directed methods, which focused on expert-to-novice knowledge transfer. Participants believed their roles as FFA advisors included facilitating and educating students in life skills, teamwork, and study skills. As facilitators, FFA advisors were there to provide guidance and assistance while the officers lead the chapter activities. Kate stated, “I have learned that I can’t [be in control]. If I do try to be that way, then my life is going to be miserable. That’s where I’ve backed off and I leave a lot of leadership to them.” FFA advisors were strictly present to provide opportunities to students, help officers set goals, and help students make good decisions.

Teachers believed students were motivated in a variety of ways to learn and engage. Robin stated, “Motivation has to come in a variety of different forms.” A majority of teachers believed students are best motivated by extrinsic influences, “By and large, extrinsically, kids are motivated better.” Moreover, two teachers believed students were not self-starters or independent thinkers, but wanted them to develop into self-motivated individuals. One teacher acknowledged that she was uncertain whether the motivational strategies she utilized would shift extrinsically based to intrinsically based motivation. Teachers also believed students are motivated in a variety of ways to engage in FFA activities. Thus, to account for the variance in extrinsically and intrinsically motivated students, teachers believed a variety of motivational strategies must be utilized.

Central Phenomenon: Relatedness

Within every interview and observation, it was evident that teachers intentionally strived to develop mutual, caring relationships. Teachers utilized specific strategies to build relationships. The most prominent strategy was humor displayed by using sarcasm and joking with students. Steven said, “I think if a kid can laugh, you can go ahead and gain their attention.” The next most prominent strategy utilized was providing encouragement and praise. For example, teachers told students that “you are appreciated.” Additionally, teachers would greet students watching for mood changes or health issues, asking how they were feeling, and asking if there was anything the teacher could do to help. Another strategy utilized was to develop deep understanding of students so teachers could incorporate the students’ experiences into the classroom and FFA. Teachers also strived to engage with the students as an “adult”. One teacher discussed this process as being more of a parent than a teacher, and within this situation several students were observed referring to this teacher as “mom.” Other teachers referred to this role, more similar to that of a sports coach, in which, as skills and close relationships are developed, discipline can be handled within the program rather than by administrators. Teachers further discussed attending the students’ after school activities to demonstrate genuine interest. Kyle said, “The biggest way is I attend their school functions. I show them that I care what they’re involved in outside of the classroom.” By developing this mutual, caring relationship built upon understanding, students became more receptive to the motivational strategies teachers utilized.

It was evident that the FFA was a key instrument within the SBAE program in which teacher-to-student relationships were developed. The time outside of the classroom, which is required to advise the FFA, prepare CDE teams, and advise SAE projects provided ample time for the teacher to engage with students in small groups, socialize, and hold personal conversations. Steven stated, “When you’ve got [the] forestry team out there and you’re walking through the woods, you can make silly jokes and you can go ahead and really get [to] talking.”

Student-to-student relationships were also fostered within the FFA and classroom. The observations showed that throughout every FFA activity, students were provided ample opportunities to interact and socialize. Within CDE practices, numerous opportunities arose where students could socialize, while also engaging in peer teaching and peer motivation. Within the classroom, the students discussed being able to interact and socialize with their peers more than in their core high school classes. Student 107 stated, “…your Math and English [class] and all that, you sit there, you do work for 50 minutes, you don’t get to really interact with people or have fun [like in ag class].” Further, a variety of peer-based instructional strategies were utilized to enhance student learning and relationships such as cooperative learning groups, peer teaching, peer checks for understanding, partner work, and partner share. Following the development and strengthening of student-to-student relationships, the teachers utilized the relationships to enhance student motivation through the use of peer motivation.

Subsequent Conditions: Motivational Strategies and Intracurricular Total SBAE Program

To encourage classroom and FFA participation a variety of extrinsic, internalized, and intrinsic motivational strategies were utilized. Within the FFA, many of the extrinsic strategies included incentives and rewards such as food, scholarships, grades, points charts, rewards trips, recreation, leadership medals, and raffles. Within the classroom, teachers also discussed extrinsically motivating students or encouraging compliance by bluffing students with threats of either punishment or the removal of incentives and rewards. Teachers acknowledged that the extrinsic strategies were more likely to foster compliance, but hoped it would eventually transform into more intrinsic motivation if students found activities which they could internalize. Internalized motivation was encouraged by increasing students’ valuing of content, aligning content with student self-schemas, and developing goals. Student 338 stated, “because you hear people using stuff they learn in Ag. You don’t hear people saying I use geometry every day." SBAE teachers also helped students to see the value in FFA activities through glamorizing success, discussing benefits, identifying connections to career aspirations, recognizing potential learning experiences, and discussing the potential development of leadership skills. To encourage intrinsically based student classroom and FFA participation, teachers utilized student interest to drive content and activity selection. Teachers also fortified a sense of novelty through the variety of content presented and activities utilized within the agricultural classes.

It emerged that by utilizing a total SBAE and by connecting the classroom, FFA, and SAE students were provided experiences which enhanced student learning, motivation, and needs support. Teachers and students agreed that the SBAE classroom provided a mechanism through which instruction and knowledge were first instigated. Then, the students applied their prior knowledge and incorporated it with the leadership and communications skills developed through the FFA. Students were also able to apply their prior knowledge and develop more career-specific knowledge and confidence through their SAE. Kyle stated, "I think it's incorporating the three-circle model into our everyday life of SAE and FFA into classroom instruction, so when you add in that variety that lends itself to having so much going on in a 45-minute class." Through the incorporation of all SBAE program components within the classroom, a variety of teaching methods were utilized and students discussed how the variety helped to heighten their engagement and motivation. Teachers stated that the scaffolding of student motivation began in the classroom and grew from there. Kyle stated, "that's all intracurricular, that FFA to me at the base serves as the motivation for a lot of students, but we don't get to do these things unless this [learning] is accomplished in the classroom."

Student Outcomes: Supported Psychological Needs and Motivational Outcomes

One pivotal mechanism which fostered the need of competence through student confidence was the hands-on nature of the agriculturally based content. Students discussed that the hands-on content allowed them to more confident and engage deeper. Student 330 stated, "I'm a better hands-on learner... So, I like going in there and just looking at it, and it helps me work through the process on my own instead of just watching someone else do it." Much of the confidence students felt within the SBAE classroom stemmed from prior knowledge from previous classes or home. Many students stated that when they possessed prior knowledge, they felt more confident, were more likely to be engaged, and were more motivated to build upon their knowledge. For students who lacked prior knowledge, the teachers discussed scaffolding the content in a way in which students develop an understanding of the basic information first and then built the content from there. Teachers emphasized providing lectures to deliver explanations and examples to shape the base of knowledge. Teachers then utilized handouts, worksheets, projects, and research to continue to build the students' knowledge. Student confidence was also fostered through teacher provided praise and encouragement within both the classroom and FFA. Students also built confidence through the successes they experienced within the FFA. Kate stated, "They [students] might not be a great athlete, but they can come in here. They can be an officer. They can be good at a contest [CDE]." Kyle agreed, "I think we provide a variety of activities for students to be able to shine." CDEs and SAE projects provided mechanisms in which students could further apply and develop their knowledge and confidence. Students discussed how the content that they learned in class was applied within their CDE teams to increase their success. Additionally, students stated they could apply their classroom knowledge, FFA experiences, and agricultural interests within their SAE project.

Much of the autonomy occurring within the SBAE program was fostered through students' independent work. During independent work, teachers provided basic instruction, answered student questions, provided guidance, or would even be out of the room at times. Students discussed feeling more motivated because they felt they were making a difference in their learning based on the decisions they could make. Student 417 stated, "I feel a lot more independent that way. That way it's not like, somebody's constantly over my shoulder making sure I'm doing what I'm supposed to do. Pretty much free range, and I can make the decisions myself ." The FFA chapter also provided more opportunities for the students to direct their actions through independent work. During FFA activities, the advisors played a more supportive role for the students, which allowed for students to work independently and solve their own problems. Along with independent work, the teachers provided students choices, which increased autonomy. To provide student choice, teachers identified that they first needed to be able to trust the students to make appropriate decisions. Then, the students' skills would be developed and resources would be provided to support the choices they made.

Some of the teachers also discussed providing structure for the students in the means of assignment/project guides or rubrics, while others provided guidance as students' questions arose. Student choices were identified within (a) agricultural course selection, (b) order of class units, (c) classroom projects, (d) proficiency award application areas, (e) group work partners, (f) agriscience projects, and (g) CDE preparation. Within the FFA, students experienced choices related to their participation and activity development and design. Students were also provided choices within their SAE projects by being able to conduct their projects in an area of interest and by making management decisions with either some or no guidance at all. Within CDE practices, the students made choices to determine what content they wanted to learn and how they wanted to learn it. Steven stated, "Just like contest teams. I'll do what they want to do for the most part. I usually give them some options and then allow them to choose where we go." In addition, teachers encouraged autonomy through listening and encouraging students.

The primary way in which autonomy was thwarted within the SBAE program was by the teacher providing directives. Within the classroom, teachers utilized directives in two forms, to direct learning and to control students' negative behaviors. Within the FFA, directives were primarily given to command students on how to set up for an activity, instruct students about CDE content, and control student behavior. Student autonomy was also thwarted when teachers provided direct instruction in which the teacher was the primary speaker, provided solutions, and held the learning materials. Student autonomy was also thwarted through the use of grades, incentives, and rewards as a means to control behavior. Teachers would utilize grades as a method to pressure students into completing notes, assignments, or projects. Grades were also utilized as a way to encourage students to complete award applications, participate in CDEs during class, and participate in the FFA. Although choices were provided within the SBAE program, a significant lack of choices was witnessed, specifically within the classroom. Further, in some programs, students were provided little to no choices regarding their required participation in CDEs, agriscience projects, and proficiencies.

Students experienced a range of motivational outcomes within SBAE programs. To begin, students identified a variety of ways in which they were extrinsically motivated. In the classroom, students were motivated due to wanting to earn respectable grades for college entry and to satisfy their parents. FFA participation was motivated by the points system, “cool” trips, leadership medals, and food. Regarding the points system, Student 104 stated, “It’s kind of like a goal from what I have seen from kids. They are trying to reach a goal of so many points and get so much done.” While being initially motivated by extrinsic motivators, students discussed finding activities or content areas they could internalize through their continued engagement. Student 330 stated, “ever since then, it’s just been building, and I just enjoy it more and more every year.” Students also experienced more internalized motivators. For example, students experienced connecting knowledge gained to their future careers, engaging in experiences that connect to their self-schemas, expanding beyond their comfort zone, having enjoyable learning experiences, and internalizing the hands-on nature of the content. FFA participation encouraged internalized motivation through knowledge gained to improve self, career, and life skill development, activities that related to self-schemas and personal experiences, teaching others, having a say in chapter activities, and enjoyable activities. Students experienced intrinsic motivation through their sheer interest or enjoyment within classroom content, FFA activities such as community service events, CDE preparation and content, and SAE project career and content areas. Students were intrinsically motivated in both SAEs and CDEs through student autonomy and their ability to direct the learning and preparation process. Student choices and engaging in novel experiences also fostered student intrinsic motivation.

Discussion

To address the convergent research question, all data sources were triangulated and a substantive theory emerged. Within the theory (see Figure 1), teacher beliefs were the context for which the psychological needs support process was fostered. Teachers possessed specific beliefs regarding the importance of developing relationships within SBAE programs, and these beliefs helped to form the central phenomenon of relatedness. Teachers believed that without the continued support of relationships no other psychological needs support or motivationally strategies would be affective. The motivational beliefs teachers held also influenced the strategies utilized and the outcomes students experienced and were underlined by their controlling orientations. Following the development of relationships, teachers utilized a variety of extrinsic and intrinsic strategies to motivate students. Intracurricular experiences were then created to strengthen the students’ psychological needs support and motivational experiences. Student displayed several outcomes including competence support, autonomy support and thwart, and extrinsic and intrinsic motivational outcomes.

As demonstrated by the theory, supporting the psychological needs of SBAE students was a sequenced process built upon teacher beliefs and student experiences. This study shows that student needs and motivational support were not triggered through a one-time awe-inspiring experience, but were rather cultivated through deliberately built upon experiences. The emergence of psychological needs and motivational support as a process aligns with previous research that emphasizes motivation as a process (Schunk, Meece, & Pintrich, 2014). Additionally, student needs support and motivation did not occur in one standalone component, but was rather fostered through the intracurricular nature of SBAE programs.

SBAE teachers must be dedicated to upholding the motivational process as students progress through the SBAE program. Additionally, the process of supporting needs and motivation must be incorporated into the day-to-day activities of all SBAE components. Teachers need to be intentional in their actions to motivation students based upon the outcomes desired. Thus, teachers need to develop an in-depth understanding of how to utilize strategies within the identified process to truly foster psychological needs support and intrinsic motivation.

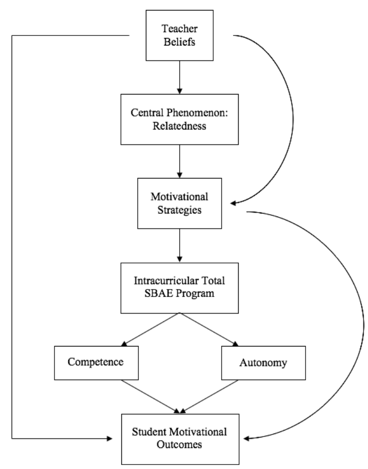

Figure 1. The Process of Supporting Psychological Needs Within the SBAE Program.

Teachers held very specific beliefs about student motivation and how the school, SBAE program, and teacher influenced the students' motivation. The teachers substantiated that no matter the motivational drivers, no motivational strategy would be effective without having developed relationships with students. Even though it is unclear how the teacher beliefs were specifically formed, teachers cited numerous years of experience and developing a profound understanding of the students they work with.

The teachers' beliefs and wisdom of practice highly influenced the ways in which teachers intentionally motivated students. It is undeniable that the SBAE teachers believed in the importance of developing strong caring relationships with students as the foundation of the motivational process. These beliefs are substantiated by previous research which emphasizes the importance of teacher-student relationships (Christenson, Reschly, Appleton, Berman-Young, Spanjers, & Varro, 2008; Niemiec & Ryan, 2009). Next, teachers incorporated student interest and enjoyable activities within all SBAE program components. Teachers also incorporated experiences where student confidence was developed through application within one or more program components. Student autonomy was also intentionally supported through student directed FFA and SAE activities, while also being less supported within the SBAE classroom. The lack of student autonomy support aligns with previous classroom literature (Reeve, 2002; 2009). Through the motivational beliefs and actions of the teachers needs support was seen within SBAE programs.

While teacher beliefs did support psychological needs within the SBAE program, teacher beliefs also undermined the motivational process. Teachers believed in developing relationships, supporting confidence and autonomy, and incorporating interest, but they also believed that to motivate all students a potpourri of motivational strategies should be constantly utilized. Teachers believed students possessed a variety of motivational drivers; thus, they continually utilized a variety of motivational strategies. Further, the teachers exhibited a divide in their beliefs regarding their roles as both teachers and FFA advisors. When fulfilling the role of FFA advisor, the participants believed they should foster student-directed activities, whereas the belief of student-directed activities was nearly vacant in the classroom. The lack of classroom student-directed activities aligned with previous literature (Reeve 2002; 2009).

The contradictory nature of beliefs and strategies utilized caused inconsistencies in student motivational outcomes. While the psychological needs and intrinsic motivation of some students was supported, the constant utilization of extrinsic strategies undermined the needs and intrinsic motivation support. The use of extrinsic motivational strategies which undermined autonomy and intrinsic motivation aligns with previous research (Deci & Ryan, 1975).

Recommendations

While the results of the study came from a limited sample, some recommendations can be made that readers can assess for application to their own situation. To begin, SBAE teachers should reflect on their motivational beliefs and determine how their beliefs influence how they motivate students. Teachers should also analyze how to best develop relationships and how FFA activities and SAE visits influence their ability to build relationships. Teachers also need to contemplate how to develop relationships with students who are less active in the FFA. Current motivational practices should be reviewed and altered to best suit the desired student motivational outcomes. If SBAE teachers truly desire to promote intrinsic motivation, they must develop and intentionally utilize strategies which will foster intrinsic motivation. Thus, they need to intentionally incorporate the students' values, goals, future aspirations, and interests. By supporting students' psychological needs, teachers will also foster intrinsic motivation. Teachers should intentionally utilize strategies that foster confidence, a sense of belonging, and student autonomy.

Professional development should be offered to help teachers reflect upon and alter their motivational processes, examine their motivational beliefs, explore empirically supported motivational strategies, and create a motivational plan which focuses on intentional motivational strategies. Teacher preparation programs must take a more explicit and intentional approach to introducing pre-service teachers to student motivation and developing their ability to purposefully motivate students. Motivationally based standalone courses can be developed to specifically analyze motivational theories and strategies while incorporating various learning and PYD strategies. Within existing courses, motivationally based lessons centered upon lesson planning, teaching methods, classroom and behavior management, and assessment can be delivered to enhance the pre-service teachers' ability to proactively address student motivation.

To further substantiate the needs support process this study should be replicated to include more SBAE programs from multiple states. Following the study expansion into SBAE programs, the process should also be examined for possible alignment within other career and technical education classes and organizations, along with other PYD programs. Further, qualitative studies should be conducted to examine the formation and application of teachers' motivational beliefs. Quantitative studies should be conducted to determine the frequency of motivational strategies utilized. Further, quantitative and mixed-methods studies should be conducted to identify SBAE students' motivational drivers and outcomes.

References

Ball, A. L., Bowling, A. M., & Bird, W. (2016). A case study of learning, motivation, and performance strategies for teaching and coaching Career Development Event teams. *Journal of Agricultural Education, 57*(3), 115-128. DOI: 10.5032/jae.2016.03115

Bird, W. A. (2012). Factors influencing students' self-perceived levels of civic responsibility during FFA sponsored civic engagement activities. University of Missouri, Columbia, MO.

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.

Creswell, J. W. (2015). *A concise introduction to mixed methods research*. Sage.

Creswell, J. W., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research.* Sage.

Dawes, N. P., & Larson, R. (2011). How youth get engaged: Grounded-theory research on motivational development in organized youth programs. *Developmental Psychology*, *47*(1), 259-269.

Deci, E. L., & Ryan, R. M. (1975). *Intrinsic motivation*. John Wiley & Sons, Inc.

Deci, E. L., & Ryan, R. M. (2000). The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268.

Deci, E. L., & Ryan, R. M. (2006). Basic psychological needs scale. Retrieved from selfdeterminationtheory.com.

Deci, E. L., Schwartz, A. J., Sheinman, L., & Ryan, R. M. (1981). An instrument to assess adults' orientations toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *Journal of Educational Psychology, 73*, 642-650.

Eccles, J. S., & Templeton, J. (2002). Extracurricular and other after-school activities for youth. *Review of Research in Education, 26*, 113-180.

Hair, J. F., Anderson, R. E., Babin, B. J., & Black, W. C. (2010). *Multivariate data analysis: A global perspective* (Vol. 7): Pearson Upper Salle River, NJ.

Hansen, D. M., Larson, R. W., & Dworkin, J. B. (2003). What adolescents learn in organized youth activities: A survey of self-reported developmental experiences. *Journal of*

Research on Adolescence, *13*(1), 25-55.

Larson, R. W., & Rusk, N. (2010). Intrinsic motivation and positive development. *Advances in Child Development and Behavior*, *41*, 89-130.

Larson, R. W., & Walker, K. C. (2010). Dilemmas of practice: Challenges to program quality encountered by youth program leaders. *American Journal of Community Psychology*, *45*(3-4), 338-349.

Larson, R. W., Walker, K. C., Rusk, N., & Diaz, L. B. (2015). Understanding youth development from the practitioner's point of view: A call for research on effective practice. *Applied Developmental Science*, *19*(2), 74-86.

Lerner, J. V., Phelps, E., Forman, Y. E., & Bowers, E. P. (2009). *Positive youth development.* John Wiley & Sons, Inc.

Leversen, I., Danielsen, A. G., Birkeland, M. S., & Samdal, O. (2012). Basic psychological need satisfaction in leisure activities and adolescents' life satisfaction. *Journal of Youth and Adolescence*, *41*(12), 1588-1599.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry* (Vol. 75). Sage.

Nunnally, J. C. (1967). *Psychometric theory.* New York: McGraw-Hill.

Phelps, K., Henry, A. L., & Bird, W. A. (2012). Factors Influencing or Discouraging Secondary School Students' FFA Participation. *Journal of Agricultural Education*, *53*(2), 70-86.

Reeve, J. (2002). Self-Determination Theory applied to educational settings. In E. L. Deci & R. M. Ryan (Ed.), *Handbook of Self-Determination Research* (pp. 3-33). Rochester, New York: The University of Rochester Press.

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist*, *44*(3), 159-175.

Reeve, J., Bolt, E., & Cai, Y. (1999). Autonomy-supportive teachers: How they teach and motivate students. *Journal of Educational Psychology, 91*(3), 537.

Roberts, R., Terry Jr, R., Brown, N. R., & Ramsey, J. W. (2016). Students' Motivations, Value, and Decision to Participate in Service-Learning at the National FFA Days of Service. *Journal of Agricultural Education*, *57*(2), 187-202.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Ryan, R. M., & Deci, E. L. (2002). An overview of self-determination theory: An organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Ed.), *Handbook of Self-Determination Research* (pp. 3-33). Rochester, New York: The University of Rochester Press.

Schunk, D. H., Meece, J. R., & Pintrich, P. R. (2014). *Motivation in education: Theory, research, and applications*. Pearson Higher Ed.

Tashakkori, A., & Teddlie, C. (Eds.). (2010). *Sage handbook of mixed methods in social &behavioral research*. Sage.

Tian, L., Chen, H., & Huebner, E. S. (2014). The longitudinal relationships between basic psychological needs satisfaction at school and school-related subjective well-being in adolescents. *Social Indicators Research*, *119*(1), 353-372.

Witt, C., Doerfert, D. L., Ulmer, J. D., Burris, S., & Lan, W. (2013). An investigation of school connectedness among agricultural education students. *Journal of Agricultural Education*, *54*(2), 186-204. DOI: 10.5032/jae.2013.02186

Discussant Remarks – 2018 AAAE National Conference

Conceptualizing the Process for Supporting Students' Psychological Needs and Motivation within School Based Agricultural Education Programs: A Mixed Methods Study

Discussant: Ed Osborne, University of Florida

This research addresses a fundamentally important responsibility of teachers but one that has not been extensively researched, particularly in agricultural education. What teacher practices foster the development of student intrinsic motivation? The authors provide a concise review of the Positive Youth Development (PYD) literature and cite school-based agricultural education as a program model that can develop the desired assets in youth. A sound and thoughtful chain of logic was created in the introduction, which laid the groundwork for this interesting study. Self Determination Theory was chosen as the theory base, and its tenets aligned well with the purpose of the study. As the authors explain, fulfillment of the need for competence, relatedness, and autonomy supports feelings of satisfaction, well-being, and intrinsic motivation. The authors connect teachers' actions to the fulfillment of these physiological needs in this well-designed mixed methods study.

The guiding objectives and questions for each respective research perspective were seamlessly integrated to shape this well-focused study. Clear criteria were used to select the five participating teachers, and the participation of those teachers' students was quite high at 60%. The authors did a remarkable job of attending to the details of the mixed methods design, and all steps in the research process were fully described in the paper. The research design and approach aligned very well with the conceptually complex nature of the study. While the instruments used in the study addressed the study objectives very well, some measurement concerns emerged, but the researchers addressed each weakness in an appropriate manner. The participating students were largely freshmen, which meant their experiences in FFA and SAE programs were limited.

The quantitative and qualitative findings of the study were presented in an organized, clear, and engaging manner. Excerpts from student and teacher interviews supported the elements of the theory that emerged from the study. The researchers established criteria for the selection of teachers to participate in the study, and evidence suggested that the teachers chosen were largely doing an excellent job of supporting the psychological needs of their students. The authors presented a very thoughtful and insightful discussion of the findings. This section alone could provide the basis for an in-depth discussion of student motivation theory and practice. Overall, this was a complex but exceptionally well designed and conducted study, and the paper presented the investigation in a well-articulated, interesting manner.

Student Motivations to Engage in Curricular Leadership Education: A Grounded Theory Approach

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Abstract

Postsecondary leadership experiences provide students opportunities to gain, enhance, and refine capacities useful in addressing complex challenges of the world. The current study sought to contribute to leadership education scholarship by exploring the motivations of postsecondary students to engage in long-term curricular leadership education (CLE) programs through two Colleges of Agriculture. Data were collected from 29 participants through focus groups and interviews to examine their motivations to engage in their selected CLE program. Results of our analysis identified expected outcomes, program characteristics, and social encouragement to be three primary motivators for student engagement in CLE programs. The primary concepts interacted to form a basis for the theory of Curricular Leadership Education Motivation (CLEM). Students expected to obtain specific outcomes as a result of involvement in their selected CLE program. Specific program characteristics would perceivably afford those outcomes and encouragement received from others would ignite and/or bolster motivation by illuminating and/or affirming specific program characteristics and/or expected outcomes. This theory serves as a foundation for the exploration of postsecondary student motivation to enhance the practice and scholarship of leadership education. A conceptual model illustrating our CLEM theory is presented as well as recommendations for practice and research.

Introduction

The world is comprised of complex interconnected systems, which frequently operate in ways which challenge the sustainability of all systems. Consequently, society faces increasingly complicated challenges like climate change, social inequality, and environmental degradation. Complex challenges illuminate both the need, and potential, for leadership to emerge from any individual, at any time, in any position, at any location (Ferdig, 2007). The urgency in which society must respond to identified, ubiquitous problems necessitates the development of leadership capacities among its members. In response, postsecondary institutions have increasingly supported new leadership development opportunities for students (Brown, 2004). Postsecondary leadership development opportunities take many forms, including intermural sports, student organizations, and curricular leadership education (Dugan & Komives, 2007). The current manuscript attends specifically to long-term, curricular leadership education (CLE) offerings within postsecondary institutions, defined as sustained, for-credit academic leadership experiences (e.g., programs, academies, majors, minors).

Research exploring the efficacy of long-term CLE programs highlights gains in citizenship, comfort with change, and increased leadership efficacy among participants (Dugan & Komives, 2007). Research supports the impact of CLE offerings and has identified a positive relationship between leadership coursework and leadership capacities (Rosch & Stephens, 2017) as well as a relationship between a first-year leadership development program and continued engagement in leadership behaviors (Posner, 2009). Identified outcomes associated with CLE programs illuminate the potential to empower postsecondary students with leadership capacities useful in addressing complex challenges. However, acknowledging the demand for a wide breadth of leaders (Ferdig, 2007), there exists a need to understand how a larger number of postsecondary students can be motivated to engage in CLE programs.

Motivation research within the context of postsecondary leadership education has primarily explored motivation to lead among students (Cho, Harrist, Steele, & Murn, 2015; Rosch, Collier, & Thompson, 2015) with scant attention given to motivations for engaging in CLE experiences. In the one identified study, Moore, Grabsch, and Rotter (2010) explored student motivations for engaging in a leadership learning community using McClelland's Achievement Motivation Theory, finding stronger evidence of motivation stemming from the need for achievement and need for affiliation and less evidence of motivation associated with the need for power.

Existing research suggests CLE programs provide a valuable context in which to develop leadership skills among postsecondary students (Dugan & Komives, 2007; Posner, 2009; Rosch & Stephens, 2017). However, little is known about student motivations for engaging in CLE programs. In the absence of such knowledge, program leaders are ill-equipped to motivate a broader scope of students. Therefore, using a grounded theory methodology, the current study explored the motivations of students enrolled in three long-term CLE programs being offered at two postsecondary institutions. A deeper exploration, and the development of a theory of student motivations to engage in CLE programs, has the potential to inform the recruitment of students into programs, expanding the scope of postsecondary students empowered with critically important leadership capacities.

Methods

The current study utilized a grounded theory methodology to develop a model for students' motivations to engage in postsecondary CLE programs. Originally developed in 1967 (Glaser & Strauss), the grounded theory approach "is a strategy of inquiry in which the researcher derives a general, abstract theory of a process, action, or interaction grounded in the views of participants" (Creswell, 2009, p. 13). The grounded theory methodology has been expanding in application since its inception, with researchers in the fields of sociology, psychology, anthropology, social work, nursing, and education using this methodology to propose explanations for a wide variety of phenomena (Strauss & Corbin, 1998).

The grounded theory methodology is situated within a pragmatic worldview (Strauss & Corbin, 1998), characterized by a focus on finding solutions to problems (Creswell, 2009). This mirrors the grounded theory approach of being open to the development of new theories, or the revision of existing theories to explain natural phenomena (Strauss & Corbin, 1998).

Additionally, the pragmatist viewpoint identifies “truth is what works at the time” (Creswell, 2009, p. 11). The grounded theory methodology shares a similar viewpoint, that knowledge is linked to time and location (Strauss & Corbin, 1998). Strauss and Corbin identified another important aspect of the grounded theory methodology, the reliance on interpretation. In grounded theory, researchers utilize the interpretations of participants to develop a theory for the phenomena experienced by the participants (Berg, 2007). This perspective, in alignment with pragmatism, is not concerned with a preexisting, knowable reality and is, instead, concerned with how individuals make sense of their own experiences.

One of the key features of grounded theory is its ability to “fit” within a wide variety of research (Strauss & Corbin, 1998). In the current study, grounded theory was utilized to study motivation to engage in CLE programs at the postsecondary level. Students’ motivation for engaging in leadership development programs is a phenomenon sparsely studied in leadership education literature. Maxwell (2005) recommended the use of an inductive methodology, like grounded theory, when the area of interest has been understudied; therefore, we considered the grounded theory method to be appropriate for this analysis.

Participants

Participants in this study were purposefully sampled based on participation in postsecondary leadership development programming within the Colleges of Agricultural Sciences at Oregon State University and the College of Agriculture, Food & Natural Resources at the University of Missouri. In total, participants included 29 students enrolled in three different leadership development opportunities. These included the Leadership Academy, a year-long leadership development program offered to students enrolled in the College of Agricultural Sciences and the College of Forestry (n = 10) at Oregon State University, an interdisciplinary campus-wide leadership minor (n = 14) at Oregon State University, and the Litton Leadership Scholars program, a sophomore-level leadership program offered to students in the College of Agriculture, Food & Natural Resources at the University of Missouri (n = 5). While the initial selection of students was based on their involvement in a CLE experience, students were asked about a variety of postsecondary leadership programs they were involved in, and not involved in, throughout their college experience.

Data Collection

Data were collected using two methods, focus groups and one-on-one, semi-structured interviews. Focus groups are “guided or unguided group discussions addressing a particular topic of interest or relevance to the group and the researcher” (Berg, 2007, p. 144). Data were collected from participants in the leadership minor (n = 14) and the Litton Leadership Scholars program (n = 5) using the focus group method. Berg (2007) recommended focus groups should consist of no more than seven participants; therefore the 14 participants enrolled in the leadership minor were split into two groups, each containing seven participants, while the five participants in the sophomore-level leadership scholars program remained together. We used a semi-structured approach to elicit participant information regarding their motivations for engaging in leadership development programs.

Data were collected from participants in the Leadership Academy (*n* = 10) using one-on-one, semi-structured interviews. Semi-structured interviews are characterized by the researcher being prepared for the interviews with an outline of questions, but the researcher is also able to explore topics through impromptu questions (Maxwell, 2005). We used data from the focus group interviews to develop the outline of questions for the one-on-one interviews. Additionally, throughout the interviews, follow-up questions were used to elicit more details about participants' motivation for engagement in different leadership experiences.

Both the focus group interviews and the one-on-one interviews were conducted at the conclusion of students' involvement in the three leadership opportunities described above. The focus groups each lasted approximately 45 minutes and, on average, the one-on-one interviews lasted 30 minutes. The one-on-one interviews and focus groups were conducted by authors of this study and audio-recorded, then transcribed verbatim.

Research Validity

Maxwell (2005) identified two potential threats to qualitative research validity: researcher bias and reactivity. Maxwell describes researcher bias as the potential for researchers to make the data fit preconceived notions. Reactivity refers to the influence the researcher's presence has on the participants and the data they share. Although qualitative researchers are unable to *prove* the conclusions they develop are valid, systematic approaches can be utilized to test conclusions against identified threats to validity (Maxwell, 2005). In an effort to test the conclusions of this research against the potential validity threat of researcher bias, all data were collected and transcribed verbatim. Maxwell (2005) recommends this approach as a method to ensure the researcher does not only document the data he/she feels are important. Participant quotations were also utilized throughout this manuscript to support the conclusions made. This step was taken to allow readers to compare our conclusions with the raw data presented by participants. Additionally, we utilized counter-codes and counter-relationships throughout the coding process to ensure the posited codes and relationships were justified by the data (Berg, 2007).

Data Analysis

Data were analyzed using inductive, theoretical coding. In theoretical coding the researcher explores the potential relationships between codes throughout the coding process as a method for building theory (Strauss & Corbin, 1997). In conjunction with theoretical coding, Strauss and Corbin recommended constant comparative analysis where the researcher is developing the theory and reviewing the data in an iterative process. We began this iterative process with an initial reading of the manuscripts. After an initial read, we inductively coded the transcribed interviews and focus groups (Auerbach & Silverstein, 2003) and crafted theoretical memos that alluded to potential relationships among the codes found in our initial coding (Berg, 2007). This initial researcher coding occurred independently. After initial open coding of the data was completed, we met as a research team to review each other's codes and determined a list of final codes for the data. Additionally, we developed a list of counter-codes to identify findings counter to the suggested code (e.g., code = interest in learning about leadership; counter code = leadership cannot be learned). Once a list of final codes and counter-codes was established, we independently returned to the data and recoded the transcripts using the final list of codes and counter-codes. We then compared our final coding; those codes with convincing data supporting the counter-codes were either modified or removed. Additionally, we conducted an inter-rater reliability check on the remaining codes; this check found an internal consistency among coders of 89%.

After an analysis of the codes, we met to discuss potential themes that could encompass multiple codes used through this analysis (Auerbach & Silverstein, 2003). After themes were developed, we turned our attention to exploring potential relationships within the data as recorded in the theoretical memos. Based on the individually developed theoretical memos as well as the group discussion of the data, emergent themes were developed into broader theoretical constructs (Auerbach & Silverstein, 2003). Then, as a research team, we developed a list of potential relationships between these theoretical constructs. For each proposed relationship a counter-relationship was also developed. The counter-relationships specified codes, quotes, or relationships within the data that would refute the posited relationship (Berg, 2007). Each researcher then individually went through the data to find confirming evidence of the posited relationships and counter-evidence of suggested relationships. We met again to discuss the findings from this stage of data analysis. Suggested relationships were either kept, reworked, or removed based on the presence of supportive evidence and counter evidence found in the data. The theoretical constructs and relationships that were overwhelmingly supported by the data were then utilized to build the theory that we suggest below.

Assumptions and Limitations

As with any social science research, this study assumes the truthfulness of participants in our study. Additionally, we assume that respondents' perceptions of their own experience are valid representations of their actual experience. Finally, this study is limited by the low number of participants in the study and the researchers' ability to develop a relevant and meaningful theory given their ability and knowledge.

Reflexivity

In qualitative research, the researcher is the research instrument (Berg, 2007). Therefore, it is important for researchers to identify potential biases to allow readers to consider these biases as they consume the research. Each researcher in this study is engaged in leadership development at the postsecondary level. Additionally, most are involved at various levels, including teaching and advising roles, in the three leadership development programs from which participants were recruited. Through the use of continual meetings, cross-checking of codes, the use of counter-codes, and rich descriptions of the data, we attempted to overcome our potential biases and we believe the findings presented through this study are valuable to the profession of leadership education.

Findings and Emerging Theory

The rich reflections and descriptions provided by participants revealed complex and multi-dimensional motivations for engaging in postsecondary CLE programs. Students in this sample attended different universities, engaged in diverse CLE programs, and identified a multitude of factors as motivations for participating in their respective CLE program. Yet, students formulated motivations to participate in similar ways, thus enhancing the credibility of the emerging Curricular Leadership Education Motivational (CLEM) theory presented below (see Figure 1). Our theory evolved as connections between three primary concepts interacted to explain student motivations for engaging in a postsecondary CLE program. The three primary concepts are: expected outcomes, program characteristics, and social encouragement. Namely, students expected to obtain specific outcomes as a result of involvement in their selected CLE program. Specific program characteristics would perceivably afford those outcomes and encouragement received from others ignited and/or bolstered motivation by illuminating and/or affirming specific program characteristics and/or expected outcomes. Representative quotations from participant interviews and focus groups are included in the sections below to chronicle the narrative of our emerging theory.

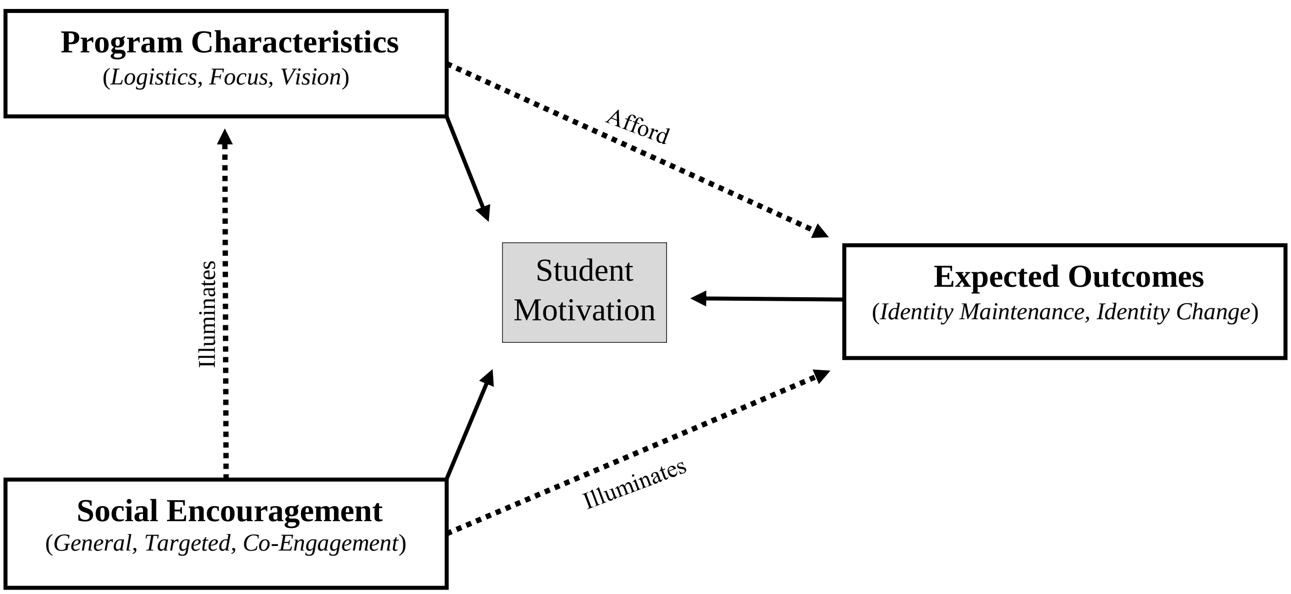

Figure 1. Curricular Leadership Education Motivational theory.

Expected Outcomes

When participants discussed motivations to engage in their selected CLE program, they referenced outcomes expected as a result of participation. These outcomes were considerable and varied by student. However, taken together, the theme of identity emerged as students sought to either maintain an existing component of their identity, or change, develop, or enhance it.

Identity maintenance - Students were motivated to engage in a CLE program because they believed it would display, or extend, an element of their identity. For many participants, the prospect of engaging in a program requiring application of existing skills was important. For example, Isabella shared how she first heard about her selected CLE program, stating, “one of the big things that I noticed on the Litton website was that they…talked about the application of leadership skills, and that was something that really interested me.” Prior to enrolling in the CLE, many students considered themselves leaders, largely stemming from prior leadership experiences. Involvement in a collegiate leadership program, then, was seen as a natural next step. For example, Ben noted, “when I heard about it, I was like ‘wow that’s a really cool idea’ because I’ve always been involved in leadership, and leadership has always been something that I’ve gone more to.” Another example is Alex who expressed the desire to continue his leadership involvement from high school experiences, “for me I had really gained a lot of leadership skills in high school through FFA and other organizations…so I wanted to continue my leadership building in college.” As a result of identifying as an existing leader, other students saw their selected CLE program as an opportunity to extend or apply leadership knowledge they had gained from prior experiences. Rhett, for example, stated, “I wanted to basically integrate all the things that I already belonged to coming into college…I wanted to make sure that I had some kind of possible leadership experiences through each of those pieces.”

Identity Change - Participants also emphasized how postsecondary CLE programs provided an opportunity to change, develop, or build a component of their identity. For some, the CLE program was seen as an opportunity to become, or be perceived as, a leader by peers and future employers. This often transpired in respondents mentioning the CLE program as a resume-building opportunity. For example, Caleb said he is “always looking for a leg up in building a resume and having/obtaining skills others may not have the chance to get.” Similarly, Sanders perceived his involvement would be a “huge thing on that resume and…make you stick out of a group of people too.” While the promise of an enhanced resume intrigued many students, others saw involvement as an opportunity to challenge themselves, grow personally, and learn how to become a better leader. Taylor, for example, had prior industry experience as well as an established resume. However, he identified a need for development, commenting “I have managed crews...through both fire and law enforcement. And the realization that even though I had the qualifications on paper didn’t mean that I had the qualifications inside.” Others desired several benefits, such as Karli who said, “it was focused on making me a better - not only student, but leader, and a better person and I knew I was gonna need that” or Meg who reflected, “it just looked like a program that would help me to be more well-rounded and be intentional with everything.”

Identity change also emerged as students discussed specific changes they hoped as a result of involvement. Zack, for example, saw the experience as an opportunity to get out of his comfort zone, “I wanted to break down those barriers…more to put myself out there, put myself in situations where I would have to talk with other people and communicate in a more professional sense.” An additional student, Adam, reflected that he enrolled because “it put you in an atmosphere that challenges you to be more articulate…to be able to work on how you come across to individuals.” Ryan talked about his identity change as more transformative, sharing “I wanted to have my own identity, so I wasn’t just following my brothers and sisters footsteps. I wanted to be my own individual, so that pushed me to do more leadership stuff.”

Program Characteristics

Students identified specific characteristics of their selected CLE program as major factors that influenced their decision to participate. These characteristics ranged from logistical aspects of the program, to elements centered on the focus or vision of the program.

Logistics - Participants identified logistical elements such as the opportunity to earn credit or fit the program into their schedule/degree plan as important motivating factors to engage in their selected CLE program. Amber, for example, emphasized the utility of the program as both an opportunity to earn college credit while simultaneously gaining leadership skills:

> I think one of the great things about the minor is that you're learning those leadership skills and doing the program but you're getting college credit for it and so it seems more useful I guess. Like, if you're going to be a part of a club that you're going to get a ton of leadership experience out of it, that's great, but you're not necessarily going to get credit for it so it's another time commitment alongside school.

Other students, like Riley, echoed the ability to earn credit, stating, "It was nice that a lot of the credits overlapped with the college of ag, so that was convenient", while others, such as Cheyenne, used the leadership minor to fulfill academic requirements, "I needed more credits and I was scrolling down through different minors and I found it and I was like 'sweet, I love leadership' it's not just like I needed more credits but I did need a minor." Students also emphasized the appeal of a longer leadership program, which would afford opportunities to develop, enhance, and transform their leadership over time. Gabrielle, for example, became intrigued with the program because it was not "a 48-hour conference or a week conference where you jam it all in" but rather an opportunity to "push yourself and change over time." Ryan felt the same way, stating "it's really hard for me to just, with time constraints and devoting one weekend, when I have a lot of other stuff going on, so I really like how this was spread out and over a year."

Programmatic Focus - Participants cited the focus of the program, or specific components of it, as motivating factors to engage in a CLE program. These components ranged from structural elements such as class size, number and diversity of students, and learning outcomes, to more specific elements such as particular assignments, built-in reflection time, and opportunities to receive critical feedback. In the case of Karli, a curriculum focused on personal growth was important:

> I wanted to do Leadership Academy versus the other program because it was centered around me, it was centered around helping me grow as an individual. And I thought, I mean I never really had that...attention, I guess, I never really allowed that attention to sit there and really like make yourself grow and be better as a leader.

Other students, such as Memphis, were interested in the flexibility of the program; he remarked, "The leadership minor allows you to choose where you want to go and what you want to do and when you want to do it. I thought it was pretty convenient." Kynlee echoed these thoughts when discussing the internship component of her CLE program, stating, "I think that's what was really helpful with the minor because you can kind of pick your own style and like any direction you want to go and find a leadership spin on it."

Vision - Alignment of the CLE program vision with participants' personal identity or vision for themselves also sparked student motivation. This was the case for Isabella who was intrigued by a program that brought together a diverse group of people sharing a common goal:

> Something that specifically drew me to this program was that it was through the College of Agriculture, Food & Natural Resources and I knew that the culture and students who surround me would have a common goal of working to feed the world or to advocate for agriculture, even though we have completely different leadership styles, majors and backgrounds.

Interestingly, when we asked participants why they would choose not to participate in a particular CLE program, reflections regarding program vision and identity also surfaced. Specifically, motivation to engage in a particular CLE program decreased if the student's identity was in conflict with the program vision. Many students stated this in simple, matter-of-fact terms, such as Mollie who said, "it kinda went against my values" or Mary who noted, "this isn't really my thing" when discussing other programs and academies. We saw this also from Isabella, who passionately spoke about other CLE programs that were deterrents:

> I would not attend a women's leadership conference even though I'm female, and I would never attend a Hispanic leadership conference, even though I'm Hispanic. Because I never want to limit myself to any of the things I cannot control. And so I don't want to be identified that way and I will not identify myself that way. And so I think that's something really big for me.

Social Encouragement

Participants identified encouragement and potential engagement with others as significant sources of motivation to engage in their selected CLE program. The strongest of these social motivators came via interactions with peers, family members, and institutional professionals who encouraged or supported them in either a general or targeted manner. Anticipation of participating in a CLE program with peers also served as social encouragement.

General - Motivation to engage in a CLE program often began as a result of general encouragement from others. This frequently originated from colleges, departments, or programs within the university that aimed to connect students to opportunities. Many participants attributed this initial connection to email announcements about the CLE program. For Lauren, an informational email from her advisor catalyzed her motivation. She said, "the advisor gives out weekly emails with all the news for the week, and...I needed more credits, and I usually didn't go for leadership roles, I just did my own thing. So I wanted to challenge myself." Zack read about it in a newsletter and thought, "it seemed like something I could do and applied for it, and ended up getting in." Other students identified a basic desire to "get involved" as a motivating factor to join a CLE program. This desire arose from parents, former teachers, or other influential individuals. Ronan, for example, stated "We're always told, 'get into college, get involved in something.' And this really went hand in hand with that…the leadership really couples with that kind of involvement and really helps that along."

Targeted - Specific individuals, such as institutional professionals, peers, and family members, also served as strong motivators for students to participate in CLE programs. Students referenced the influence and motivation fostered by institutional professionals and often heeded their word prior to knowing all the details about the program. This advice often came in the form of a direct command where faculty and staff would "tell," "nudge," or "suggest" students apply. Amirah for example said, "I would not have thought to join any of them had my advisor…not been like, a mandate from her". Participants also revealed that one-on-one interactions, whether they be in person or via email, made students pay attention and heed the advice of these institutional professionals. Karli, for example, detailed how one of her professors was an influential motivator:

> Sue is the reason why I decided to-why I even had the information…she emailed me personally and said like 'you should look at this'. And, like from my perspective, I think that is really the way to go if you want to get students. Because when I get an email, personally, from a professor, I pay attention to it.

For Ryan, a similar interaction occurred between him and his advisor:

> I didn't know about the Litton Scholars until my advisor mentioned to me about taking it, and then once he mentioned about the opportunities and the stuff that it really allows you to do, I was interested after that. It was because of my advisor pushing me and recommending it to me that I decided to do it.

Peers, who were largely identified as highly involved upperclassmen, also served as motivators, albeit in a different manner. In one respect, targeted peer interactions were initiated to verify or affirm a student's initial consideration to join a CLE program. Christopher illustrated this by stating, "having conversations with past fellows was very helpful because they let me know what the program structure looks like…from a student perspective, and how they fit it, and why they did it." Peers were also influential in a more vicarious manner. Past actions of peers, such as holding positional leadership roles, influenced students to emulate their actions. For example, Gabrielle reflected, "a lot of the people that influenced me were older students within the college who had been successful in other clubs, having offices or serving on committees and such." Similarly, Alex stated he "look[s] towards those people that had previously been involved in Litton Scholars and were involved on campus, and so they really recommended the program, which is partially why I joined."

Co-Engagement - Students attributed co-engagement, the prospect of learning from, or participating with, another individual or group of individuals, as a motivating ingredient to participate in a CLE program. For several students, this emerged as an opportunity to engage in a leadership experience with an existing friend. Oscar illustrates this by stating:

> Often times, I join an organization because my friend says, 'hey you should go do this with me', or 'this is a really cool thing that I'm going to do, and we're making an impact in these places' so for me, that's a big factor.

Others were intrigued by the prospect of interacting with, and learning from, others in a safe and welcoming environment. Students perceived these environments as spaces that allowed for personal connection, the sharing of different perspectives, and candid conversations. Alex, for example, spoke about the benefits of co-engagement with diverse students stating, “we can talk about things in other clubs and how we can apply those in other areas of our lives, too. And so for me that’s really cool, to see the different perspectives.” Ryan had similar thoughts stating, “I wanted to get to know people...so I could relate to them to a certain extent and really get to network in a way and kind of understand where they are coming from.”

Discussion

Participation in a CLE program was predominantly perceived as an opportunity that would afford particular outcomes, and these expected outcomes varied by student, ranging from outcomes corresponding to identity maintenance to identity change. Programmatic characteristics of particular CLE programs, which also varied within our sample, were seen as conduits fostering those outcomes. While a few students made the connection between programmatic characteristics and desired outcomes on their own, encouragement from others, especially peers and institutional professionals, significantly bolstered motivation. Specifically, motivation occurred as individuals illuminated programmatic characteristics in relation to outcomes the student would gain as a result of their participation. Karli, for example, initially searched for a CLE program her senior year in college because she wanted to enhance her resume and gain leadership skills prior to employment (expected outcomes). After initially hearing about one CLE program through a professor (social encouragement), she sought additional information about several CLE programs. This prompted Karli to revisit her initial conversation and seek an additional conversation with a second professor about what each program entailed. Eventually, Karli decided the focus and structure of Leadership Acade (program characteristics) would best afford her expected outcomes. Jessica, a student from a different university, also demonstrates the interactive nature of our theory; albeit in a different manner. Due to her high school leadership involvement in the National FFA Organization, her participation in a collegiate CLE program would afford a continuation of her existing leadership identity (expected outcomes). Conversations with alumni of the CLE program and professors (social encouragement) told her the program focus and structure (program characteristics) would be a great experience; thus, accomplishing her desires to learn from others and expand her thinking (expected outcomes).

Throughout the research process, it became increasingly evident that the primary concepts did not occur in isolation. Rather, each primary concept and secondary theme interacted to cultivate student motivation. While our research is a first step in exploring the complex and intricate nature of postsecondary student motivation, CLEM provides a useful genesis for further examination of CLE student motivation.

Conclusions

Leadership education exists, in part, to empower learners with the capacities needed to solve problems and initiate change for the betterment of our world. Increasingly, awareness suggests development of leadership capacities is not reserved for a select few and, in fact, all are well served to engage in leadership education (Ferdig, 2007). Expanding leadership education to a broader range of individuals presents an exciting challenge, and opportunity, for those who offer leadership education experiences. Seizing this opportunity requires answers to a myriad of questions, including identifying what motivates students to engage in leadership education. The current study sought to address this question by building a theory for student engagement in long-term, CLE programs at the postsecondary level.

The resultant theory includes three domains of related motivators, (a) program characteristics, (b) social encouragement, and (c) expected outcomes. Importantly, the three domains within the CLEM relate closely to the sources of motivation found by Moore et al. (2010) in their exploration, using McClelland's Achievement Motivation Theory, of student motivations to engage in a leadership learning community. Moore et al. found stronger evidence of motivation related to the need for achievement and the need for affiliation. The two domains of motivation supported by Moore et al. relate closely to two domains found in the current grounded theory. First, the expected outcomes theme is closely linked to the need for achievement, both indicating students engage in postsecondary leadership with a vision of gaining a more robust leadership skillset. Second, social encouragement is closely linked to the need for affiliation, illuminating the importance of others to increase awareness of, and commitment to, engaging in CLE. Further, neither Moore et al. nor the current grounded theory supports the need for power as a motivating factor for students engaged in postsecondary CLE programs. Building upon previous work, the CLEM adds program characteristics, recognizing student motivation for engaging in CLE is a reciprocal relationship between the individual and program, influenced by diversity of programs and individuals.

Recommendations

The current grounded theory illuminates the diversity of potential motivations to engage in postsecondary CLE programs while recognizing that the motivations mirror the diversity in students. Students enter into CLE programs with differing experiences and personal characteristics, such as Karli and Jessica in the current study. Karli enrolled in a CLE experience searching for academic minors in her senior year, while Jessica referred to her previous leadership engagement with the National FFA Organization. This study served to develop a general motivational theory for involvement in CLE programs; therefore, did not address this diversity among participants. Future research should explore how these diverse personal characteristics (e.g., class level, sex, major, URM status, career goals, past leadership experience) influence the salience of identified predictors. Additionally, CLE program leaders should empower the population of current and past program participants to recruit for the program, illuminating the success of students with diverse characteristics and experiences.

The diversity of students targeted by CLE programs implies diverse motivations for engagement; therefore, programs should not seek to homogenize. Rather, programs should illuminate, for students, what makes them distinct. This transparency of CLE program characteristics (e.g., vison, focus, target population, engagement level), may empower students to make more informed decisions about enrolling in a program best aligned with their personal motivations. Further research exploring CLE program marketing and student success may also illuminate strategies for the recruitment of successful students to specific CLE programs.

Postsecondary leadership experiences provide students opportunities to gain, enhance, and refine capacities useful in addressing complex challenges of the world. The current study sought to contribute to leadership education scholarship by providing the CLEM theory, grounded in CLE experiences of postsecondary students. This theory serves as a foundation for the exploration of postsecondary student motivation to enhance the practice and scholarship of leadership education.

References

Auerbach, C. F. & Silverstein, L. B. (2003). *Qualitative data: An introduction to coding and analysis*. New York, NY: NYU Press.

Berg, B. L. (2007). *Qualitative research methods for the social sciences* (6th ed.). Boston, MA: Pearson Education, Inc.

Brown, S. C. (2004). How college facilitates the development of wisdom. *Journal of College Student Development, 45*(2), p. 134-148. doi:10.1353/csd.2004.0020

Cho, Y., Harrist, S., Steele, M., & Murn, L. T. (2015). College student motivation to lead in relation to basic psychological need satisfaction and leadership self-efficacy. *Journal of College Student Development, 56*(1), 32-44. doi:10.1353/csd.2015.0005

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Dugan, J. P., & Komives, S. R. (2007). *Developing leadership capacity in college students: Findings from a national study*. A Report from the Multi-Institutional Study of Leadership. College Park, MD: National Clearinghouse for Leadership Programs.

Ferdig, M. A. (2007). Sustainability leadership: Co-creating a sustainable future. *Journal of Change Management, 7*(1), 25-35.

Glaser, B., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine.

Maxwell, J. A. (2005). *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, CA: Sage Publications.

Moore, L. L., Grabsch, D. K., & Rotter, C. (2010). Using achievement motivation theory to explain student participation in a residential leadership learning community. *Journal of Leadership Education, 9*(1), 22-34.

Posner, B. Z. (2009). A longitudinal study examining changes in students’ leadership behavior. *Journal of College Student Development, 50*(5), 551-563. doi: 10.1353/csd.0.0091

Rosch, D. M., Collier, D., & Thompson, S. E. (2015). An exploration of students' motivation to lead: An analysis by race, gender, and student leadership behaviors. *Journal of College Student Development, 56*(3), 286-291. doi: 10.1353/csd.2015.0031

Rosch, D. M., & Stephens, C. M. (2017). Campus involvement as a predictor for durable leadership development in conjunction with leadership program participation. *Journal of College Student Development, 58*(7), 1107-1112. doi: 10.1353/csd.2017.0087

Strauss, A., & Corbin, J. (1997). *Grounded Theory in Practice*. Thousand Oaks, CA: Sage.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research* (2nd ed.). Newbury Park, CA: Sage.

Discussant Remarks – 2018 AAAE National Conference

Student Motivations to Engage in Curricular Leadership Education: A Grounded Theory Approach

Discussant: Ed Osborne, University of Florida

This is a well-written paper focused on students' motivation to engage in the increasingly popular leadership education experiences available in colleges of agriculture. The authors link the seemingly unlimited array of societal challenges whose solutions demand effective leadership and raise the question of why more students are not enrolled in curricular leadership education, especially in light of the research evidence that supports the beneficial outcomes of these programs.

The grounded theory approach to the study was an appropriate method of inquiry and was well executed in the study. This approach allowed the researchers to gain in-depth perspectives on students' motivation to participate in curricular leadership education. Participating students were enrolled in a leadership academy, leadership minor, or leadership scholars program. The focus groups and individual interviews with students provided a complementary data set. The paper includes a detailed explanation of the coding process and the supporting rationale, which led to a sound overall approach and the identification of a small number of themes that were well supported by the data. The research team worked together throughout the data analysis process to ensure consistency and eliminate bias.

The resulting theory presented by the researchers includes three primary concepts that explain students' motivation to participate in curricular leadership education. The paper provides ample detail and supporting excerpts from the focus groups and interviews to support each of the emergent themes that comprise the resulting theory. The authors described the considerable connection between the theory of motivation developed in this study and McClelland's motivation theory. The sub-themes listed for each major concept were also well supported by the interview excerpts shared in the paper. The conceptual model suggests linkages between the three motivational factors. A more detailed explanation of the meaning and action of the words "Illuminates" and "Afford" would help the reader more fully understand the value and appropriateness of these pieces of the model. Further, as space allows, additional thoughts and ideas on how this research and the proposed theory could guide recruitment efforts would be very helpful to program leaders, instructors, staff, and administrators.

Overall, this was a very well conceived, executed, and presented study that has practical value for those providing leadership education experiences in colleges and universities.

A Measure of Motivation to Learn STEM Through Plant and Animal Science Classes

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Abstract

A profound need exists currently in the United States for an increased interest by schoolchildren in science, technology, engineering, and mathematics (STEM) based careers. This study focused on how undergraduate students conceptualized their motivation to learn contextualized agriscience while viewed through the lens of both Social Cognitive Theory and Azjen's Theory of Planned Behavior. This non-experimental, descriptive study focused on post-secondary students enrolled in an animal science or plant science course. The instrument used for this study was a modified version of the Science Motivation Questionnaire II (SMQ II). The SMQ II has been found to have good content validity and criterion-related validity. The science motivation scales with the highest reported average mean scores were grade motivation, career motivation, and intrinsic motivation. The self-determination and self-efficacy scales received lower ratings from the undergraduate students. There was a non-significant interaction effect and main effect of previous experience in college science courses, but the main effect of students' college major was found to be significant. Results from this study have identified that those researched found a greater motivation to learn the science in the plant and animal science course resulting from the contextualized approach than those taking traditional undergraduate science coursework.

Introduction

The need for a scientifically-literate American citizenry has been documented for several decades (Roberts, Harder, & Brashears, 2016; National Research Council [NRC], 1988). Changes in issues, technology, practices, and ideas require constant review, communication, and understanding between parties (i.e., producers and consumers, faculty and students, etc.) (Roberts et al., 2016). Moreover, as changes in science-related areas (e.g., agriscience) occur, educational needs change as well. For example, student achievement in science is often not at a level that could be expected of a diverse and technologically-advanced society (National Center for Education Statistics [NCES], 2017a). What is more, many students do not fare well in science content as measured by standardized testing. Throughout recent history, American public education students have not globally led in science achievement scores (NCES, 2017a). Rather, American students have underperformed in comparison to their international counterparts in Singapore, Vietnam, Germany, and other countries, as measured by the Program for International Student Assessment (PISA) science literacy scale (NCES, 2017b).

A profound need exists currently in the United States for an increased interest by schoolchildren in science, technology, engineering, and mathematics (STEM) based careers (Guzey, Harwell, & Moore, 2014). It has been projected that growth in the sciences, mathematics, computer, and engineering occupations will collectively increase by 69% between 2010 and 2020 (Lockard & Wolf, 2012), indicating an expressed need for future workers that have a career interest essential to competing with leading countries in STEM competencies, thus increasing our countries economic growth (Guzey et al., 2014).

However, the research has indicated that "We have been trying to prepare young people for a 21st- century workplace with 19th- century educational structures" (Drew, 2011, p. 18). All of which is an indicator that the United States cannot currently keep up with the need for graduates capable of meeting the demand in STEM career areas (Byars-Winston, 2014). Research by Gardner (1983) in *A Nation at Risk: The Imperative for Educational Reform,* affirmed that "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war" (p. 5). A profound statement, but one that should be a wakeup call to the United States considering STEM related occupations are essential to continued and sustained economic growth (Babco, 2004). A number of factors exist as contributors to the lack of adequately trained workers in STEM career areas: ". . . individual differences in career preferences, inadequate science and mathematics academic preparation, [and] poor STEM classroom experiences . . ." (Byars-Winston, 2014, p. 343).

All that said, a considerable effort towards change from what has traditionally occurred in the past regarding the emphasis and integration of contextualized learning is gaining momentum (National Research Council [NRC], 2009). It has been realized (NRC, 2009) that the integration of practical hands-on, minds-on activities through problem-solving approaches has been shown to elevate student interest in the criterion material, thereby increasing achievement and motivation levels of students as a result (NRC, 2009).

Agricultural education has taken a prominent role in emphasizing and contextualizing STEM content through the global agriculture, food, fiber, and natural resources systems (Myers & Dyer, 2006; Parr, Edwards, & Leising, 2006; Parr, Edwards, & Leising, 2008; Sanders, 2008; Thompson & Balschweid, 2000; Warnick & Thompson, 2007; Young, Edwards, & Leising, 2009). Through documented research in student scientific and mathematics achievement, indicators exist that support the ability of agricultural education to be a means to student success in STEM content areas, not only on the secondary level, but through post-secondary education as well (Chiasson & Burnett, 2001; Conroy & Walker, 2000; Parr et al., 2006; Ricketts, Duncan, & Peake, 2006). Researchers (Stubbs & Myers, 2016) have identified that future careers in agriculture will necessitate a greater need in content knowledge and capacities and has identified that agricultural education is ideal for focusing student abilities into achievement through a contextualized pedagogical approach (Stubbs & Myer, 2016).

Theoretical Framework

This study on how undergraduate students conceptualized their motivation to learn contextualized science (agriscience) is viewed through the lens of both *Social Cognitive Theory* (Bandura, 1986; 2001), and Azjen's *Theory of Planned Behavior* (1991). Social Cognitive Theory regards the thought that a considerable amount of learning attempted by humans occurs best in a social environment (Schunk, 2008). Schunk (2008) goes on to clarify that through social interaction, ". . .people acquire knowledge, rules, skills, strategies, beliefs, and attitudes" (p. 78), that contributes to the retention of knowledge in the learning process. The experiences gained through both direct or observational episodes are then stored and reserved for future use, and can be influenced through social interaction with others (i.e., family, friends, associates, etc.) (Bandura, 1986).

The triadic reciprocality model of *Social Cognitive Theory* (Bandura, 1986) suggests that "behavior, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other" (p. 18), and constantly occur or change over a lifetime. When operationalizing the triadic reciprocality model, the authors chose Stripling and Roberts' (2013) version to reference as follow: "behavior is the teaching of contextualized mathematics, external environment is the teacher education program, and personal factors are self-efficacy and mathematics ability" (p. 138), found in *Investigating the Effects of a Math-Enhanced Agricultural Teaching Methods Course* (Stripling & Roberts, 2013). The model combines interacting variables (i.e., behavior, human factors, and environmental factors and events) as factors (Bandura, 1986) relating to how undergraduate college students theorized their incentive to learn science through a conceptualized approach. In this instance, the authors allow for *behavior* to be the contextualized instruction of science (agriscience), *personal factors* as individualistic efficacy and aptitude in science, and *external factors and events* as science-based courses related to plant and animal science (Figure 1).

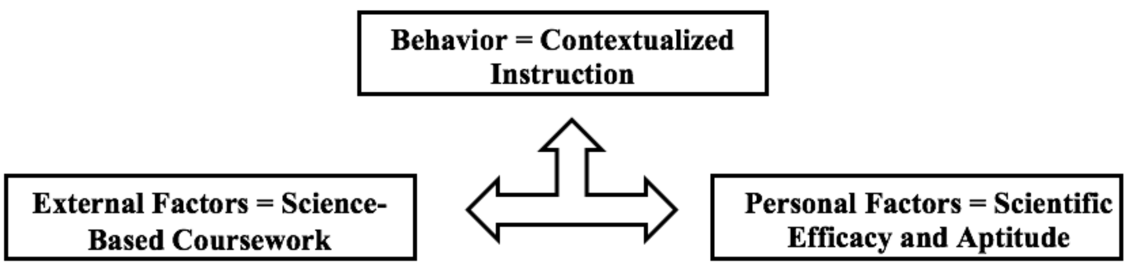

Figure 1. Triadic reciprocality model. Adapted from Bandura (1986).

The *Theory of Planned Behavior* (Azjen, 1991) extends from Fishbein and Azjen's theory of reasoned action (1975). They both exhibit informational and motivational developmental influences and their relationships on behavior (Connor & Armitage, 1998). According to Chumbley, Haynes, and Stofer (2015), "The theory of planned behavior suggests that behavioral intentions can be best viewed as consequences of an individual's attitude, which is a result of values and beliefs, in turn affected by demographic variables and knowledge" (p. 109). When the data for this study is holistically analyzed through both lens, the value and benefit of learning contextualized science by collegiate undergraduate students is evident.

Objectives

The purpose of this study was to identify how undergraduate agriculture science students conceptualized their motivation to learn agriscience. The researchers also sought to determine whether previous experience in college science courses or the students' grade classification had an impact on these motivational factors. Specific objectives of this study were to:

1. Evaluate motivational factors of undergraduate students to learn in science-based courses related to plant and animal science.

2. Determine the main effects of the college major of students and previous experience in college science courses, and the interaction effect between the two factors on undergraduate students' science motivation. To assess the second research objective, the following null hypothesis were tested:

$H_0$1: In the population, there is no statistically significant difference in the science motivation scores due to the interaction of undergraduate students' college major and their previous experience in college science courses ($H_{0(\text{Previous experience in college science courses x College Major})}$).

$H_0$2: In the population, there is no statistically significant difference in the science motivation scores of undergraduate students due to their previous experience in college science courses ($H_02_{(\text{Previous experience in college science courses})}$: $\mu_1 = \mu_2$ in the population).

$H_0$3: In the population, there is no statistically significant difference in the science motivation scores of undergraduate students due to the student's major ($H_03_{(\text{College Major})}$: $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$ in the population).

Furthermore, this study addresses Research Priority Four of the American Association for Agricultural Education (AAAE) National Research Agenda – Meaningful, Engaged Learning in All Environments (Edgar, Retallick, & Jones, 2016). The indicated need to explore elements impacting student interest and motivation, posited in the fourth research priority area (Edgar et al., 2016; NRC, 2009), adds credence to the need for this study, which explored the science motivations of post-secondary students.

Methods

This non-experimental, descriptive study focused on post-secondary students enrolled in an animal science or plant science course at Texas A&M University-Kingsville (TAMUK). Participants were selected based upon the criteria that they were enrolled in at least one animal science (AGSC **** "Livestock Production") or plant science (PLSS **** "Introduction to Plant Science") course. After IRB approval, surveys were collected after class during the third week of the Spring 2017 semester.

Participants

Of the 240 students asked to participate in this study, 173 students (72% response rate) responded to the instrument. The undergraduate students which participated in this study were mostly female (n = 107, 63%) and had previously taken a college science course (i.e., biology and/or chemistry; n = 117, 75%). In regard to the grade classification of the students, 52 (31.33%) were freshman, 36 (21.69%) were sophomores, 48 (28.92%) were juniors, and 30 (18.07%) of the students indicated they were seniors. The majority of students indicated their GPA fell within the 2.51 - 3.0 (n = 47, 39.8%) and 3.01 - 3.5 (n = 39, 33.1%) ranges. Moreover, only one student (0.8%) indicated their GPA was below the 2.0 threshold.

Instrumentation

The instrument used for this study was a modified version of the Science Motivation Questionnaire II (SMQ II) (Glynn, Brickman, Armstrong & Taasoobshirazi, 2011). Glynn and Koballa (2006), developed the Science Motivation Questionnaire to assess the motivation of students to learn science. The 25-question instrument included the following five-item scales: *intrinsic motivation*, *self-determination*, *self-efficacy*, *career motivation*, and *grade motivation.* Each item was coupled with a five-point Likert-type scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*).

The Science Motivation Questionnaire was originally designed to assess students' general motivations to learn science. The items of the revised questionnaire were designed so that the word "science" in each item can be replaced with the word biology, chemistry, or agriscience, respectively (Taasoobshirazi & Glynn, 2009). Glynn and Koballa (2006) posited the instrument was applicable in all facets of science. For the purposes of this study, the general term, "science," was replaced by the term "agricultural science."

The Science Motivation Questionnaire II has been found to have good content validity and criterion-related validity (Glynn et al., 2011). Face and content validity was confirmed for this study through the use of a panel of experts comprised of university faculty. The panel felt the statements "my career will involve agriculture science" and "I will incorporate agriculture science in my career" were too similar. The latter was removed, leaving the researchers with 24 motivation statements in the instrument. The possible score range on each of the five 5-item sub-scales was 5–25. Overall, a participant's summated score could range from 24-120. The survey instrument began with the prompt, "In order to better understand what you think and how you feel about agriscience, please respond to each of the following statements from the perspective of "When I am in an agricultural science course . . ."

As recommended by DeVellis (2003), the items were randomly ordered, strongly worded, unambiguous declarative statements in the form of short, simple sentences without jargon. The Flesch-Kincaid formula indicated readability at the sixth-grade level (Taasoobshirazi & Glynn, 2009). The items were focused on the motivation to learn science in courses rather than a multitude of contexts, such as hobbies. Reliability of the Science Motivation Questionnaire II resulted in Cronbach's Alpha Coefficient of 0.92 (Glynn et al., 2011), the same reliability coefficient was found for this study (.922). The reliability of the individual scales assessed by Cronbach's alphas for the modified instrument was: career motivation (0.9), intrinsic motivation (0.89), self-determination (0.88), self-efficacy (0.56), and grade motivation (0.84).

Data Analysis

Collected data was entered and analyzed using the Statistical Package for Social Sciences (SPSS©), version 25. Descriptive statistics (i.e., percentages, frequencies, means, and standard deviations) were calculated to evaluate items related to demographic characteristics and science motivation. In regard to science motivation items, measures of central tendency and dispersion were computed to analyze individual items, science motivation scales, and the average of science motivation scores.

For the second objective, a 5 x 2 factorial ANOVA was conducted to assess the main effects of students' majors (i.e. Agricultural Science – Teaching Certification, Agricultural Science, Agribusiness, Animal Science, and Wildlife), students previous experience in college science courses (i.e., have previous experience or do not have previous experience), and the interaction effect between the two factors on students' overall science motivation, tested at the significance level of .05 *a priori*. To determine the practical significance of the findings, partial eta square (η_p^2) effect sizes were calculated. Effect sizes were interpreted using descriptors predicated by Kirk (1996). Specifically, effect sizes ranging from 0 - .010 were considered to be small, .011 - .059 were described as medium, and effect sizes greater than .138 were considered to be large (Kirk, 1996).

Findings

The first objective sought to measure the motivational science learning factors of plant and animal science undergraduate students. The science motivation scales with the highest reported average mean scores were grade motivation (M = 4.63, SD = 0.65), career motivation (M = 4.61, SD = 0.78), and intrinsic motivation (M = 4.39, SD = 0.82); the self-determination (M = 4.19, SD = 0.83) and self-efficacy (M = 4.18, SD = 1.09) scales received lower ratings from the undergraduate students (see Table 1).

Table 1
Measurement of Individual Factors Motivating Student Learning (n = 173)

	M	*SD*
Grade Motivation		
Scoring high on agricultural science tests and labs matters to me	4.75	0.58
It is important that I get an "A" in agricultural science courses	4.72	0.60
Getting a good agricultural science grade is important to me	4.72	0.62
I think about the grade I will get in agricultural science courses	4.64	0.68
I like to do better than other students on agricultural science tests	4.30	0.78
Career Motivation		
Knowing agricultural science will give me a career advantage	4.65	0.70
Learning agricultural science will help me get a good job	4.63	0.76
Understanding agricultural science will benefit me in my career	4.64	0.75
My career will involve agricultural science	4.52	0.89
Intrinsic Motivation		
Learning agricultural science is interesting	4.55	0.72
I enjoy learning agricultural science	4.53	0.75
I am curious about discoveries in agricultural science	4.46	0.82
Learning agricultural science makes my life more meaningful	4.22	0.92
The agricultural science I learn is relevant to my life	4.18	0.87
Self-Determination		
I put enough effort into learning agricultural science	4.39	0.71
I study hard to learn agricultural science	4.21	0.89
I prepare well for agricultural science tests and labs	4.16	0.80
I use strategies to learn agricultural science well	4.12	0.84
I spend a lot of time learning agricultural science	4.08	0.91
Self-Efficacy		
I am sure I can understand agricultural science	4.29	0.73
I believe I can master agricultural science knowledge and skills	4.17	0.77
I believe I can earn a grade of "A" in agricultural science courses	4.17	0.78
I am confident I will do well on agricultural science labs and projects	4.16	0.79
I am confident I will do well on agricultural science tests	4.13	2.36

Note. 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*.

In regard to participants' indication of occurrence of various sources of motivation, participants' responses ranged from *often* to *always* on all items on the Science Motivation Questionnaire (Glynn & Koballa, 2006). Belonging to the grade motivation scale, the items with the highest mean scores were "scoring high on agricultural science tests and labs matters to me" (M = 4.75, SD = 0.58), "it is important that I get an "A" in agricultural science courses" (M = 4.72, SD = 0.60), and "getting a good agricultural science grade is important to me" (M = 4.72, SD = 0.62). The two items with the lowest mean scores were "I use strategies to learn agricultural science well" (M = 4.12, SD = 0.84, *Scale*: Self-Determination) and "I am confident I will do well on agricultural science tests" (M = 4.13, SD = 2.36, *Scale*: Self-Efficacy).

The second objective sought to evaluate the main effects of the college major of students and their previous experience in college science courses, and the interaction effect between the two factors on undergraduate students' science motivation. Before analyzing the interaction effect and main effects of the investigated factors, potential sources of bias were assessed. Homogeneity of variance was evaluated using Levene's test, which yielded a non-significant result $F(9, 150) = 1.25$, $p = .27$. A factorial 5 x 2 ANOVA was conducted to compare the main effects of college major and previous experience in college science courses, and the interaction effect between the two factors, on science motivation scores.

The interaction effect between the major of the student and previous experience in college science courses, on the student's science motivation score was not found to be statistically significant $F(3, 150) = 0.94$, $p = .43$. Therefore, the null hypothesis was not rejected (see Table 2).

Table 2

Analysis of Variance Source Table of Effects of College Major and Previous Experience in College Science Courses on the Dependent Variable of Science Motivation Score.

	SS	*df*	*MS*	*F*	*p*	η_p^2
Corrected Model	7.00	9	0.78	2.98	.003*	
Intercept	765.84	1	765.84	2932.50	<.001*	
Major	2.76	4	0.69	2.65	.036*	.066
CE	1.93	2	0.96	3.69	.027*	.047
Major * CE	0.73	3	0.24	0.94	.43	.018
Error	39.17	150	0.26			
Total	3099.58	160				

Note. $R^2 = .152$, Adjusted $R^2 = .101$, $*p < .05$. CE = Previous Experience in College Science Courses (i.e., biology and/or chemistry).

Kirk (1996) indicated the main effects of a factorial ANOVA should be evaluated when the interaction effect is not found to be statistically significant. The main effect of previous experience in college science courses on the average science motivation score of the student was statistically significant $F(2, 150) = 3.69$, $p = .027$, $\eta_p^2 = .049$, and the second null hypothesis ($H_02_{\text{(Previous experience in college science courses)}}$: $\mu_1 = \mu_2$ in the population) was rejected. The effect size for this main effect was considered to be small (Kirk, 1996). This finding indicated the students with previous experience in college science courses ($M = 4.36$, $SD = .56$) had significantly lower scores in comparison to students who had not previously taken college science courses ($M = 4.46$, $SD = .39$).

The main effect of college major on the student's average science motivation score was statistically significant $F(4, 150) = 2.65$, $p = .036$, $\eta_p^2 = .066$) with a medium effect size (Kirk, 1996). Therefore, the third null hypothesis ($H_03_{\text{(College Major)}}$: $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$ in the population) was rejected. A Bonferroni post hoc test was conducted to evaluate where the significant differences science motivation scores existed between students of various majors (see Table 3).

Table 3
Means and Standard Deviations for Science Motivation Scores by Students' Majors (n = 161)

Major	*n*	M^1	*SD*
Agricultural Science – Teaching Certification	30	4.69^{ab}	0.37
Agricultural Science	29	4.49	0.52
Agribusiness	19	4.30	0.57
Animal Science	65	4.27^{a}	0.58
Wildlife	18	4.15^{b}	0.49

Note. ^{1} = Subscripts with differing letters are significantly different at ^{a}.010 and ^{b}.013.

The post hoc test revealed agricultural science-teaching certification students (M = 4.69, SD = .37) had significantly higher science motivation scores when compared to students majoring in animal science (M = 4.27, SD = 0.58) and wildlife (M = 4.15, SD = 0.49).

Conclusions

The purpose of this study was to identify how undergraduate agricultural science students conceptualized their motivation to learn about agricultural science. This study also sought to determine if students' previous experience in college-level science courses and grade classification had an impact on their science motivation. Although this research study provided insight on the agricultural science undergraduate students' sources of motivation to learn science, caution should be exercised when attempting to generalize the findings beyond the participants in this science motivation study.

The first research objective sought to assess various motivational factors (i.e., intrinsic motivation, self-determination, self-efficacy, career motivation, and grade motivation) of undergraduate students to learn in science-based courses related to plant and animal science. Of the five science motivation scales, the agricultural science undergraduate students reported highest agreement with items related to grade motivation, career motivation, and intrinsic motivation. Similar to the findings of this study, Chumbley et al. (2015), who assessed the science motivation of secondary agricultural science students, reported the students' highest motivating factor to learn science was grade motivation. The impact of academic achievement in science courses has been reported to be a strong motivational factor in students' motivation to learn science in previous literature (Pintrich & Schunk, 1996; Tuan, Chin, & Shieh, 2005).

The second highest rated motivational factor was career motivation. According to previous research, the lack of students' motivation to learn science can be linked to their inability to conceptualize the applicability of science in their future careers (Arwood, 2004; Druger, 1998; Glynn, Taasoobshirazi, & Brickman, 2007). Moreover, Glynn et al. (2007) indicated an individual's belief that science is relevant to their career has the propensity to influence the achievement of the individual, both cognitively and affectively. Based on the findings of this study, it is implied that the undergraduate students perceive science to be closely linked to their career aspirations.

The second objective of this research study was to determine the main effects of the college major of students and previous experience in college science courses, and the interaction effect between the two factors on undergraduate students' science motivation. The two-way ANOVA indicated there was a non-significant interaction effect and main effect of previous experience in college science courses, but the main effect of students' college major was found to be significant. More specifically, students which were pursuing a degree in agricultural education had a significantly higher level of science motivation when compared to students pursing a degree in wildlife or animal science.

Interestingly, the students' previous experience in college science courses (e.g., biology or chemistry) did not have a significant effect on their motivation to learn agricultural science. The finding of a non-significant effect of previous experience in college science courses, coupled with the finding that students largest overall source of science motivation was derived from grade motivation, might imply their current levels of science motivation might have been impacted by their previous achievement in the college science courses. According to Tuan et al. (2005), the science motivation levels of students are significantly correlated with the students' current and previous achievement scores in science courses. Furthermore, Pintrich and Schunk (1996) posited that students' science achievement scores can serve as an indirect predictor of the students' science motivation.

Recommendations for Research

This study sought to determine the primary motivational factors of undergraduate students to learn science through a contextualized approach. The highest motivational factor was found to be in academic achievement. According to Bandura (1986), the drive to succeed solely for academic achievement is classified as extrinsic in nature, which is only satisfied via the immediate desire for success. As such, the desire and motivation to learn science is not satisfied through the desire to learn science itself. According to the Center for Educational Research and Innovation (2000), students who are intrinsically-motivated will exert more effort to process information at a deeper level. In contrast, students which are extrinsically-motivated are likely to put forth minimum effort to ascertain a given reward. Research should be conducted to determine what methods might exist to encourage an intrinsic motivation to learn science. Could this be a result of the instructor's lack of pedagogical abilities to motivate their students to want to learn the science?

It is also important to consider where the students stand in regard to the spectrum of learning theories (e.g., pedagogy or andragogy). The strong focus on academic achievement, reported by the participants, might indicate that they ascribe to aspects of pedagogy. Future science motivation research should focus on the learning styles of the students and their preferred teaching approaches. The age of the students should not serve as the sole determinant of preferred learning styles. McGrath (2009) posited that many adult learners have been deeply immersed in pedagogical learning environments, making them reluctant to engage in adult learning activities. Focusing on students' learning behavior, the role of previous experiences, orientation to learning, and readiness to learn (Knowles, Elwood, Holton, & Swanson, 1998), will provide further insight on factors associated with students' motivation to learn science. As such, it is recommended that further research on the science motivation of agricultural science students should focus on the impact of science achievement (i.e., current and present) on the students' science motivation.

It was also identified of the importance of readily identifying a career as a motivator to learn science. The research identified that those students who found a reason behind learning the science content, such as a way they could utilize it in the real world found it to be motivational to do so. Researchers have found that contextualizing the science as well as other STEM content provides a reason behind the learning and allows it to be seen as important to the learner (Haynes, Robinson, Edwards, & Key, 2012; Myers & Dyer, 2006; Parr et al.,2006; Parr et al., 2008; Thompson & Balschweid, 2000; Warnick & Thompson, 2007; Young et al., 2009). Results from this study have identified that those researched found a greater motivation to learn the science in the plant and animal science course resulting from the contextualized approach of those taking traditional undergraduate science coursework.

Finally, due to the relatively small sample size (n = 173) participating in the study, it is recommended that the research be replicated to support the findings of this research. The participants in this research study were students enrolled in a plant or animal science course at TAMUK. This convenience sample limits the ability to generalize the findings beyond the students enrolled in these courses. To enhance the generalizability of this study, it is recommended that similar science motivation studies should be conducted with a probabilistic sample.

Recommendations for Practice

The students who participated in this study indicated their motivation to learn science was largely influenced by their desire to achieve high grades. This extrinsic source of motivation might indicate that the students perceive involvement in the animal and plant science courses as a means to an end. Measures should be taken to enhance the intrinsic desire of students to learn science. Through the lens of the *Self-Determination Theory* (SDT), Kusurkar, Croiset, and Ten Cate (2011) put forth 12 practical teaching tips to enhance intrinsic motivation of students, including: (1) identify and nurture what students need and want, (2) have students' internal states guide their behavior, (3) encourage active participation, (4) encourage students to accept more responsibility for their learning, (5) provide structured guidance, (6) provide optimal challenges, (7) give positive and constructive feedback, (8) give emotional support, (9) acknowledge students' expressions of negative effect, (10) communicate value in uninteresting activities, (11) give choices, and (12) direct with "can, may, could" instead of "must, need, should." Professional development should be provided to faculty in the Dick and Mary Lewis Kleberg College of Agriculture, Natural Resources and Human Sciences at TAMUK, to provide them with teaching tools to bolster students' intrinsic desires to learn science content.

The findings of this study indicated the students' motivation to learn science was linked to their ability to see connections between the science content and their career aspirations. Glynn et al. (2007) reported similar results and recommended that "instructors should do more to connect concepts in life science and physical science to the varied careers that non-science majors have in mind" (p. 1102). Furthermore, Glynn et al. posited it was unrealistic to expect students to make connections between science and their careers on their own. It is recommended that faculty from both traditional and contextualized science courses crosswalk their curriculums to emphasize where career opportunities may occur as a result of learning the science. The faculty members should be strategic when deciding which career opportunities to highlight. It is important the instructors link science concepts with the actual career aspirations of the students in the course. To accomplish this task, instructors need to develop an understanding of their students' interest, readiness to learn, and career goals. Having a deeper understanding of the students' aspirations will allow them to make appropriate connections—thus moving away from the "one size fits all" mindset.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. doi:10.1016/0749-5978(91)90020-T

Arwood, L. (2004). Teaching cell biology to non-science majors through forensics, or how to design a killer course. *Cell Biology Education, 3*(1), 131–138. doi:10.1187/cbe.03-12-0023

Babco, E. (2004). *Skills for the innovation economy: What the 21st century workforce needs and how to provide it*. Washington, DC: Commission on Professionals in Science and Technology.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice- Hall, Inc.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*(1), 1-26. doi:10.1146/annurev.psych.52.1.1

Byars-Winston, A. (2014). Toward a framework for multicultural STEM-focused career interventions. *The Career Development Quarterly, 62*(4), 340-357. doi:10.1002/j.2161-0045.2014.00087.x

Chiasson, T. C., & Burnett, M. F. (2001). The influence of enrollment in agriscience courses on the science achievement of high school students. *Journal of Agricultural Education, 42*(1), 60-70. doi:10.5032/jae.2001.01061

Chumbley, S. B., Haynes, J. C., & Stofer, K. A. (2015). A measure of students' motivation to learn science through agricultural STEM emphasis. *Journal of Agricultural Education, 56*(4), 107-122. doi:10.5032/jae.2015.04107

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*, 1429-1464.

Conroy, C. A., & Walker, N. J. (2000). An examination of integration of academic and vocational subject matter in the aquaculture classroom. *Journal of Agricultural Education, 41*(2), 54-64. doi:10.5032/jae.2000.02054

DeVellis, R.F. (2003). *Scale development: Theory and applications*. (2nd ed.) Thousand Oaks, CA: Sage.

Drew, D. E. (2011). *Stem the tide: Reforming science, technology, engineering, and math education in America*. Retrieved from https://ebookcentral.proquest.com

Druger, M. (1998). Creating a motivational learning environment in large, introductory science courses. *Journal of Natural Resources and Life Sciences Education*, *27*(1), 80–82. Retrieved from https://eric.ed.gov/?id=EJ582706

Edgar, D. W., Retallick, M. S., & Jones, D. (2016). Research priority 4: Meaningful, engaged learning in all environments. In T. G. Roberts, A. Harder, & M. T. Brashears. (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020.* Gainseville, FL: Department of Agricultural Education and Communication.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research.* Reading, MA: Addison-Wesley.

Gardner, D. P., & National Commission on Excellence in Education (ED), Washington, DC. (1983). *A nation at risk: The imperative for educational reform. an open letter to the american people. A report to the nation and the secretary of* education. Distributed by ERIC Clearinghouse.

Guzey, S. S., Harwell, M., & Moore, T. (2014). Development of an instrument to assess attitudes toward science, technology, engineering, and mathematics (STEM). *School Science and Mathematics*, *114*(6), 271-279. doi:10.1111/ssm.12077

Glynn, S. M., Brickman, P., Armstrong, N., & Taasoobshirazi, G. (2011). Science motivation questionnaire II: Validation with science majors and nonscience majors. *Journal of Research in Science Teaching, 48*(10), 1159–1176. doi:10.1002/tea.20442

Glynn, S. M., & Koballa, T. R. (2006). *Motivation to learn in college science*. In J. J. Mintzes & W. H. Leonard (Eds.), Handbook of college science teaching, 25–32. Arlington, VA: National Science Teachers Association Press.

Glynn, S. M., Taasoobshirazi, G., & Brickman, P. (2007). Nonscience majors learning science: A theoretical model of motivation. *Journal of Research in Science Teaching*, *44*(8), doi:1088-1107. 10.1002/tea.20181

Haynes, J. C., Robinson, J. S., Edwards, M. C., & Key, J. P. (2012). Assessing the effect of using a science-enhanced curriculum to improve agriculture students' science scores: A causal comparative study. *Journal of Agricultural Education*, *53*(2), 15. doi:10.5032/jae.2012.02015

Kirk, R. E. (1996). Practical significance: A concept whose time has come. *Educational and Psychological Measurement*, *56*(5), 746–759. doi:10.1177/0013164496056005002

Knowles, M. S., Elwood, R., Holton, R., III, & Swanson A. (1998). *The adult learner: The definitive classic in adult education and human resource development* (5th ed.). New York, NY: Heinemann.

Kusurkar, R. A., Croiset, G., & Ten Cate, O. T. J. (2011). Twelve tips to stimulate intrinsic motivation in students through autonomy-supportive classroom teaching derived from self-determination theory. *Medical teacher, 33*(12), 978-982. doi:10.3109/0142159X.2011.599896

Lockard, C. B., & Wolf, M. (2012). Employment outlook: Occupational employment projections to 2020. *Monthly Labor Review, 135*(1), 84-108.

McGrath, V. (2009). Reviewing the evidence on how adult students learn: An examination of Knowles' model of andragogy. *Adult Learner: The Irish Journal of Adult and Community Education*, 99-110. Retrieved from https://eric.ed.gov/?id=EJ860562

Myers, B. E., & Dyer, J. E. (2006). Effects of investigative laboratory instruction on content knowledge and science process skill achievement across learning styles. *Journal of Agricultural Education*, *47*(4), 52–63. doi: 10.5032/jae.2006.04052

National Center for Education Statistics (2017a). International comparisons of achievement. Retrieved from https://nces.ed.gov/FastFacts/display.asp?id=1

National Center for Education Statistics (2017b). International comparisons: Science, reading, and mathematics literacy of 15-year-old students. Retrieved from https://nces.ed.gov/programs/coe/indicator_cnu.asp

National Research Council. (1988). *Understanding agriculture: New directions for education*. Washington, DC: National Academy.

National Research Council. (2009). *Engineering in K–12 education: Understanding the status and improving the prospects*. Washington, DC: National Academies Press.

OECD. (2000). *Motivating students for lifelong learning. Center for Educational Research and Innovation.* Retrieved from ERIC Academic Database (ED449566).

Parr, B. A., Edwards, M. C., & Leising, J. G. (2006). Effects of a math–enhanced curriculum and instructional approach on the mathematics achievement of agricultural power and technology students: An experimental study. *Journal of Agricultural Education, 47*(3), 81–93. doi: 10.5032/jae.2006.03081

Parr, B. A., Edwards, M. C., & Leising, J. G. (2008). Does a curriculum integration intervention to improve the mathematics achievement of students diminish their acquisition of technical competence? An experimental study in agricultural mechanics. *Journal of Agricultural Education*, *49*(1): 61–71. doi: 10.5032/jae.2008.01061

Pintrich, P., & Schunk, D. (1996). The role of expectancy and self-efficacy beliefs. *Motivation in education: Theory, research & applications*, (3).

Ricketts, J. C., Duncan, D. W., & Peake, J. B. (2006). Science achievement of high school students in complete programs of agriscience education. *Journal of Agricultural Education, 47*(2), 48-56. doi:10.5032/jae.2006.02048

Roberts, T. G., Harder, A., & Brashears, M. T. (2016). American Association for Agricultural Education national research agenda: 2016-2020. *Gainesville, FL: Department of Agricultural Education and Communication*.

Sanders, M. (2008). STEM, STEM education, STEMmania. *The Technology Teacher, 68*(4), 20–26.

Schunk, D. H. (2008). *Learning theories: An educational perspective* (5th ed.). Upper Saddle River, N.J: Pearson/Merrill Prentice Hall.

Stubbs, E. A., & Myers, B. E. (2016). Part of What We Do: Teacher Perceptions of STEM Integration. *Journal of Agricultural Education*, *57*(3), 87-100. doi: 10.5032/jae.2016.03087

Stripling, C. T., & Roberts, T. G. (2013). Investigating the effects of a math-enhanced agricultural teaching methods course. *Journal of Agricultural Education, 54*(1), 124–138. doi: 10.5032/jae.2013.01124

Taasoobshirazi, G. & Glynn, S. M. (2009). College students solving chemistry problems: A theoretical model of expertise. *Journal of Research in Science Teaching, 46*(10), 1070–1089. doi:10.1002/tea.20301

Thompson, G. W., & Balschweid, M. M. (2000). Integrating science into agriculture programs: Implications for addressing state standards and teacher preparation programs. *Journal of Agricultural Education, 41*(2), 73–80. doi: 10.5032/jae.2000.02073

Tuan, H., Chin. C., & Shieh. S. (2005) The development of a questionnaire to measure students' motivation towards science learning, *International Journal of Science Education, 27*(6), 639-654. DOI: 10.1080/0950069042000323737

Warnick, B. K., & Thompson, G. W. (2007). Barriers, support, and collaboration: A comparison of science and agriculture teachers' perceptions regarding integration of science into the agricultural education curriculum. *Journal of Agricultural Education, 48*(1), 75–85. doi: 10.5032/jae.2007.01075

Young, R. B., Edwards, M. C., & Leising, J. G. (2009). Does a math-enhanced curriculum and instructional approach diminish students' attainment of technical skills? A year-long experimental study in agricultural power and technology. *Journal of Agricultural Education, 50*(1), 116–126. doi: 10.5032/jae.2009.01116

Discussant Remarks – 2018 AAAE National Conference

A Measure of Motivation to Learn STEM through Plant and Animal Science Classes

Discussant: Ed Osborne, University of Florida

This study examined contextualization, specifically in agriculture, as one possible avenue for increasing undergraduate students' motivation to learn science. The authors highlight the need for increasing science literacy and achievement in the U.S., driven by the high proportion of science-based careers today and in the future. Theory and research support the advantage of learning science in an applied field, such as agriculture, as indicated in the introductory section of the paper. The use of social cognitive theory and the theory of planned behavior provide an appropriate theory base for the study. I'd suggest that the authors move the last sentence in the theoretical framework section to the discussion section of the paper.

The convenience sample contained ample diversity with respect to GPA, class rank, gender, and previous science course work. Also, the Science Motivation Questionnaire II used as the instrument source in the study has an established, high reliability, and the instrument as modified by the researchers had an equally high reliability estimate, except for the self-efficacy scale. I was a bit confused by the phrase "motivation to learn contextualized agriscience" (versus motivation to learn science in the context of agriculture) and encourage the authors to be more precise in this wording throughout the paper. The "agricultural science" wording in the revised scale also seems unclear. For example, "Learning science in an agricultural context is interesting" would have been a clearer and more precise statement in the Intrinsic Motivation section of the instrument as opposed to "Learning agricultural science is interesting." I believe each of these statements measures a different idea, and the wording in the former statement reflects the intended purpose of this study. The items in the revised scale may not accurately or consistently clearly measure students' motivation and perceptions about agriculture courses (plant and animal science) as the context for learning science. In the end, the study may have actually measured students' overall motivation to do well in their agriculture courses, without much regard for the opportunity to learn science in that context.

With regard to the instrument, was the original SMQ II organized into the subscales used in this study? If so, what were the reliability coefficients for the original scale? The order in which the items are listed in Table 1 is very interesting, based on the mean score. The list indicates very high grouping of the sets of items, which is a bit surprising. How were the mean scores in this table interpreted? Assuming a mean of 3.50 to 4.49 was considered "Often," based on the values in the scale, and those with a mean of 4.50 and higher were considered "always," this was a highly motivated group of students, as measured by this instrument. However, this may reflect their motivation to do well in their agriculture courses versus their motivation to learn science in an agricultural context. Finally, more information on the previous science courses completed by the students and their performance in each would have been useful in interpreting the results related to that variable.

**Creating Relevancy in Scientific Information:
An Analysis of the Impact of Motivational Salience and Involvement on Visual Attention**

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Note: This material is based upon work that is supported by the NLGCA Capacity Building Grants [grant no. 2017-70001-25991] from the USDA National Institute of Food and Agriculture.

Abstract

Agricultural communications literature has indicated scientists are struggling to make information salient to consumers. Prior studies have examined the efficacy of message frames and types of appeals that increase visual attention and information processing among general consumers. Research suggests that value-oriented frames may connect with consumers through increased personal involvement and motivational salience. To evaluate the effects of competing message frames on visual attention, an eye-tracking experiment was conducted to understand the interaction between pre-existing attitudes and issue involvement on participants' attention to messages about genetic modification and antibiotic use in livestock. For products that are low in issue involvement (i.e., food products and scientific information), the results indicated the reader devoted more time to reading advertisements that were framed to be more motivationally salient (i.e., the value-oriented frame). Because selective attention is the first part in the sequence of how individuals process information and form attitudes, agricultural science communicators should highlight values and motivational salience in their messaging. Recommendations for practitioners and the use of eye tracking as a research tool are described.

Keywords: Advertorials, Motivation, Salience, Value-Oriented, Visual Attention Allocation

Introduction and Literature Review

Traditionally, agricultural communication efforts have provided scientifically based information to increase positive perceptions and trust; however, researchers and scientists argue logical and scientific reasoning are not capturing the attention of the public audience (Ruth, Gay, Rumble, & Rodriguez, 2015; Rumble & Irani, 2016; Woteki, 2012). Scholars and practitioners alike have suggested information about the sciences must be structured in a way that is relevant and salient to the general public (Bucchi, 1998; Scheufele, 2013). To address this issue, researchers in scientific and agricultural communications have called for more research to understand how communicators can make scientific information more relevant and salient in ways that resonates with the public (Bucchi, 1998; Scheufele, 2013; Weitkamp, 2016). Specifically, before attitudes can be changed, communicators must gain the attention of viewers. Therefore, this study sought to understand the impact of increasing saliency, through motivational relevancy, on visual attention allocation.

Message Frames

One way of achieving this increased relevance is through framing of messages. Message frames are crucial to improving strategic communication (i.e., crafting messages toward a specific, targeted audience) and are an effective way to communicate about social science issues (Fischer et al., 2017; Warner, Rumble, Martin, Lamm, & Cantrell, 2015). The selection of targeted message frames allows communicators to make information salient while encouraging particular behaviors, evaluations, or attitudes (Entman, 1993). A frame of reference may be set when a reader, viewer, or listener interprets specific information in a message based on how the source presents the information (Scheufele, 1999). Rather than focusing on logic-based arguments with scientific information and food products, researchers have called for messages tailored to appeal to the emotions of the audience to make information more salient (Brader, 2006; Krause, Meyers, Irlbeck, & Chambers, 2016; Ruth & Rumble, 2016). Value-oriented messaging may provide an opportunity to impact target audiences when they seek out information regarding low involvement products such as food (Dodds, Tseëlon, & Weitkamp, 2008; Shen & Edwards, 2005; Warner et al., 2015). This type of messages may be effective as "many people consider issues in terms of their beliefs, and appealing to specific values is a way to shape individual opinions and attitudes" (Warner et al., 2015, p. 62). Specifically, Shen and Edwards (2005) stated value frames are associating a basic human value with an issue and a product (i.e., support gay marriage, buy this product) (Shen & Edwards, 2005). Value frames are prevalent in issue-based messaging and have been researched to understand how citizens respond to a particular issue (Brewer & Gross, 2005). Literature has suggested an orientation of the message frame to a personal value has led to higher levels of information processing, issue relevant thoughts, attention, and attitudes (Shen & Edwards, 2005). These frames are successful because they produce higher levels of information processing by activating "thoughts in memory participants would not otherwise recall; likewise, it may lead them to weigh thoughts to which they would otherwise attach little importance" (Brewer & Gross, 2005, p. 935).

Visual Attention Allocation

In simple terms, the construct of attention broadly refers to allocating cognitive and mental resources to a specific object or situation. Visual attention more specifically refers to eye movements to spatial locations, which has been connected to cognitive resources allocated to an area of a message (Duchowski, 2007). As noted in the Elaboration Likelihood Model (ELM) and other information processing theories and conceptual frameworks such as selective attention, humans cannot attend to all things at once. Because of this hierarchy of effects that occurs between how an individual allocates mental resources to stimuli, learns and remembers its content, and then develops an attitude, visual attention allocation plays a role in information processing (Thorson, Chi, & Leavitt, 1992). Due to this fact, an individual's attention is used to focus mental resources on one specific object so the mind can process the stimulus of interest (Duchowski, 2007; Wu, 2011). Essentially, the measurement of visual attention to media allows researchers to understand a "more granular assessment of not only attention to media message or platform over other elements in the environment, but also intra-stimulus selective attention to elements within a message" (Cummins, *in press*, p. 1). Specifically, by tracking visual attention, researchers can uncover patterns of visual searches and time spent in specific areas on a stimulus.

As individuals view a message, a specific sequence of events occurs that enables the individual to process a message, and attention to the stimuli must be present before any other stages of information processing occur (Thorson et al., 1992). In order to cope with the overwhelming volume of mediated information present in today's society, viewers will choose to attend to specific messages and elements within a visual message, consequently adding bias to the media's effects (e.g., Zillman & Bryant, 1985). Specifically, "if people are biased in their selection of information, it is almost certain that they must be biased in what they can remember because people obviously cannot remember information to which they are never exposed" (Smith et al., 2007, p. 949).

Selective attention has been used to describe the viewer's allocation of attention to select specific elements in the visual field to then process where "people develop sophisticated selection mechanisms to rapidly prioritize aspects of a complex message and guide attention towards specific message elements" (Gong & Cummins, 2016, p. 4). Message-level and individual-level factors have influenced selective attention to advertisements. Specifically, the individual's motivation to process information impacts the capacity an individual has to process information resulting in selective attention to specific elements in the stimuli. The individual will selectively attend to information that is consistent with his or her prior beliefs impacting consumer behavior, attitude, and trust (Smith et al., 2007). In addition to ignoring information inconsistent with viewing goals, viewers are most likely to seek out information to support their beliefs or information that is oriented with their pre-existing attitudes (Folk, Remington, & Johnston, 1992; Smith, Fabrigar, Powell, & Estrada, 2007).

Elaboration Likelihood Model and Selective Attention

According to Gong and Cummins (2016), “message saliency concerns the prominence of sensory information in the message, especially in the form of the attention-grabbing features (e.g., novelty, movement) and structure changes (e.g., camera changes, sound effects, etc.)” (p. 7). Although certain visual elements, such as flashing lights or contrasting colors, result in a redirection of an individual’s attention toward these elements through visual saliency (Bruce & Tsotsos, 2009), elements of an advertisement that are personally relevant (i.e., motivationally salient) to the individual have also increased attention (MacInnis & Jaworski, 1989). In MacInnis and Jaworksi’s (1989) results reflecting the processing of brand specific information, individuals were found to express attention allocation to elements of the message that were consistent with their motivations, issue involvement, and pre-existing attitudes. Therefore, if issue involvement and pre-existing attitudes align with a message, then greater attention may be directed toward the message, yielding higher levels of processing, and greater likelihood of impacting attitudes and beliefs. Similarly, Borgida and Howard-Pitney (1983) found pre-existing condition variables such as personal involvement increase the receiver’s perceived saliency of a message. Their research also found personal involvement increased systematic processing. Gong and Cummins (2016) defined personal relevance in messaging as the perceived personal importance or the perceived personal connection to the persuasive communication. When perceived personal relevance is high, the message elicits a controlled response to the information, which is a direct correlation to increased attention (Gong & Cummins, 2016). These results provide evidence that the relevance of the information to the receivers may activate a mechanism that stimulates the processing of the message (MacInnis & Jaworkski, 1989).

As an individual attends to a print advertisement, visually and motivationally salient features influence the level of information processing (Gong & Cummins, 2016). When an individual is first exposed to an advertisement, the visually salient elements will first elicit an automatic orientating response from the viewer (Gong & Cummins, 2016; Graham, 1979). However, the motivationally relevant elements (i.e., personally relevant information) within the message will generate greater sustained attention. However, when message consumers have low involvement with an advertisement, they may only “process the visual salient information and shift their attention away without attending to other less salient ad elements” (Gong & Cummins, 2016, p. 9). Thus, visually salient information should be used to initially capture attention toward messages; however, advertisements with motivationally relevant information will generate more sustained visual attention allocation. Similarly, perceived personal relevance, or when an individual perceives the message to be self-related (i.e., related to personal motives, goals, or values), the individual associates the message or product to be congruent with their personal goals, which has been known to drive consumer behavior (i.e., information processing, attitude formation, and visual attention) (Guido, 2001).

Particularly, The Elaboration Likelihood Model (ELM) has been used in prior studies in the realm of agricultural communications and served as a theoretical framework for the study (Rumble & Irani, 2016; Ruth, 2015; Meyers, 2008). The ELM allows researchers to understand how personal attributes and message attributes allow individuals to select and attend to particular aspects of information and whether these individuals process information through a systematic evaluation and analysis (i.e., the central route) or using heuristic cues to accept or reject the information (i.e., the peripheral route) (Petty & Cacioppo, 1986). Personal attributes such as pre-existing attitudes and issue involvement have been found to increase the central route processing of a message (Petty & Cacioppo, 1986). Increased amounts of visual attention indicate more cognitive resources are being allocated to a particular aspect of the message (Duchowski, 2007). An individual who has a higher level of issue involvement toward a message tends to place more cognitive resources on the message as motivation is increased (Celsi & Olsen, 1988). Therefore, if the message appeals to the receiver, the ELM model predicts the individual to be more likely to place more attention and process the message more critically leading to increased processing.

Purpose and Hypotheses

In order to create trust toward the agricultural industry, communicators need to make information more salient for message recipients, and one means of doing this is to establish the efficacy of competing appeal types in the context of agricultural issues. Messages with agricultural science information could be more relevant to the audience if these messages connect to consumer values. To understand the effect of value-oriented messages on the first stage of information processing, the purpose of this study was to assess how issue involvement and pre-existing attitudes influenced the nature of processing in the form of visual attention allocation to value-oriented versus scientific message frames. The following hypotheses guided the experiment:

> **H_1**: Visual attention allocation will be greater for value-oriented message frames than scientific reasoning message frames.
>
> **H_2:** Visual attention allocation will differ significantly due to issue involvement, pre-existing attitudes, and the type of message frame.

Method

This study used a 2 (message frame: value-oriented vs. scientific reasoning) x 2 (message topic: antibiotic use in livestock and genetic modification in crops) between-subjects experimental design to examine the impact of these factors on visual attention allocation to magazine advertisements. A factorial design experiment was chosen in order to determine the role of visual attention allocation in information processing and its function with issue involvement and pre-existing attitudes. The two issues of genetic modification and antibiotic use in livestock were chosen based on the prior literature suggesting that these were two of the most concerning food production topics for parents and the message repetition (i.e., the participant viewed two genetic modification messages and two antibiotic use in livestock messages) was selected to better generalize the type of message type to other issues, topics, and message types and to account for message variance (Thorson et al., 2012). In addition, the researchers determined the participants' pre-existing attitudes and issue involvement toward the two agricultural practices. Eye tracking is a tool that has been previously been used to measure visual attention allocated to stimuli (Bucher & Schumacher, 2006; Duchowski, 2007)

Independent Variables

Message Frame. The message frame represents the experimental manipulation, and the variable was operationalized in two levels: value-oriented and scientific reasoning. The scientific reasoning frame was operationalized via emphasis within the advertisement text on statistical evidence supporting a claim from sources such as the FDA and USDA (Shen & Bigsby, 2013). These messages provided definitions, statistics, and information regarding antibiotic use in livestock and genetic modification of crops. Accompanying visuals portrayed the product (i.e., meat products, soybeans, and corn) or producers working on the farm and/or ranches. To operationalize the value-oriented frame, advertising text and accompanying visuals were manipulated to increase the conceptual term of motivational saliency of the message. Parents have shown interest in the food they buy their family, and this audience has been connected to the values of security, universalism, benevolence, and self-direction (Hughner, McDonagh, Prother, Shultz, and Stanton 2007; Wilkins, Gorham, & Meyers, 2017). Similarly, researchers have indicated individuals are most likely to trust people who are similar to them such as friends and family (Fox & Jones, 2009). The advertisements included body copy and images referencing these trusted sources. Additionally, a narrative was created focusing on testimonial stories and highlighted values of security, universalism, benevolence, and self-direction.

Advertorials have historically been used as a magazine advertisement that allow for a more journalistic or feature writing approach, and it was chosen as Koroulis and Abrams (2017) concluded short promotional messages "only garner attention and awareness and are insufficient to move the attitudinal needle" (p. 17). Additionally, a large agricultural organization promoting genetic modification had used similar advertorials to promote brand trust and scientific literacy in magazines such as *Family Circle*, *Good Housekeeping,* and *Better Homes and Gardens.* Therefore, advertorials were chosen for their increased amount of text in a paid advertisement and prior campaign placement. A priori message testing occurred with student populations at Texas Tech University to determine if there were true differences between the scientific reasoning message frame and the value-oriented message frame described below. An additional round of message testing occurred with the final sample to confirm message type differences. The advertorials included the same compositional elements, word counts, and sizes, but in varying arrangements and layout.

Message Topic. The message topics of genetic modification and antibiotic use in livestock served as an independent variable. The participants were assigned to receive two advertorials focused on the science of genetic modification and two advertorials focused on the science of antibiotic use in livestock. Additionally, a message repetition (i.e., the participant viewed two genetic modification messages and two antibiotic use in livestock messages) was selected to better generalize the type of message type to other issues, topics, and message types (Thorson et al., 2012). Specifically, repetition was chosen to account for message variance. This led to a series of eight advertorials: genetic modification science version 1 and 2; genetic modification value version 1 and 2; antibiotic use scientific version 1 and 2; antibiotic use value-oriented version 1 and 2.

Pre-existing attitudes. To understand pre-existing attitudes, participants were asked to indicate their responses with the statement "I feel genetically modified foods are…" or " I believe meat from animals raised with antibiotics is..." depending on the message received. The index used a 5-point semantic differential scale with six bipolar adjective pairs: *wrong/right, unacceptable/acceptable, bad/good, unfavorable/favorable, foolish/wise, and negative/positive.* The measure was adapted from Zaichowsky's (1985) Personal Involvement Inventory (PII), which has been used in studies relating to understanding attitudes of the agricultural industry in Lundy (2004), Meyers (2008), and Goodwin (2015) studies. The internal reliability of the measure was genetic modification ($\alpha = .93$) and antibiotic use in livestock ($\alpha = .96$).

Issue involvement. Issue involvement was measured using Nowak and Salmon's (1987) involvement with social issues scale. Prior research has suggested issue involvement has a relationship with motivation to process messages (von Borgstede, Andersson, & Hansla, 2014; O'Keefe, 2008; Petty & Cacioppo, 1986). The issue involvement regarding social issues scale was measured using is a 7-item semantic differential scale with five scale points: *important/unimportant, irrelevant/relevant, matters to me/doesn't matter to me, significant/insignificant, of no concern to me/of concern to me, very meaningful to me, means nothing to me, interesting/not interesting, trivial/fundamental* (Nowak & Salmon, 1987). Internal reliability for genetic modification was $\alpha = .92$ and $\alpha = .88$ for antibiotic use in livestock.

Dependent Variable

Amount of visual attention placed on the advertisement served as a dependent variable and was assessed using eye tracking. The operational measure of entire visual attention allocation was the aggregate sum of the fixation durations within the overall advertorial. Fixations have been operationalized as "eye movements that stabilize the retina over a stationary object of interest" (Duchowski, 2007, p. 46). Because the participants were viewing the magazine at a self-pace, the amount of time (seconds) on the advertisements allows researchers to understand the amount of cognitive resources allocated to the message (Duchowski, 2007).

Participants

The population for the study was parents, who are the primary grocery purchaser for their home. In particular, the mother in the family tends to be the primary grocery shopper for the home (Lake, 2016). This population was selected as prior research has found parents either lack trust of the food and agricultural industry, and the knowledge to make informed decisions about the agricultural industry, and/or they are characterized as being the most concerned with the food they buy for their families (Hughner et al., 2006; Weatherel et al., 2003). To collect a sample, the primary grocery store shopper for them home, or parents of school-aged children (K-12) who resided in Lubbock, Texas, and its surrounding counties in April - May 2017 were invited to participate in the study. Participants were recruited from university listserv and announcements, local PTA associations, church groups, and sport groups through recruitment scripts and social media posts. Participants were awarded a $50 cash equivalent (VISA Gift Card) incentive for their participation. A total 71 participants were recruited. Within the eye tracking literature, smaller study designs have traditionally been employed (Jacob & Karn, 2003).

A post-test questionnaire contained demographic questions to determine the participants' age, gender, education level, income, race and number of K-12 children in the household. The majority of the participants were female and accounted for 53 (77.9%) of the participants. The participants in the study were recruited to be parents of K-12 children, and the participants indicated an average number of 1.69 ($SD = .957$) K-12 children within the household.

Participants holding a graduate or professional degree (n = 28, 41.2%) and a bachelor's degree (n = 17, 25%) made up the majority of participants. The participants' mean annual household income was between $50,000 and $59,999.

Procedure and Protocol

To participate, participants were sent a link to complete an online pre-test via Qualtrics before coming to the eye tracking laboratory. The pre-test questionnaire included questions related to the participants' level of issue involvement and pre-existing attitude toward genetic modification and antibiotic use in livestock. A pre-test was chosen as the effect of priming was not a concern as the differences in the evaluation were between message type (i.e., scientific reasoning vs. value-oriented) and not attention placed on agricultural science information versus non-agricultural science information. The data were collected in individual sessions in an eye tracking, laboratory setting. An eye tracking experiment was chosen as it allows for a greater level of control of the experiment (Duchowski, 2007). Although the laboratory setting decreases ecological validity, the increased control allows for higher internal validity and allows the researchers to "uncover similarities of viewing patterns of large groups of viewers" (Duchowski, 2007, p. 160). Upon arrival to the lab, each of the participants was asked to sit approximately 24 inches from a 27-inch computer monitor. A Tobii X2-60 Eye-Tracker control unit was located just below the screen to monitor the participant's gaze during the experiment. This type of apparatus is noninvasive as it is no different than viewing a computer screen. Tobii studio software was used to collect the gaze data at a sampled rate of 60hz.

Before the presentation of the magazine, the above software and apparatus was used to calibrate each of the participant's gaze using a calibration procedure. After the calibration procedure, the participants were randomly assigned to view a version of a 25-page magazine from a section of the April 2017 version of *Good Housekeeping*. Participants were asked to browse the magazine for quality (up to 30 minutes). The magazine was selected for its target audience of the primary grocery store buyer for the families with school-aged children (typically married females), and it had content regarding food. Additionally, the model for the advertorials ran in *Good Housekeeping.* The magazine was divided into four equal sections (number of pages, advertisements, and editorial content), with each of the four sections containing an advertorial and four foil (control) advertisements. This study was a part of a larger study, and to understand effects of the message on attitude, a between-subjects distribution of stimuli was chosen. Participants were randomly assigned to receive either value-oriented or scientific reasoning messages. Although Tobii Studio software does not allow for randomization as seen in traditional questionnaire design, a rotation system was used to counter error effects. This system has been utilized in past eye tracking research and was recommended based on prior research (Duchowski, 2007). Participants were then randomly assigned to one of eight rotation orders.

Data Collection and Analysis

For the questionnaire, the researcher recorded the data through Qualtrics and exported the data to SPSS v.24. The eye tracking data was gathered through the Tobii Studio (v. 3.4.7) software system, exported into Microsoft Excel, and then imported into SPSS. This study used both descriptive and inferential statistical procedures for mixed measures ANOVAs outlined by Field (2012). In order to understand the relationships between the variables, a significance level of $p < .05$ was established a priori. Additionally, data were also inferred as 'approaching significance' with a description of the effect size. Wasserstein and Lazar (2012) explained "scientific conclusions and business or policy decisions should not be based only whether a *p*-value passes a specific threshold," and instead, researchers should evaluate the results based on many contextual factors including inferences and effect size, the design of the study, the quality of the measurements, the phenomenon understudy, and the validity of the assumptions. Thorson et al. (2012) described a report of non-significant findings with substantial effect sizes may allow the reader to "assess whether the non-significant result is the result of low power" as seen in laboratory based studies (Thorson et al., 2012, p. 124). This data set is part of a larger study; however, these hypotheses were analyzed and inferred separate from the rest of the data.

Results

The first hypothesis (H_1) predicted motivationally salient messages in print advertisements would elicit more visual attention allocation than non-motivationally salient elements. To address this hypothesis, a mixed-measures ANOVA was used to calculate the effect of message frame on total fixation duration in seconds on the advertorials. The message topic (genetic modification, antibiotic use) and the message repetition served as the within-subjects variable, and the message frame served as the between-subjects variable. The main effect of message frame was found to be significant, $F(1,66) = 4.45$, $p = 0.039$, $\eta^2 = .063$, indicating the value-oriented messages elicited an overall longer fixation duration (seconds) on the messages (Scientific Reasoning: $M = 9.82$, $SD = 9.94$; Value-Oriented: $M = 16.80$; $SD = 12.14$). Figure 1 provides a depiction of the visual attention allocated (seconds) to the GM version 1 advertorials.

Figure 1. Heat map of visual attention allocation to genetic modification (GM version 1) advertorials (Left, Scientific Reasoning; Right, Value-Oriented)

H_2 sought to understand the effect of issue involvement (toward genetic modification, antibiotic use in livestock) and pre-existing attitudes (toward genetic modification, antibiotic use in livestock) and their effect on total fixation duration based on message frame (scientific reasoning, value-oriented). To do so, a median split was calculated on the variables of issue involvement and pre-existing attitudes for each topic (issue involvement: 1 = low, 2 = high; pre-existing attitudes: 1 = negative, 2 = positive). Figure 2 depicts the difference between participants with low involvement with genetic modification and their total fixation duration to participants with high involvement with genetic modification and their total fixation duration based on message frame. The line represents how the value-oriented message receives longer duration of visual attention allocation than the scientific reasoning message. As seen in Table 1, those with low involvement had longer fixation durations (seconds) with the value-oriented message frame (genetic modification 1: *M* = 29.42, *SD* = 22.37; genetic modification message 2: M = 24.72, *SD* = 17.06) than the scientific message frame (genetic modification 1: *M* = 15.58, *SD* = 14.42; genetic modification 2: *M* = 14.33, *SD* = 14.53).

Table1

Estimated Marginal Means of Total Fixation Duration by Message Frame and Level of Issue Involvement (seconds)

	Low Issue Involvement		High Issue Involvement	
	Mean	SD	Mean	SD
Scientific Reasoning Message Frame				
GM 1	15.56	14.42	16.73	14.88
GM2	14.33	14.53	24.85	21.18
Antibiotic Use 1	16.60	28.40	23.31	28.40
Antibiotic Use 2	17.41	15.39	21.38	22.48
Value Oriented Message Frame				
GM1	29.42	22.69	24.83	21.10
GM2	24.72	17.07	21.56	17.00
Antibiotic Use 1	30.82	21.74	21.97	14.42
Antibiotic Use 2	27.10	19.54	19.23	13.52

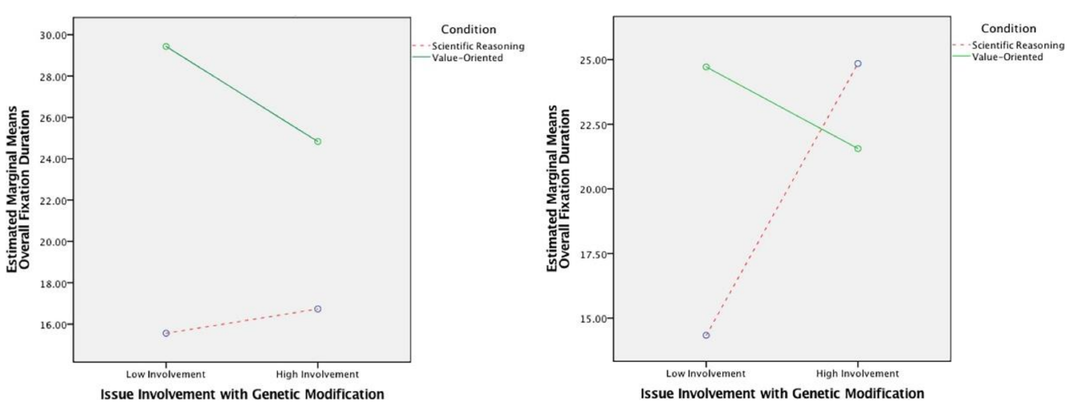

Figure 2. Visual representation of estimated marginal means, issue involvement to genetic modification, and message frame (Left, GM1; Right, GM2)

The same statistical procedures were conducted to understand the effect of issue involvement (low, high) and message frame (scientific reasoning, value-oriented) on total fixation duration of the antibiotic use in livestock messages. To do so, a mixed-measures ANOVA was conducted. Total fixation duration served as the dependent variable; whereas, message repetition served as the within-subjects variable and message frame (scientific reasoning, value-oriented) and issue involvement (low, high) served as the between-subjects variables. The interaction effect between issue involvement and message frame was approaching significance, $F(1,63) = 3.02$, $p = .08$, $\eta^2 = .05$ with a medium effect size (Ellis, 1988). As seen in Table 1, those with low involvement had longer fixation durations with the value-oriented message frame (Antibiotic1: $M = 30.82$, $SD = 21.74$; Antibiotic2: $M = 27.10$, $SD = 19.54$) than the scientific message frame (Antibiotic1: $M = 16.60$, $SD = 17.16$; Antibiotic2: $M = 17.42$, $SD = 15.39$). Additionally, the line on figure 3 visually demonstrates longer fixation durations on value-oriented messages versus scientific reasoning messages.

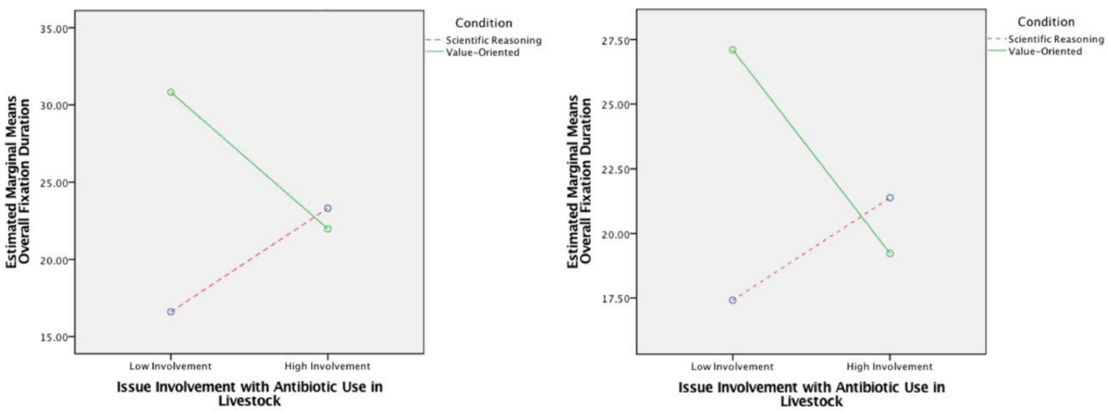

Figure 3. Visual representation of estimated marginal means, issue involvement to antibiotic use in livestock, and message frame (Left, Antibiotic 1; Right, Antibiotic 2)

To understand the effect of pre-existing attitudes (positive, negative) and message frame (scientific reasoning, value-oriented) on total fixation duration of the advertorials, two mixed-measures ANOVA were conducted. The interaction effect between pre-existing attitudes and message frame was not significant for the messages about genetic modification, $F(1,62) = .052$, $p = .821$, $\eta^2 = .001$, or messages about antibiotic use in livestock $F(1,63) = .018$, $p = .893$, $\eta^2 = .000$.

Conclusions, Implications, and Recommendations

Research has suggested the American public has a limited understanding of agricultural science information. Concurrently, agricultural scientists are struggling to communicate with audience members who receive a large amount of information daily. To bridge the gap between scientific and public opinion, scientific information should be made relevant through enhanced saliency in messaging. Communicators have suggested using value-oriented frames to connect scientific information to personal values to distribute more relevant scientific information (Krause et al., 2015; Ruth & Rumble, 2016). The prior literature suggested that although research has explored selective attention in response to processing, little research has explored selective attention and its role in the processing of scientific information. The results of this study provided empirical evidence to demonstrate how agricultural science information may become more salient to resonate with the public (i.e., Bucchi, 1998; Scheufele, 2013). The analysis of how two different types of message frames attract attention shows that an increase in motivational saliency allows for an increase in personal involvement through values, leading to higher levels of visual attention allocation. Thus, it suggests evidence communicators should use value-oriented messages to inform the public about agricultural science issues.

Participants were more likely to place attention on value-oriented message frames as opposed to the scientific reasoning message frames. Individuals encounter a great deal of information on a daily basis, and to cope with the influx of information, individuals have developed mechanisms to prioritize aspects of messages (Gong & Cummins, 2016). Specifically, individuals tend to ignore information inconsistent with an attentional goal (Folk et al., 1992), or information that does not support their prior beliefs and/or attitude (Smith et al., 2007). In the current study, the value-oriented message frame served to increase motivational saliency because the individual is exposed to information that affects them personally or their families. When the personal relevance of the message appeared to be higher (e.g., the value-oriented frame), the messages elicited higher levels of visual attention allocation. Similarly, the scientific reasoning message may have received less visual attention allocation due to not being consistent with the viewer's attentional goal (Smith et al., 2007). In the current experiment, the majority of the *Good Housekeeping* magazine content dealt with issues pertaining to the home and family. When exposed to scientific reasoning framed advertorials, the viewer ignored the elements of the advertorials, and the individual chose to ignore the information that was inconsistent with their viewing habits (e.g., Folk et al., 1992). This heeds to the practical suggestion that when providing issue-based messaging, the message must align with the individual's prior viewing habits in order to be processed.

Exploration of issue involvement and pre-existing attitudes revealed issue involvement had approaching statistical significance interactions ($p = .08$, $\eta^2 = .05$) on visual attention allocation. However, pre-existing attitudes did not elicit differences in visual attention allocation. The analysis of the figures suggested participants with low issue involvement placed a longer amount of visual attention allocation on the value-oriented message; however, high involvement participants placed relatively equal amounts of visual attention on both the value-oriented and scientific reasoning message. The results from the low issue involvement participants further support the idea that value-oriented messages attempt to increase motivational saliency by making the information more relevant to the consumer. Because food products and scientific information are characterized as low involvement products (Dodds et al., 2008), the value-oriented frame provides an avenue to increase in saliency leading to higher processing of the issue, product, and information. These results may be an indicator that when perceived personal relevance is high, the participant may experience a controlled attention response to the information, resulting in longer visual attention allocation. The nature of the higher visual attention allocation was consistent with other studies of low-involvement advertisements. Specifically, Gong and Cummins (2016) suggested low involvement type products must be advertised with an increase in perceived involvement to make consumers aware of connections and personal references between the message and its reader.

The results of this study suggest the value-oriented message frame elicited more visual attention allocation. Those participants with low issue involvement held longer fixation durations to the value-oriented messages. The value-oriented message frame increases motivational saliency and captures the attention of those unfamiliar and with low to neutral issue involvement with the scientific topics. Researchers have suggested scientific information needs to be more relevant to the average public audience (Buchi, 2008; Scheufele, 2013), and this study confirms value-oriented messages elicit higher levels of visual attention allocation. The first step in information processing is attention allocation. Within information processing, attention allocation occurs first, then information processing and attitude development (Lang, 2000; Smith et al., 2007; Thorson et al., 1992). By capturing viewing engagement, communicators can better reach their audiences with their content and information. Perhaps the key indicator in value-oriented information is the increase in motivational saliency and personal involvement − showing the participants why they should care about the information.

The study provides evidence to confirm an increase in motivational salience has the potential to increase visual attention allocation toward agricultural science messages. Theoretically, selective attention is a major driver in how attitudes and information are processed. Without the ability to view information, individuals are unable to process the information. One future study should be conducted with a larger sample size. A future study should evaluate the effect of the motivational saliency on attitude toward the advertisement. Methodologically, this study provides a starting point for developing messages in agricultural communications that capture attention. Little research has used the eye tracking tool to understand the effect of message development in the agricultural social sciences. Eye tracking and monitoring visual attention allocation allow researchers to not only understand the sequence of gaze or viewing that occurs when a participant views a stimulus, but also the duration of time spent viewing and the specific areas of interest. Continued research within eye tracking could confirm what aspects of the message elicit higher visual attention allocation.

Strategic communication and framing with issue-based advertising is necessary in the agricultural industry. Many consumers find information from social media, television, print advertisements, out of home advertisements, and even food labels. Information embedded within these forms of communication have impacted public perception of the issues at hand (Abrams, 2010; Rummo, 2016). This study's results support the industry-based recommendations that value-oriented message frames should be added into advertisements and communication materials about the agricultural industry.

References

Bayer Corporation. (2016). Bayer forum narrows gap between and food production. *PR Newswire.* Retrieved from http://www.prnewswire.com/news-releases/bayer-forum-narrows-gap-between-public-and-food-production-300228494.html

Borgida, E., & Howard-Pitney, B. (1983). Personal involvement and the robustness of perceptual salience effects. *Journal of Personality and Social Psychology*, *45*(3), 560-570. doi: 10.1037/0022-3514.45.3.560

Bucchi, M. (1998). *Science and the media: Alternative routes of scientific communication.* London: Routledge.

Brader, T. (2006). *Campaigning for hearts and minds: How emotional appeals in political ads work*. Chicago, IL: University of Chicago Press.

Brewer, P. B., & Gross, K. (2005). Value, framing, and citizens' thoughts about policy issues: effects on content and quantity. *Political Psychology, 2*(6), 929-948. doi:10.1111/j.1467-9221.2005.00451.x

Bruce, N. D., & Tsotsos, J. K. (2009). Saliency, attention, and visual search: An information theoretic approach. *Journal of vision*, *9*(3), 5-5. doi:10.1167/9.3.5

Bucher, H. & Schumacher, P. (2006). The relevance of attention for selecting news content. An eye-tracking study on attention patterns in the reception of print and online media. *Communications, 31*(3), 347-368. doi:10.1515/COMMUN.2006.022

Center for Food Integrity. (2014). Cracking the code on food issues: Insights from moms, millenials and foodies. *The Center for Food Integrity.* Retrieved from http://s3.amazonaws.com/www.foodintegrity.org/wp-content/uploads/2015/08/CFI2014ResearchBook.pdf

Cummins, R.G. (in press). Eye tracking. In R.F. Potter (Ed.), *International encyclopedia of Communication Research Methods*. Hoboke, NJ: Wiley-Blackwell.

Dodds, R. E, Tseëlon, E., & Weitkamp, E. L. C. (2008). Making sense of scientific claims in advertising: A study of scientifically aware consumers. *Public Understanding of Science, 17*(2), 211-230. doi: 10.1177/0963662506065559.

Duchowski, A. (2007). *Eye tracking methodology: Theory and practice* (2nd ed.) London: Springer.

Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication,(*4), 51. Retrieved from http://search.proquest.com/docview/1302274657?acc ountid=10920

Field, A. (2012). *Discovering statistics using IBM SPSS Statistics* (4th Ed.). London, UK: Sage

Fischer, L. M., Cummins, R. G., Gilliam, K., Baker, M., Burris, S., & Irlbeck, E. (2017). Examining the critical moments in information processing of water conservation videos within young farmers and ranchers: A psychophysiological analysis. Paper presented at the national meeting of the American Association for Agricultural Education, San Louis Obispo, CA.

Folk, C. L., Remington, R. W., & Johnston, J. C. (1992). Involuntary covert orienting is contingent on attentional settings. *Journal of Experimental Psychology: Human Perception and Performance*, *18*(4), 1030-1044. doi: 10.1037/0096-1523.18.4.1030

Fox, S., & Jones, S. (2009). *The social life of health information.* Washington, DC: Pew Internet & American Life Project.

Funk, C., & Raine, L. (2015). Public and scientist's view on science and society. *Pew Research Center.* Retrieved from http://www.pewinternet.org/2015/01/29/public-and-scientists-views-on-science-and-society/

Gong, Z. & Cummins, R. G. (2016, August). Processing capacity in visual search: The impact of visual salience and involvement on attention. Paper presented to the annual meeting of the Association for Education in Journalism and Mass Communication, Minneapolis, MN.

Graham, F. K. (1979). Distinguishing among orienting, defense, and startle reflexes. In H. D. Kimmel., E. H. VanOlst, & J. F. Orlebeke (eds.), The Orienting Reflex in Humans (pp. 137–167). Hillsdale, NJ: Erlbaum.

Guido, G. (2001). *The Salience of Marketing Stimuli: An Incongruity-Salience Hypothesis on Consumer Awareness.* Norwell, MA: Kluwer Academic Publishers.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour*, *6*(2-3), 94-110.

James, W. (1890). *The Principles of Psychology*. New York, NY: Holt.

Koroulis, C. & Abrams, K. (2017). *Matching local food messages to consumer motivators: An experiment comparing the effects of differently frames messages*. Paper presented at the Southern Association of Agricultural Scientists meeting: Agricultural Communications section. Mobile, AL.

Krause, A., Meyers, C. Irlbeck, E., & Chambers, T. (2016). *The value of a Youtube video: A content analysis of the message sensation value of labeling videos*. Paper presented at the National American Association of Agricultural Education meeting. Kansas City, MO.

Lake, R. (2016). Grocery Shopping Statistics: 23 Fun Size Facts to Know. Credit Donkey. Retrieved from: https://www.creditdonkey.com/grocery-shopping-statistics.html

Lang, A. (2000). The limited capacity model of mediated message processing. *Journal of Communication, 50*(1), 46-70. doi 10.1111/j.1460-2466.2000.tb02833.x

MacInnis, D. J. & Jaworksi, B. J. (1989). Information processing from advertisements: Toward an integrative framework. *Journal of Marketing, 53*(4), 1-23. doi: 10.2307/1251376. doi: 10.1177/0093650206298071

Meyers, C. A. (2008). *The agricultural angle: Effect of framing agricultural biotechnology messages on attitudes and intent to publish within the Elaboration Likelihood Model* (Doctoral Dissertation). Retrieved from http://gradworks.umi.com/33/34/3334488.html

Nowak, G. J., & Salmon, C. T. (1987). Measuring involvement with social issues. Paper presented at the annual meeting of the Association for Education and Journalism and Mass Communication, San Antonio, TX.

Ohman, A. (1979). The orienting response, attention, and learning. An information processing perspective. In H. D. Kimmel, E. H., van Olst, & J. F. Orlebeke (Eds.) *The orienting reflex in humans* (pp. 443-471). Hillsdale, NY: Lawrence Erlbaum Associates.

Rumble, J, & Irani, T. (2016). Talking through open barn doors: The effect of transparent communication attitude. *Journal of Applied Communications, 100*(2), 57-72. Retrieved from http://journalofappliedcommunications.org/images/stories/issues/2016/jac_v100_n2_article5.pdf

Ruth, T. K., Gay, K. D., Rumble, J. N., & Rodriguez, M. T. (2015). Influences on undergraduate students' opinion toward genetically modified food. Paper presented at the national meeting of the American Association of Agricultural Educators conference, San Antonio, TX.

Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of communication, 49*(1), 103-122. DOI: 10.1111/j.1460-2466.1999.tb02784.x

Scheufele, D. (2013). Communicating science in social settings. *Proceedings of the National Academy of Sciences of the United States of America, 110*, 14040-14047. Retrieved from http://www.jstor.org/stable/42713429

Shen, L., & Bigsby, E. (2013). The effects of message features: Content, structure, and style. In J.P. Dillard & L. Shen (eds.), *The Sage Handbook of Persuasion: Developments in Theory and Practice* (pp. 20-35). Thousand Oaks, CA: Sage.

Smith, S. M., Fabrigar, L. R., Powell, D. M., & Estrada, M. J. (2007). The role of information-processing capacity and goals in attitude-congruent selective exposure effects. *Personality and Social Psychology Bulletin, 33*(7), 948-960. doi: 10.1177/0146167207301012

Shen, F., & Edwards, H. H. (2015). Economic individualism, humanitarianism, and welfare reform. A value-based account of framing effects. *Journal of Communication, 55*(4), 795–809. doi:10.1111/j.1460-2466.2005.tb03023.x

Thorson, E., Chi, A. & Leavitt, C. (1992). Attention, memory, attitude, and conation: A test of the advertising hierarchy. *Advances in Consumer Research, 19, 366-379.* Retrieved from: http://www.acrwebsite.org/volumes/7323/volumes/v19/NA-19

Thorson, E., Wicks, R., & Leshner, G. (2012). Experimental methodology in journalism and mass communication research. *Journalism and Mass Communication Quarterly, 89*(1), 112-124. doi: 10.1177/1077699011430066

Warner, L. A., Rumble, J., Martin, E., Lamm, A. J., & Cantrell, R. (2015). The Effect of Strategic Message Selection on Residents' Intent to Conserve Water in the Landscape. *Journal of Agricultural Education. 56*(4). 59 - 74. doi: 10.5032/jae.2015.04059

Wasserstein, R. L., & Lazar, N. A. (2016). The ASA's statement on p-values: Context, process, and purpose. *The American Statistician, 70*(2), 129-133. doi: 10.1080/00031305.2016.1154108

Weatherell, C., Tregear, A., & Allinson, J. (2003). In search of the concerned consumer: UK public perceptions of food, farming, and buying local. *Journal of Rural Studies, 19*(2), 233-244. Doi: 10.1016/S0743-0167(02)00083-9.

Weitkamp, E. (2016). Trust, advertising and science communication. *Journal of Science Communication. 15(*5). 1-4.

Wilkins, K., Gorham, L., & Meyers, C. (2017). *Visualizing values: A content analysis to describe a value congruent video message campaign used in agriculture*. Paper presented at the Southern Association of Agricultural Scientists: Agricultural Communications Section, Mobile, AL.

Woteki, C. (2012, February 23). Bridging the gap on agricultural research and development with the private sector. *The United States Department of Agriculture.* Retrieved from http://blogs.usda.gov/2012/02/23/bridging-the-gap-on-agricultural-research-and-development-with-the-private-sector/

Wu, W. (2011), Confronting many-many problems: Attention and agentive control. *Noûs*, 45, 50–76. doi:10.1111/j.1468-0068.2010.00804.x

Zillman, D. & Jennings, B. (1985). *Selective Exposure to Communication.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Discussant Remarks – 2018 AAAE National Conference

Creating Relevancy in Scientific Information:

An Analysis of the Impact of Motivational Salience and Involvement on Visual Attention

Discussant: Ed Osborne, University of Florida

This research addresses a major issue in agriculture and natural resources (ANR) today, as well as society, in general. How can we get people to cognitively engage with information sources that focus on ANR topics and issues? This paper reports on a fascinating study that examines visual attention given to a message as an indicator of the perceived relevance of the scientific information presented. The literature review was exceptionally well written, addressing multiple theoretical and research perspectives relevant to the study. The connections between message framing, visual attention allocation, and selective attention were reviewed in a detailed and coherent way. The introductory sections of the paper conveyed a compelling need to further examine the topic and also made this reviewer intrigued by the approach taken in this study. In addition, the theoretical base chosen for the study was very appropriate and was connected to the procedures used. Visual attention allocation as a component of information processing provided a clear foundation for the study.

The purpose and objectives of the study were clearly articulated and well aligned. Each variable in the study was fully and clearly described, including why it was included, the reasons for the design, and how it was measured. In addition, the instrumentation used in the study was highly appropriate, succinct, and appropriately focused for this study. A sound rationale for the population choice and sampling strategy was presented in the paper. Fortunately, the researchers had the funds to offer a significant cash incentive to participate, thus securing the number of respondents needed. Since study participants were recruited from a college town, the multifaceted recruitment strategy captured a fairly professional segment of the community, in terms of academic degrees and income. Different results may have been found with a sampling of the population in other communities. The study procedures and their description in the paper were very thorough and detailed. The researchers effectively addressed all procedural aspects of this complex study. The authors also provided a literature citation that was useful in guiding their interpretation of the statistical analyses. The findings were presented in a clear and innovative way. All relevant statistics were included, along with short explanatory statements to assist the reader in understanding the results. The charts in Figures 2 and 3 were difficult to read without enlargement, a likely symptom of space limitations.

This study examined the effectiveness of value-oriented messages in engaging the public with agricultural issues. A study with that purpose could have been approached from a number of perspectives, but the approach taken in this study serves as a model for innovative inquiry – from the overall focus to the design, procedures, instrumentation, measurement, data analysis and interpretation, and presentation of results. This paper is exceptionally well written, and the study itself is one that others researchers should review as an example of outstanding research quality.

Discussant – Alexa Lamm; Timekeeper – Blake Colclasure

Research Strategies
Development and Validation of a Study Abroad Perceived Cost Scale *Brandon Raczkoski, Leslie Edgar, M. Craig Edwards, J. Shane Robinson, and Marshall A. Baker*
The Coach Phenomena: A Collective Case Study Examining the Validity of the Kolb Educator Role Profile in Preservice Agricultural Education *Lauren Lewis Cline, Marshall A. Baker*
Effects of Question Difficulty and Post-question Wait-time on Cognitive Engagement: A Psychophysiological Analysis *Kyle C. Gilliam, Dr. Matt Baker, Dr. John Rayfield, Dr. Rudy Ritz, Dr. R. Glen Cummins*
Methods of Establishing Instrument Validity in Manuscripts Published in the Journal of Agricultural Education between 2007 and 2016 *Hailey N. Gates, Dr. Donald M. Johnson, Dr. Catherine W. Shoulders*

Development and Validation of a Study Abroad Perceived Cost Scale

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M. Craig Edwards, Oklahoma State University
J. Shane Robinson, Oklahoma State University
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Abstract

*Study abroad experiences exist to provide students an opportunity to explore various cultures, ideals, and lifestyles around the world. However, those who desire to participate have varying levels of motivation. Using the expectancy-value theory as a context, the purpose of this study was to validate an instrument developed to assess college students' (*N *= 1,000) conceptions of relative cost regarding participation in short-term, study abroad courses or experiences. Exploratory and confirmatory factor analyses were conducted using R-type programming to confirm the factor structures. Findings revealed that 12 items loaded onto four distinct factors: emotional cost, outside effort cost, loss of valued alternatives cost, and task effort cost – explaining 84% of the variance in college students' motivation to study abroad. Students were most motivated to study abroad based on the outside effort cost factor. Thus, they had a neutral level of agreement regarding studying abroad participation because of the perceived amount of time and effort they would have to endure for other tasks. Due to the rigorous psychometric properties employed in this study to validate the instrument, researchers can have confidence in including relative cost as a vital component for assessing student motivations underpinned by the expectancy-value theory.*

Introduction

Assessing and understanding the value of study abroad opportunities for students in the United States has been a common theme in higher education since the 1970s (Hachtmann, 2012). Study abroad experiences for students have diversified over the years, starting as a general education model focused primarily on sending mostly female students to Western European countries for cultural and language training (Hachtmann, 2012). However, present day study abroad experiences focus largely on preparing students for a global marketplace of goods, services, and ideas. Although, the *typical* study abroad experience is not defined easily (Hachtmann, 2012), an increase in student participation in such experiences has been detected in colleges of agriculture (Estes, Hansen, & Edgar, 2016; Irani, Place, Lundy, & Friedel, 2004; Towsic, n.d.; Zhai & Scheer, 2004).

A study abroad experience is a common trend in higher education, where numerous institutions have experienced an increase in student participation during the past decade (North Association of Foreign Student Advisors [NAFSA], 2017). There also has been an increase in opportunities for students to be immersed in foreign languages, cultures, and lifestyles on a global level (Clark, Flaherty, Wright, & McMillen, 2009). These opportunities are important because benefits may include increased social proficiency, intercultural awareness, and openness to intercultural communication (Clark et al., 2009). Additionally, previous research has identified that students involved in global experiences have enhanced worldviews, increased self-reliance and confidence, and higher levels of openness and flexibility (Özturgut, 2007). However, “the decentralized nature of U.S. higher education allows for considerable variance in study abroad participation from institution to institution and from state to state” (NAFSA, 2017, p. 3). Short- or long-term study abroad programs also may influence students’ interest in interdisciplinary study and perceptions of globalization (Lewis & Niesenbaum, 2005).

Engaging in various international experiences provides students with numerous educational opportunities and instances to develop professionally and personally (Bunch, Lamm, Israel, & Edwards, 2013; Dooley, Dooley, & Carranza, 2008; Edgar, & Edgar, 2009; Estes, Hansen, & Edgar, 2016; Hall, 2007; Kitsantas & Meyers, 2001; Navarro & Edwards, 2008; Norris & Gillespie, 2009; Northfell & Edgar, 2014; Roberts & Edwards, 2016). The Institute for the International Education of Students surveyed more than 3,400 alumni who participated in study abroad experiences from 1950 through 1999. The results suggested that participating in an international program served as a defining occasion that continued to influence the participants’ lives long after the program ended. No matter where the location in which the individual studied abroad or the duration of the program, the impact remained prominent and substantial (Norris & Gillespie, 2009).

The educational justifications for study abroad include increases in students’ levels of awareness of the interdependence of nations, the value of diversity, the development of global perspective, and the importance of international understanding (Kitsantas & Meyers, 2001). In addition to these educational justifications, it is perceived that study abroad experiences allow students to be more competitive in the job market after graduation and to develop language proficiency and lifelong friendships (Kitsantas & Meyers, 2001). Research also links the accumulation of culturally relevant knowledge gained from study abroad experiences to creative thinking processes (Lee, Therriault, & Linderholm, 2012).

Within the framework of a global knowledge-economy, universities provide and advertise study abroad opportunities that seek to equip students with the skills, abilities, and mindsets “needed to deal with the realities of globalizing markets, greater job insecurity, and the likelihood of continual occupational mobility throughout their lives” (Barnick, 2010, p. 21). In 2010, University of Arkansas set a goal that 25% of graduating seniors would complete an international experience by 2020 (University of Arkansas Annual Report, 2013); however, the current rate of graduating seniors in the Dale Bumpers College of Agricultural, Food and Life Sciences (Bumpers College) who complete an international experience each year is roughly only 5%. Although Bumpers College students have shown positive perceptions to international program participation, the participation rates have not changed substantially in at least five years (Estes et al., 2016).

Research notes that international programs serve as an enhanced educational experience (Hachtmann, 2012) and prepare students for a globalized workforce (Andreasen, 2003). Students’ interests and motivations to participate in an international experience are mostly due to the effects it could have on their future, including 1) increasing awareness of diversity, 2) developing a global perspective, 3) improving job marketability, and 4) creating lifelong friendships (Estes et al., 2016; Kitsantas & Meyers, 2001; Norris & Gillespie, 2009). In addition, when selecting an international program, students engage in assessing the pros and cons of participating before committing (Estes et al., 2016). Understanding students' motivational factors in relation to perceived barriers and benefits for studying abroad could improve efforts intended to increase student participation in international programs (Danjean, Bunch, & Blackburn, 2016).

Theoretical Framework

The expectancy-value theory (EVT) has been used for decades to understand motivational and social factors, including both long- and short-term achievement goals and behaviors (Eccles, 2013). This comprehensive model synthesizes multiple theoretical perspectives and captures key components of motivation as it seeks to explain a wide range of achievement-related choices and performances (Barron & Hulleman, 2014). The model focuses on understanding the subjective-task value, and is built on work associated with decision-making, achievement theory, and attribution theory (Crandall, 1969; Weiner, 1992). The EVT model is used to identify an individual's likely decision based on two beliefs: 1) his or her expectation for success and 2) the importance or value he or she places on the activity/task. Eccles (2013) noted: "We believe that the conscious and non-conscious choices people make about how to spend time and effort lead, over time, to marked differences between groups and individuals in lifelong achievement-related patterns" (p. 106). Researchers have noted that the critical issue is the relative personal value an individual places on the choice options he or she faces (Barron & Hulleman, 2014; Crandall, 1969; Eccles, 2013; Weiner, 1992).

Recent empirical research suggests cost is a separate factor from expectancy and value (Barron & Hulleman, 2014; Flake, Barron, Hulleman, McCoach, & Welsh, 2015; Kosovich, Hulleman, Barron, & Getty, 2015), and it can influence an individual's overall motivation to engage in a task. Others have concluded perceived relative cost is associated negatively with achievement-related choices and performances (Conley, 2012; Grays, 2013; Kosovich et al., 2015; Perez, Cromley, & Kaplan, 2014), which should encourage researchers to consider perceived cost as its own distinct source of motivation (Hulleman, Barron, Kosovich, & Lazowski, 2016).

Study Abroad Perceived Cost Model

Raczkoski, Baker, Edwards, and Gordon (2017) adapted the expectancy-value-cost model developed by Flake et al. (2015), to the context of short-term, study abroad courses or experiences. The model is similar to Flake's and colleagues' original model. However, there is a one major distinction between them. Flake et al. (2015) related their EVC model to students' overall motivation in discrete categories: Sciences, Applied Sciences, Engineering/Computer Science, Math/Statistics, Social Sciences, Arts/Humanities, and all other major categories. In their study, a majority of students self-reported to be Engineering/Computer Science majors. The current study builds on that research by adapting and administering the instrument to a new context and population, i.e., assessing students' overall motivation to enroll in a short-term, study abroad course or experience before graduating. To this aim, consider the proposed EVC model adapted to the context of short-term, study abroad courses or experiences illustrated in Figure 1.

Study abroad programs are viewed as a mechanism for cultivating global awareness and competency in students (Norris & Gillespie, 2009; Salisbury, Umbach, Paulsen, & Pascarella, 2008). From a student perspective, perceived benefits may include: 1) exposure to a different culture; 2) listing participation on a resume or CV; and 3) the opportunity to study subjects not available locally or within their degree programs (Anderson, Hubbard, & Lawton, 2015; Danjean et al., 2016; Doyle, Gendall, & Meyer, 2010; Estes et al., 2016; Lee et al., 2012). The most commonly perceived barrier is focused on financial concerns, as well as lack of knowledge about programming, and confidence navigating a foreign landscape (Anderson et al., 2015; Danjean et al., 2016; Doyle et al., 2010; Estes et al., 2016; Lee et al., 2012). As based on the expectancy-value-cost-model, this research study was an attempt to determine student motivational factors, as outlined in study abroad barriers at a land-grant university in the mid-south region of the United States. This study aligns with Research Priority 4: Meaningful, Engaged Learning in All Environments (Roberts, Harder, & Brashears, 2016).

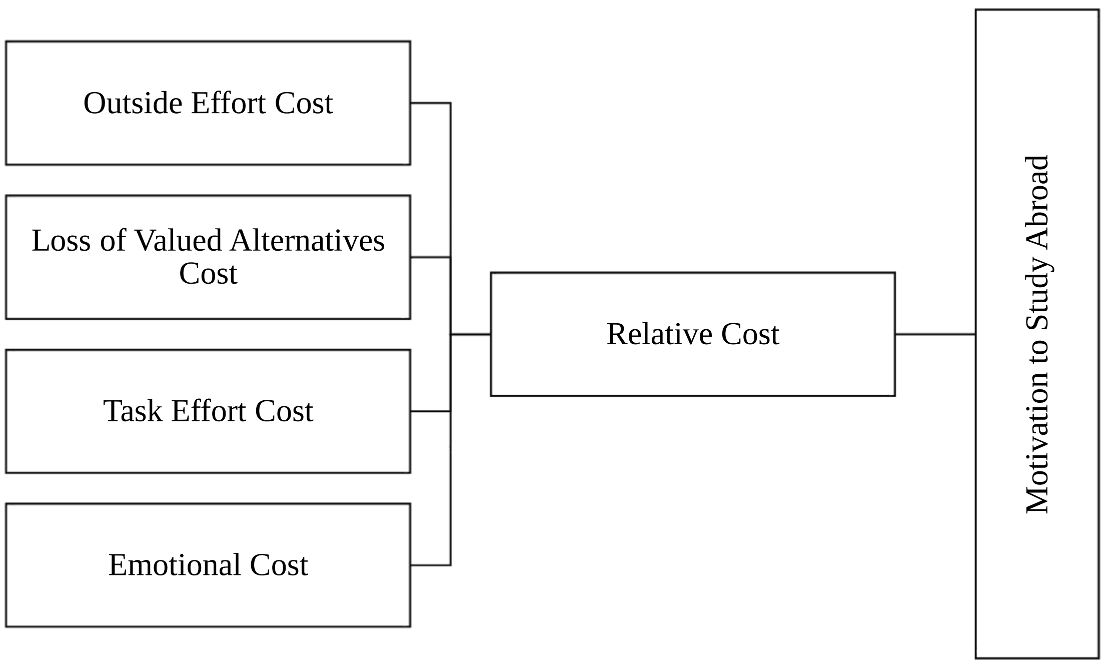

Figure 1. Conceptual model for the EVC model and students' motivations to study abroad (Raczkoski et al., 2017).

Purpose and Research Questions

The purpose of this study was to validate an adapted instrument developed to measure college students' motivation to participate in a short-term, study abroad course or experience before graduation. We used a sequential approach with a dataset split into two subsets. Three research questions guided this inquiry:

1. What were the perceived relative cost factors and construct validity of items used as measures regarding undergraduate participation in a short-term, study abroad course or experience?
2. Were the factors of undergraduate perceptions of perceived relative cost to study abroad reliable?

3. Using perceived relative cost factors, were undergraduates motivated to participate in short-term, study abroad courses or experiences?

Methods and Procedures

Undergraduate students (freshmen to seniors) at the University of Arkansas were recruited during the Fall 2017 semester to complete the perceived relative cost measure for short-term, study abroad courses or experiences. The results were part of a larger study investigating overall motivations to participate in international experiences prior to graduation. The survey population consisted of a stratified sample of courses ($N = 106$) by academic major ($N = 16$) and course level ($N = 4$) (Trochim, 2001). Courses were selected based on class level (1000, 2000, etc.) and total number of students enrolled. All large enrollment courses over 75 students, and all freshmen orientation Fall 2017 undergraduate courses in the Bumpers College were selected. Of possible courses ($N = 106$), 53 courses were selected, and 40 course instructors agreed to participate ($n = 75.5\%$). In all, students in 17 courses were surveyed, and responded with complete data sets for analysis. Instruments were provided in paper form to students in classes. Undergraduate students ($n = 1{,}000$) spanning several academic disciplines and colleges participated due to the nature of student enrollment in the Bumpers College. The highest percentage of respondents self-identified as sophomores (39%) and juniors (33%) while freshmen (20%) and seniors (8%) comprised the lowest percentage of respondents. A majority of participants (93%) had not participated previously in a university international program. However, 70% identified short-term faculty-led programs as the type of international experience they are most interested in participating.

Instrument

The instrument used in the current study was adapted from the EVC model instrument (Flake et al., 2015) to assess college students' perceived relative cost regarding participation in short-term, study abroad courses or experiences (Raczkoski et al., 2017). In their study, Raczkoski et al. (2017) adapted items from the EVC model instrument (Flake et al., 2015) to the context of short-term, study abroad courses or experiences. The study abroad perceived cost scale (SAPCS) was a self-report measure consisting of 16 items that combine to yield four composite cost scores and one overall cost score. This instrument was pilot tested using a convenience sample of agricultural students ($N = 219$) at a neighboring land-grant institution (Raczkoski et al., 2017). Data were collected online using Qualtrics Survey Software and imported into IBM SPSS Statistics 21 for analysis. Exploratory factor analysis (EFA) with a Promax rotation was used to determine the underlying factor structure of the items, and four factors emerged: outside effort cost ($\alpha = .89$); loss of valued alternatives cost ($\alpha = .86$); emotional cost ($\alpha = .85$); and task effort cost ($\alpha = .86$).

Following the analysis of data derived from the pilot test, it was determined that the EVC model (Barron & Hulleman, 2014; Flake et al., 2015) was an appropriate theoretical framework for the instrument's intent. Items were added and revised further to align with the factors of the EVC model. We presented these items to a panel of experts to collect validity evidence. In the current study, respondents completed a paper-based version of the revised SAPCS – with response categories ranging from 1 (*completely disagree*) to 5 (*completely agree*).

Data Analysis

Descriptive statistics were computed using IBM SPSS Statistics 21. System-missing values were excluded from the analysis automatically by SPSS 21. Post-hoc Cronbach's alpha scores were used to determine the internal reliability of the instrument. Reliability coefficients larger than .70 were considered reliable (Nunnally, 1978). Pearson's correlation coefficients were used to examine the relationships among the variables of interest. For factor analysis, the data were divided into one of two subsets using the random sample of cases function in SPSS 21, one set for exploratory factor analysis (EFA) and one set for confirmatory factor analysis (CFA).

Exploratory Factor Analysis. The psychometric investigation began with an EFA to determine the underlying factor structure of the dataset. We used multiple methods to establish the number of factors to retain, i.e., eigenvalue > 1, scree test, and parallel analysis (Henson & Roberts, 2006). We extracted the underlying factors using principal axis factoring with a Promax rotation in SPSS 21 because in social science cognitive factors tend to be correlated. Our criterion for number of factors to retain was at least three factors with loadings greater than .50. Based on this criterion, the four-factor solution was used. Several crossloading items were present; crossloading items (> .32) were removed and the factor analysis re-run. The suitability of the data for factor analysis was determined using standard conventions: Kaiser-Meyer-Oklin measure of sampling adequacy and Bartlett's test of sphericity.

Confirmatory Factor Analysis. The CFA model was run using the maximum likelihood estimation method (MLR). We identified a four factor-model. This model had strong support from previous versions of the instrument (Flake et al., 2015), so we chose to use the four-factor model for this reason and because of the findings from our EFA. Several measures of fit indices were used to determine model fit (Kline, 2011), including: root mean square error of approximation (RMSEA); *p* value to test fit; standardized root mean square residual (SRMR); and comparative fit index (CFI). We conducted the CFA to validate the hypothesized factor structure within the **R** statistical environment (Beaujean, 2013).

R is a very powerful statistical package where all analysis can be completed in the same program. This is especially useful for structural equation modeling (Beaujean, 2013). Another reason for using **R** is the "vast majority of syntax and packages are transportable from one system to another. This can aid in both research collaboration and making one's research replicable, as colleagues can reproduce results by copying and pasting the syntax" (Beaujean, 2013, p. 1).

The syntax for the four factor CFA model is listed below.

```
#Read in data set:
data = read.csv(file = "filename.csv", na.strings=".")
head(data)
dim(data)
cov(data[,1:12])
cor(data[,1:12])
model03.syntax = "
```

```
#factor specification statement (only statement needed)
EC =~ EC1 + EC2 + EC3
OEC =~ OEC1 + EC2 + OEC3
LOVA =~ LOVA1+ LOVA2 + LOVA3
TEC =~ TEC1 + TEC2 + TEC3
"
#model estimation
model03.fit <- sem(model03.syntax, data=data, mimic="Mplus", estimator = "MLR")
#display model output
summary(model03.fit, fit.measures = TRUE, standardized = TRUE)
attributes(model03.fit)
#display normalized residual covariances
residuals(model03.fit, type="normalized")
#reorder normalized residuals from largest in absolute value to smallest in absolute value
residual_matrix = residuals(model03.fit, type="normalized")$cov
norm_resid = NULL
#plot path diagram with unstandardized coefficients
install.packages("semPlot")
install.packages("pbkrtest")
library("semPlot")
semPlotModel(model03.fit)
semPaths(model03.fit,intercepts = TRUE, residuals = TRUE, style="mx",
    layout="tree", rotation=1, optimizeLatRes=TRUE, whatLabels = "par")
#Checking residual covariances repetitions
summary(abs(residual_matrix)>2)
#get model-estimated mean and covariance matrix
fitted(model03.fit)
#getting model R^2
inspect(model03.fit, what="r2")
#plot path diagram with standardized coefficients
semPaths(model03.fit,intercepts = TRUE, residuals = TRUE, style="mx",
    layout="tree", rotation=1, optimizeLatRes=TRUE, whatLabels = "std")
```

Results

Three analyses were utilized to address each of the research questions. Results are presented by research question.

Research Question 1: Exploratory Factor Analysis

To address research question one, the first dataset (*n* = 473) was used to conduct an exploratory factor analysis (principal axis factoring with a Promax rotation) of the revised instrument (19 items) to determine if a set of latent factors represented undergraduate students' perceived relative cost regarding participation in short-term, study abroad courses or experiences. Factors with three or more loadings greater than .50 were considered to be strong and stable (Costello &

Osbourne, 2005). The suitability of the data for factor analysis was determined using standard conventions, i.e., the Kaiser-Meyer-Oklin measure of sampling adequacy (KMO = .94) and Bartlett's test of sphericity (p = .000).

A four-factor solution was selected because it explained the most variance (84%) with the fewest factors prior to rotations, and it met the selection criteria. *Emotional cost* consisted of three items, which represented whether or not students perceived short-term study abroad courses to be emotionally draining, worrisome, and anxiety ridden (see Table 1). *Outside effort cost* consisted of three items, which represented students' beliefs about time and effort put forth for tasks other than short-term, study abroad courses or experiences. *Loss of valued alternatives cost* consisted of three items, which represented students' beliefs about short-term, study abroad courses or experiences preventing them from doing other things and missing out on valued alternatives to participation. *Task effort cost* consisted of three items, which represented students' perceptions about the amount of time and effort a short-term, study abroad course or experience would require (see Table 1).

Table 1

*Communalities and Factor Loadings from Exploratory Factor Analysis of the Study Abroad Perceived Cost Scale, Subset 1 (*n *= 473)*

Items	Factor Loadings	Communalities
Emotional Cost (3 items)		
EC_1: Will be emotionally draining	0.91	0.84
EC_2: I will worry too much	0.87	0.78
EC_3: Makes me feel too anxious	0.80	0.67
Outside Effort Cost (3 items)		
OEC_1: Because of all the other things I do, I will not have time	0.92	0.74
OEC_2: Because of all the other demands on my time, I will not have enough time	0.83	0.81
OEC_3: I will have so many responsibilities that I am unable to put forth the effort	0.77	0.71
Loss of Valued Alternatives Cost (3 items)		
LOVA_1: Will cause me to miss too many other things I care about	0.84	0.83
LOVA_2: Will prevent me from spending time doing other things I like	0.80	0.67
LOVA_3: I will not spend as much time doing the other things that I would like	0.73	0.76

Task Effort Cost (3 items)		
TEC_1: Will be too much work	0.69	0.75
TEC_2: I will have to put forth too much energy	0.65	0.73
TEC_3: Will be too exhausting	0.60	0.68

Note. EC = Emotional Cost; OEC = Outside Effort Cost; LOV = Loss of Valued Alternatives Cost; TEC = Task Effort Cost.

Research Question 2: Confirmatory Factor Analysis

Research question two utilized the second subset (n = 487) to conduct a confirmatory factor analysis (CFA) validating the hypothesized factor structure based on the EFA results. The data came from 12 items on a summated-rating scale measuring relative cost regarding study abroad participation (Raczkoski et al., 2017; Flake et al., 2015). Goodness of fit was evaluated using the root mean square error of approximation (RMSEA), p value to test fit, standardized root mean square residual (SRMR), and comparative fit index (CFI). All model-fit criteria were sufficient: RMSA < .08; 90% CI; SRMR < .05; CFI > .90 (Kline, 2011). The chi-square test is reported, but its results are de-emphasized due to over-sensitivity to sample size. The fit indices are presented in Table 2. Together, these they provided a holistic and conservative approach to determining model fitness (Jackson, Gillaspy, & Purc-Stephenson, 2009). We did not conduct any post-hoc analyses due to the good fit of the model.

Table 2

*CFA Fit Indices for the Four Factor Model of Study Abroad Perceived Cost Scale, Subset 2 (*n *= 476)*

Model	χ^2	*df*	*CFI*	*RMSEA*	*RMSEA* CI_{90}	*SRMR*
Four factor	66.892*	48	.993	.029	.009 – .054	.019

Note. RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Square Residual.
*p = .037.

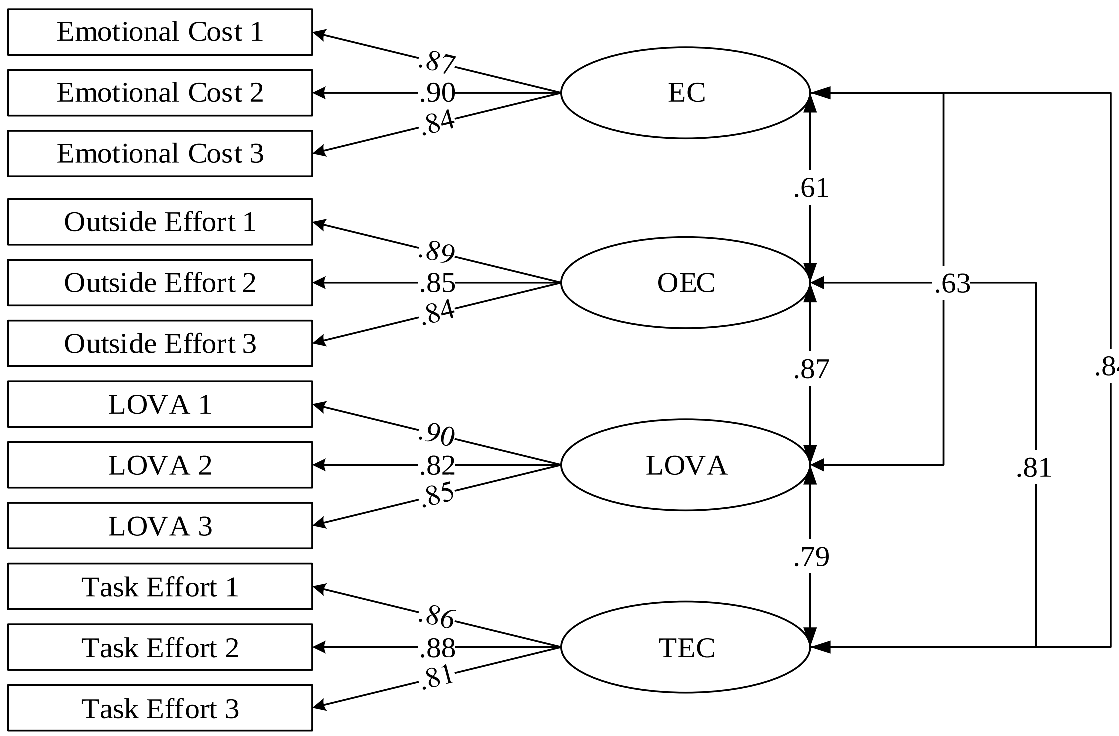

Figure 2. Path Diagram for the Four Factor Model of the Study Abroad Perceived Cost Scale. Root Mean Square Error of Approximation = .029; Comparative Fit Index = .993; Standardized Root Mean Square Residual = .019; degrees of freedom = 48. EC = emotional cost; OEC = outside effort cost; LOVA = loss of valued alternatives cost; TEC = task effort cost.

Our hypothesized four factor model is illustrated above in Figure 2. Ellipses represent latent variables and rectangles represent measure variables. We used thin solid lines to show the measurement component between the study's variables. A correlation table is shown in Table 3.

Table 3

*Correlations Among Study Abroad Perceived Cost Scale Composite Scores, Subset 2 (*n *= 476)*

Variables	1	2	3	4
Cronbach's alpha	0.90	0.89	0.89	0.89
1. Emotional cost	1.00			
2. Outside effort cost	0.61**	1.00		
3. Loss of valued alternatives	0.63**	0.87**	1.00	
4. Task effort cost	0.84**	0.81**	0.79**	1.00

**p < .01.

Reliability coefficients using Cronbach's alpha scores were used to determine if the four factors were reliable among data subset 2 (n = 476). Each of the four factors had reliability coefficients greater than .70, which were considered acceptable (Nunnally, 1978). Reliability estimates for each of the factors were: emotional cost (α = .90; 3 items); outside effort cost (α = .89; 3 items); loss of valued alternatives cost (α = .89; 3 items); and task effort cost (α = .89; 3 items). Reliabilities of the individual factors are presented in Table 3.

Research Question 3: Descriptive Statistics Related to Students' Motivations to Study Abroad

Descriptive statistics were utilized to address research question three. A summated-rating scale was used to determine their level of agreement for the 12 items identified as relative cost. Researchers adhered to the following real limits standard: 1.00 to 1.49 = *strongly disagree*, 1.50 to 2.49 = *disagree*, 2.50 to 3.49 = *neutral*, 3.50 to 4.49 = *agree*, and 4.50 to 5.00 = *strongly agree*. The results indicated that Bumpers College students from the University of Arkansas perceived a general disagreement with emotional cost (M = 2.23; SD = 1.04) and task effort cost (M = 2.26; SD = 0.98). Students exhibited a neutral level of agreement concerning outside effort cost (M = 2.71; SD = 1.15) and loss of valued alternatives cost (M = 2.54 SD = 1.09). Means and standard deviations for each of the four perceived costs are noted in Table 3.

Table 3

*Descriptive Statistics Among Study Abroad Perceived Cost Scale Composite Scores, Subset 2 (*n *= 476)*

Variables	Emotional cost	Outside effort cost	Loss of valued alternatives	Task effort cost
Mean	2.23	2.71	2.54	2.26
Standard Deviation	1.04	1.15	1.09	0.98

**p < .01.

Conclusions, Discussion, Implications, and Recommendations

Here, we present a very concise report of the results. The sequential, two-phased approach uncovered the four dimensions of perceived relative cost (emotional cost, outside effort cost, loss of valued alternatives cost, and task effort cost) and provided evidence for the psychometric properties of the 12-item instrument. The four-factor model emerged from the EFA analyses, as suggested by Flake et al. (2015). The fit indices from the CFA suggested the four-factor model provides an acceptable fit.

Although this research does provide validity evidence for a four-factor model of the SAPCS, it is not without limitations. The students in our study were from a mid-south region, land-grant university. As a result, the findings may not be generalizable to all students at land-grant universities. The importance of this study lies in its generalizability across disciplines. Additional research on the factor structure of the SAPCS with students from other land-grant universities is needed. One potential research question related to location is whether students' perceived relative cost vary by geographical region (Bunch et al., 2013). In addition, the results are limited to construct validity of the scale. Our results support the validity of the four factor model, but not information about the degree to which perceived relative cost factors predict achievement-related choices and performance (Barron & Hulleman, 2014; Eccles et al., 1983). At the same time, research by (Raczkoski et al., 2017) revealed that *outside effort cost* was predictive of students' overall motivation and intent to enroll in a short-term, study abroad course or experience before graduating. However, a poor response rate and an invalid scale limited the results of their pilot study. In this study, outside effort cost and *loss of valued alternatives cost* appear to be the most likely prohibitors for participation in short-term, study abroad courses or experiences. However, the ability of these factors to predict achievement-related choices and performance remains an opportunity warranting further research.

Despite the limitations, this is the first factor analytic study of the SAPCS among college students at a land-grant university. Because this four-factor model is a very different (truncated) version from previous iterations of the expectancy-value-cost model instrument (Flake et al., 2015), an empirical investigation such as this provides a unique contribution to the literature regarding the assessment of motivational barriers and benefits by college students at a land-grant university. This research should provide guidance to faculty and administrators in their roles as leaders and administrators involved in the process of internationalizing land-grant campuses and curriculum.

Research has been clear in establishing the benefits of study abroad experiences (Dooley, Dooley, & Carranza, 2008; Edgar, & Edgar, 2009; Estes et al., 2016; Hall, 2007; Kitsantas & Meyers, 2001; Navarro & Edwards, 2008; Norris & Gillespie, 2009; Northfell & Edgar, 2014; Roberts & Edwards, 2016). Studies have also identified that students are motivated to study abroad when considering intrinsic, attainment, and utility subjective task values. Why is it that student participation rates remain stagnant (Estes et al., 2016)? Perhaps too much time has been spent asking students of their *value* of study abroad experiences rather than the *cost* of participating. The 12-item instrument of interest in this study should be used to further understand the cost dimension of students' decision to study abroad. A deeper, and valid, understanding of how students perceive relative cost could be informative in developing strategies to engage more students in this valuable learning experience. For example, this study found that outside effort cost and loss of valued alternatives cost are the largest factors when students consider traveling abroad. How could those factors be mitigated? Are those student perceptions of cost accurate? What is the impact of perceived relative cost when various interventions are utilized? These questions can be examined more fully with the development and confirmation of the cost scale presented and validated in this study.

References

Anderson, P. H., Hubbard, A., & Lawton, L. (2015). Student motivation to study abroad and their intercultural development. *The Interdisciplinary Journal of Study Abroad, 26,* 39–52. Retrieved from https://frontiersjournal.org/wp-content/uploads/2015/11/ANDERSON-HUBBARD-LAWTON-FrontiersXXVI-StudentMotivationtoStudyAbroadandTheirInterculturalDevelopment.pdf

Andreasen, R. J. (2003). Barriers to international involvement. *Journal of International Agricultural and Extension Education, 10*(3), 65–69. doi:10.5191/jiaee.2003.10308

Barnick, H. (2010). Managing time and making space: Canadian students' motivations for study in Australia. *Anthropology in Action, 17*(1), 19–29. doi:10.3167/aia2010.170103

Barron, K. E., & Hulleman, C. (2014). Expectancy-value-cost model of motivation. In J. S. Eccles & K. Salmelo-Aro (Eds.), *International Encyclopedia of Social & Behavioral Sciences, 2nd edition: Motivational Psychology.* Elsvier.

Beaujean, A. (2013). Factor analysis using R. *Practical Assessment, Research & Evaluation, 18*. Retrieved from www.pareonline.net/pdfv18n4pdf

Raczkoski, B. M., Baker, M. A., Edwards, M. C., & Gordon, S. R. (2017). Title. *Proceedings of the AAAE Western Region AAAE Research Conference*. Fort Collins, CO. Retrieved at http://aaaeonline.org/2017-Western-Region

Bunch, J. C., Lamm, A. J., Israel, G. D, & Edwards, M. C. (2013). Assessing the motivators and barriers influencing undergraduate students' choices to participate in international experiences. *Journal of Agricultural Education, 54*(2), 217–231. doi:10.5032/jae.2013.02217

Clarke, III, I., Flaherty, T., Wright, N., & McMillen, R. (2009). Student intercultural proficiency from study abroad programs. *Journal of Marketing Education*, *31*(2), 173–181.

Conley, D. M. (2012). Cultural dimensions of human capital development. In, *Global networks, global perspectives, global talent: Discussions on the development of human capital in agribusiness.* College Station, TX: International Food and Agribusiness Management Review. Retrieved from http://www.ifama.org/resources/Documents/v15ia/v15ia.pdf#page=87

Costello, A. B., & Osbourne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*(7), 1–9. Retrieved from http://www.pareonline.net/pdf/v10n7.pdf

Crandall, V. C. (1969). Sex differences in expectancy of intellectual and academic reinforcement. In C. P. Smith (Ed.), *Achievement Related Behaviors in Children* (pp. 11–45). New York, NY: Russell Sate Foundation.

Danjean, S., Bunch, J. C., & Blackburn, J. (2016). Examining the motivations and barriers influencing the decisions of Louisiana State University College of Agriculture freshmen to participate in international experiences. *Journal of International Agricultural and Extension Education*, *22*(1), 49–62. doi:10.5191/jiaee.2015.22104

Dooley, K. E., Dooley, L. M., & Carranza, G. (2008). Beliefs, barriers, and benefits of a faculty aboard experience in Mexico. *Journal of International Agricultural and Extension Education*, *15*(3), 29–38. doi:10.5191/jiaee.2008.15303

Doyle S., Gendall, P., & Meyer, L. H. (2010). An investigation of factors associated with student participation in study abroad. *Journal of Studies in International Education, 14*(5), 471–490. doi:10.1177/1028315309336032

Eccles, J. (2013). Subjective task value and the Eccles et al. model of achievement-related choice. In (Ed.), *The handbook of competence and motivation*. New York, NY: The Guilford Press.

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., & Meece, J. (1983). Expectancies, values and academic behaviors. In J. T. Spence (ed), *Achievement and achievement motives* (pp. 75–146). San Francisco, CA: W. H. Freeman.

Edgar, D. W., & Edgar, L. D. (2009). Students' perceptions of Mexican agricultural practices occurring in Chihuahua State. *Journal of Southern Agricultural Education Research, 59.* Retrieved from http://www.jsaer.org/pdf/Vol59/2009-59-004.pdf

Estes, S., Hansen, M. J., & Edgar, L. D. (2016). University student and faculty needs, barriers, and expectations of international efforts and opportunities: A closer look at one land-grant university's college of agriculture. *Journal of International Agricultural & Extension Education*, *23*(1). doi:10.5191/jiaee.2016.23103

Flake, J. K., Barron, K. E., Hulleman, C., McCoach, B. D., & Welsh, M. E. (2015). Measuring cost: The forgotten component of expectancy-value theory. *Contemporary Educational Psychology*, *41*(2015), 232–244. Retrieved from https://doi.org/10.1016/j.cedpsych.2015.03.002

Grays, M. (2013). Measuring motivation for coursework across the academic career: A longitudinal invariance. *Dissertations*. 76. http://commons.lib.jmy.edu/diss201019/76

Hachtmann, F. (2012). The effect of advertising-focused, short-term study abroad programs on students' worldviews. *Faculty Publications, College of Journalism & Mass Communications*. Paper 68. Retrieved from http://digitalcommons.unl.edu/journalismfacpub/68

Hall, D. E. (2007, October). Why professors should teach abroad. *The Chronicle of Higher Education* (The Chronicle Review Section), *54*(6), B20.

Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published research: Common errors and some comment on improved practice. *Educational and Psychological Measurement, 66*(3), 393–416. doi:10.1177/0013164405282485

Hulleman, C. S., Barron, K. E., Kosovich, J. J., & Lazowski, R. A. (2016). Student motivation: Current theories, constructs, and interventions within an expectancy-value framework. In A. A. Lipnevich, F. Preckel, & R. D. Roberts, *Psychosocial skills and school systems in the 21st century: Theory, research, and practice.* Switzerland: Springer International Publishing.

Irani, T., Place, N. T., Lundy, L., & Friedel C. (2004). Experience, perceptions, and likelihood of participation in international opportunities among college of agricultural and life science students. Proceedings from the *20th Annual Association for International Agricultural and Extension Education Conference*, 273–283.

Jackson, D. L., Gillaspy, Jr., J. A., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview of some recommendations. *Psychological Methods, 14*(1), 6–23. doi:10.1037/a0014694

Kitsantas, A., & Meyers, J. (2001). Studying abroad: Does it enhance college student cross-cultural awareness? Paper session presented at the combined *Annual Meeting of the San Diego State University and the U.S. Department of Education Centers for International Business Education and Research*, San Diego, CA.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Kosovich, J. J., Hulleman, C. S., Barron, K. E., & Getty, S. (2015). A practical measure of student motivation: Establishing validity evidence for the expectancy-value-cost scale in middle school. *Journal of Early Adolescence, 35*(5-6), 790–816. doi:10.1177/0272431614556890

Lee, C. S., Therriault, D. J., & Linderholm, T. (2012). On the cognitive benefits of cultural experience: Exploring the relationship between studying abroad and creative thinking. *Applied Cognitive Psychology*, *Applied Cognitive Psychology, 26*(5), 768–778. doi:10.1002/acp.2857.

Lewis, T. L., & Niesenbaum, R. A. (2005). Extending the stay: Using community-based research and service learning to enhance short-term study abroad. *Journal of Studies in International Education*, *9*(3), 251–265. doi:10.1177/1028315305277682

Navarro, M., & Edwards, M. C. (2008). Priorities for undergraduate education and the inclusion of internationalized curriculum in colleges of agriculture: Interpreting and negotiating the "comparison dilemma." *Journal of Agricultural Education, 49*(4), 72–82. doi:10.5032/jae.2008.04072

Norris, E. M., & Gillespie, J. (2009). How study abroad shapes global careers: Evidence from the United States. *Journal of Studies in International Education, 13*(3), 382–397. doi:10.1177/1028315308319740

North Association of Foreign Student Advisors [NAFSA]. (2017). Trends in U.S. study abroad. Retrieved from http://www.nafsa.org/Policy_and_Advocacy/Policy_Resources/Policy_Trends_and_Data/Trends_in_U_S__Study_Abroad

Northfell, A., & Edgar, L. D. (2014). Using reflective journals to compare an international faculty-led study tour and student internship experience. *Journal of Applied Communications, 98*(4), 28–41. doi:10.4148/1051-0834.1091

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.

Özturgut, O. (2007, Fall). Study/teach abroad programs for higher education faculty. *Essays in Education, 22*, 42–49.

Perez, T., Cromley, J. G., & Kaplan, A. (2014). The role of identify development, values, and costs in college STEM retention. *Journal of Educational Psychology, 106*(1), 315–329. doi:10.1037/a0034027

Roberts, R., & Edwards, M. C. (2016). Transforming students' global knowledge and perspectives through international service-learning (ISL): How U.S. university agriculture students made sense of their lived experiences over time. *Journal of International Agricultural & Extension Education, 23*(3). doi:10.5191/jiaee.2016.23301

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication.

Salisbury, M. H., Umbach, P. D., Paulsen, M. B., & Pascarella, E. T. (2009). Going global: Understanding the choice process of the intent to study abroad. *Research in Higher Education, 50*, 119–143. doi:10.1007/s11162-008-9111-x

Towsic, M. L. (n.d.). Executive summary. *University of Minnesota survey: Study abroad curriculum integration*. Retrieved from www.umabroad.umn.edu/ci/docs/evaluation/surveys/01_02/facadv_exec_sum.pdf

Trochim, W. (2001). *The research methods knowledge base* (2nd ed.). Cincinnati, OH: Atomic Dog Publishing.

Zhai, L., & Scheer, S. D. (2004). Global perspectives and attitudes towards cultural diversity among summer agriculture students at the Ohio State University. *Journal of Agricultural Education*, *45*(2), 39–51. doi:10.5032./jae.2004.02039

Development and Validation of a Study Abroad Perceived Cost Scale
Discussant Remarks: Alexa Lamm

Instrument development and validation is imperative to strengthening the research we conduct as a profession. I commend the authors for taking on such a task and doing it with a large enough group of students (*N* = 1,000) that advanced statistics could be used. The author team established the need, had a strong theoretical foundation and included enough details in their methods that the study could be replicated easily. The discussion also assists us in moving forward as we strive to measure the motivations behind student engagement in study abroad programs. Given this, I would like to pose the following questions:

The literature review in this manuscript was very thorough in terms of discussing previous research on study abroad and its importance to undergraduate students. I appreciate the number of citations included to justify the statements made. I would like to ask the authors why validating the scale itself assists in moving this area of inquiry forward since it is the true purpose of the research?

The authors also did a commendable job grounding the study in theory using expectancy-value theory as their framework. When introducing the theory, the author's stated "the model is used to identify an individual's likely decision based on two beliefs: 1) his or her expectation for success and 2) the importance or value he or she places on the activity/task." Given this, my questions are: How does this translate into the conceptual model that only indicates relative cost as a predictor of motivation to study abroad? What are the implications that the largest motivator for studying abroad in this study was outside effort cost? And what does this say about the two beliefs driving motivation in EVT?

Finally, I am curious why the authors chose to use both an EFA and a CFA. Given the strong theoretical foundation and that the scale was already developed and tested on other populations, I would be interested to hear why the authors chose to conduct an EFA which is typically used when constructs are completely unknown to explore the data.

This research is important given such a small percentage of our students choose to engage in study abroad experiences and this sample is no different with 93% reporting they had not participated. I encourage anyone interested in measuring motivators to studying abroad to use the scale validated in this study.

The Coach Phenomena: A Collective Case Study Examining the Validity of the Kolb Educator Role Profile in Preservice Agricultural Education

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Abstract

The collective case study sought to understand the coaching phenomena, one's preference for the coach educator role, in Oklahoma preservice agricultural educators. Kolb Educator Role Profile (KERP) results and semi-structured interviews to understand the choice rationale of preservice agricultural educators were coded to determine the assessment's qualitative validity. Two theoretical themes to address key issues emerged: (a) ERP theoretical perspectives and (b) espoused theories. An adapted ERP framework reflects the case's diverging conceptualizations. Four theoretical categories describe the educator roles in agricultural education: (a) the friend, (b) the know-it-all, (c) the sounding board, and (d) the career development event (CDE) coach. Two theoretical categories capture conceptualization of learning modes: (a) student-first versus book-knowledge focus and (b) dialogue versus hands-on focus. Espoused theories of the preservice agricultural educators reveal KERP item statements were chosen that (a) reflect how I was taught, (b) connect to what I am good at, (c) involve action and real-world, (d) let agricultural education be different, (e) focus on personal growth of students, (f) are what I think students like, and (g) I understand. KERP results do not appear to be valid qualitatively for preservice agricultural educators due to the contextually and culturally laden option choices.

Introduction

Experiential learning, though widely accepted and conceptually sound, is plagued by oversimplification of the theory, ambiguity in praxis and a lack of effective and consistent measurement (Baker, Robinson, & Kolb, 2012; Kirschner, Sweller, & Clark, 2006; Roberts, 2006; Roberts, 2012). "The result of [experiential learning] is a series of recommendations that most educators find almost impossible to implement" (Kirschner et al., 2006, p. 76). Kolb, Kolb, Passarelli, and Sharma (2014) proposed the Educator Role Profile (ERP) framework to formalize the role of the educator in helping learners progress through the full experiential learning cycle. The framework established four key experiential educator roles and extends those roles to practices and teaching methods aligned with each role. The Kolb Educator Role Profile (KERP) was created in conjunction with the framework as a self-assessment tool for educators to develop an awareness of their preferred role, to make deliberate choices when designing instruction, and to improve training and evaluation of experiential educators (Kolb & Kolb, 2017). This measure meets the psychometric burden of establishing reliability and validity in a number of settings, including agricultural education (Kolb et al., 2014; Kelley, 2017), but interpretation and use of the findings are of most concern when establishing validity (Shultz & Whitney, 2005).

Research in agricultural education demonstrates a very strong and consistent preference for the coaching role (Baker & Twenter, 2016; Kelley, 2017). Eighty-eight percent of preservice agricultural educators (*N* = 124) noted the coaching role as their top preferred role, while only 7% preferred the standard-setter/evaluator role, and less than 2% found subject expert or facilitator to be their largest preference. How does one interpret the validity of these findings? The crux of this collective case study seeks to conceptualize how preservice agricultural educators interact with the items of the KERP instrument and understand the *coaching phenomena*, with such strong preference for coaching, whilst a noticeable disdain for subject expert.

Development of Issues

Stake (1995) recommends the use of issues, represented by the Greek symbol □, to provide conceptual structure and serve as research questions to bring focus to the problems being addressed and the complexity of the conditions around said problem. The literature used to frame this collective case study outlines key issues associated with the valid interpretation of findings from the KERP in preservice agricultural educators in Oklahoma.

Experiential approaches to learning have gained substantial attention over the last decade, as evidenced by extensive use in more than 30 fields and academic disciplines (Kolb et al., 2014). This learner-centered approach to instruction is often connected to service-based learning (Eyler, 2009), adventure education (Fuller, 2012), problem-solving (Bethell & Morgan, 2011), internships (Lewis & Williams, 1994), career and technical education (Clark, Threeton, & Ewing, 2010), and place-based learning (Smith, 2002) in both formal and informal school settings. In agricultural education, scholars and practitioners have adopted experiential learning as a defining learning theory (Baker, Robinson, & Kolb, 2012; Roberts, 2006) and connected experiential learning to authentic learning (Knobloch, 2003). Baker et al. (2012) aligned the experiential learning theory to the three key components of agricultural education. Though experiential learning continues to gain attention in agricultural education, both critics and supporters have struggled to move the theory to practice (Baker et al., 2012; Roberts, 2006, Roberts, 2012). Experiential learning must be more of a “something than an everything” (Roberts, 2012, p. 3) in order to facilitate meaningful conversations, rather than be hampered by ambiguity (Itin, 1999).

An important part of the conversation, relevant to more formal educational settings, is the role of educators in facilitating experiential learning (Baker & Twenter, 2016; Baker et al., 2012; Kolb et al., 2014). Roberts (2012) distinguished experiential learning from experiential education in noting, experiential learning is not merely an ongoing human process, but a method or technique “that any teacher might employ to meet certain instructional objectives” (p. 4). What exactly are the skills, steps, or strategies associated with experiential learning? Roberts (2012) argued the breadth of application would require each field or discipline to contextualize methods or techniques for their purposes. The challenge is to “hang on to the distinctive ways experiential education frames the educational process while at the same time ensuring that it does not become quaint and overly isolated” (Roberts, 2012, p. 9).

Kolb et al. (2014) responded to the challenge by creating the Educator Role Profile (ERP) and shared: “we have created an educator-role framework to assist educators in the application of the ELT concepts of the learning cycle and learning style in a dynamic-matching model of teaching around the learning cycle” (Kolb & Kolb, 2017, p. 365). The ERP outlines four key roles that educators play in supporting experiential learning: (a) facilitator, (b) subject expert, (c) standard setter/evaluator, and (d) coach (Kolb et al., 2014). Each of the roles are accompanied by practical descriptions of methods and approaches indicative of each role. The Kolb Educator Role Profile (KERP) was designed as a self-assessment instrument to “help educators sharpen their awareness of their educator-role preferences and to make deliberate choices about what works best in a specific situation” (Kolb & Kolb, 2017, p. 367).

As explained by Shultz and Whitney (2005), the development of a metric that accompanies the ERP framework provides valuable information to practitioners as they make decisions, research the effectiveness of strategies, and further improve the ERP framework – so long as the metric is “well-developed and used in combination with other relevant information” (p. 3). Literature established that the KERP meets the standards for both reliability and validity (Kolb et al., 2014). Though this quantitative, confirmatory, process is one valuable piece of determining validity, Furr and Bacharach (2008) reminded researchers, “a measure itself is neither valid nor invalid; rather, the issue of validity concerns the interpretations and uses of a measure’s scores” (p. 168). Furr and Bacharach (2008), referring to a 48-question conscientiousness scale as an example, shared:

> In terms of validity, the set of items themselves is neither valid nor invalid. Similarly, the scores derived from the 48 items are neither valid nor invalid. However, the authors’ interpretations of the scores might be valid or invalid. Are the authors correct in interpreting scores on the set of 48 items in terms of planfulness, organization, and determination. (p. 168)

Though the KERP is a valuable tool for experiential educators, the interpretation of KERP scores within various contexts warrants attention.

Should we modify practice, assess instructional strategies, or monitor effectiveness using the KERP? The answer rests on the validity of the measure, which is defined as, “the degree to which evidence and theory support the *interpretations* [emphasis added] of test scores entailed by the proposed uses” (AERA, APA, & NCME, 1999, p. 9). Are we, the authors, correct in interpreting the KERP results of preservice agricultural educators? Is there a valid explanation for the coaching phenomena? To answer these important questions, five key issues have been identified to better understand how students interact with the KERP instrument to achieve their ultimate score.

Focus of the Case through Issues Identification

The literature framed this collective case study by highlighting six specific issues that guided data collection and analysis.

$\square_1$: How are preservice agricultural educators interpreting the KERP key concepts?

- □$_2$: What espoused theories (Argyris & Schön, 1974) guide preservice agricultural educators' choice between the KERP's dichotomous role options?
- □$_3$: Are concepts embedded within the KERP that preservice agricultural educators operationalize differently than the ERP framework?
- □$_4$: Why are preservice agricultural educators finding coach as their preferred role?
- □$_5$: Why are less than two percent of preservice agricultural educators finding subject expert or facilitator as their most preferred role?

Methodological Approach

A collective instrumental case study approach was employed in this study as the cases were instrumental in understanding how preservice agricultural educators view the KERP. Twelve cases "hospitable to our inquiry" were selected "to maximize what we can learn" (Stake, 1995, p. 4). Procedural, situational, relational, and exiting ethics were considered throughout the research process (Tracy, 2010). Preservice agricultural educators in their final year of the teacher education program were asked to participate in this inquiry. An incentive was provided in the form of course credit, and the research team remained transparent in explaining the aims and objectives of the study and the connection between this study and the course content they were interacting. The preservice agricultural educators were exposed to the ERP framework through coursework during the semester. Once preservice agricultural educators reviewed the IRB documents, they were asked to join the researchers for an interview. Researchers asked participants to choose between two educator role options, identical to the KERP, and to explain the rationale of their choice. A semi-structured interview protocol provided freedom to explore emergent ideas and to ask questions (Creswell & Miller, 2000). The interviews were recorded and transcribed verbatim.

Following data collection, the reesarchers independently coded each interview utilizing Microsoft Excel®. Preservice agricultural educator voice was of interest in this study, thus researchers used In Vivo coding was used as the first-round coding strategy (Saldaña, 2013). In Vivo coding ensured interpretations used terms "that participants use in their everyday lives, rather than in terms derived from the academic disciplines or professional practices" (Stringer, 1999, p. 91). Theoretical coding was chosen as the second cycle coding method in order to bring analysis back to the key issues of the study grounded in the ERP framework (Saldaña, 2013). Though theoretical coding is most often associated with theory development, research focused on pre-existing theories in order to answer the "how" and "why" questions can also be important (Saldaña, 2013). Analytic memos were kept during the coding process to document the coding process and deductive decisions (Saldaña, 2013). Throughout the coding process, reflexivity discussions elucidated researcher biases and supported bracketing in analysis (Creswell & Miller, 2000). Disconfirming evidence was sought following each deductive decision to ensure trustworthiness of the findings (Creswell & Miller, 2000).

Theoretical Lens

The *Educator Role Profile* (ERP) is a framework, grounded in the experiential learning theory (Kolb, 1984/2015), focusing on the role of educators in guiding students around the experiential learning cycle (Kolb et al., 2014). Kolb et al. (2014) defined each role:

> **The Facilitator Role.** When facilitating, educators help learners get in touch with their personal experience and reflect on it. They adopt a warm affirming style to draw out learners' interests, intrinsic motivation, and self-knowledge. They often do this by facilitating conversation in small groups. They create personal relationships with learners. **The Subject Expert Role.** In their role as subject expert, educators help learners organize and connect their reflections to the knowledge base of the subject matter. They adopt an authoritative, reflective style. They often teach by example, modeling and encouraging critical thinking as they systematically organize and analyze the subject matter knowledge. This knowledge is often communicated through lectures and texts.
> **The Standard-Setter/Evaluator Role.** As a standard-setter and evaluator, educators help learners master the application of knowledge and skill in order to meet performance requirements. They adopt an objective results-oriented style as they set the knowledge requirements needed for quality performance. They create performance activities for learners to evaluate their learning.
> **The Coaching Role.** In the coaching role, educators help learners apply knowledge to achieve their goals. They adopt a collaborative, encouraging style, often working one-onone with individuals to help them learn from experiences in their life context. They assist in the creation of personal development plans and provide ways of getting feedback on performance. (pp. 220-221)

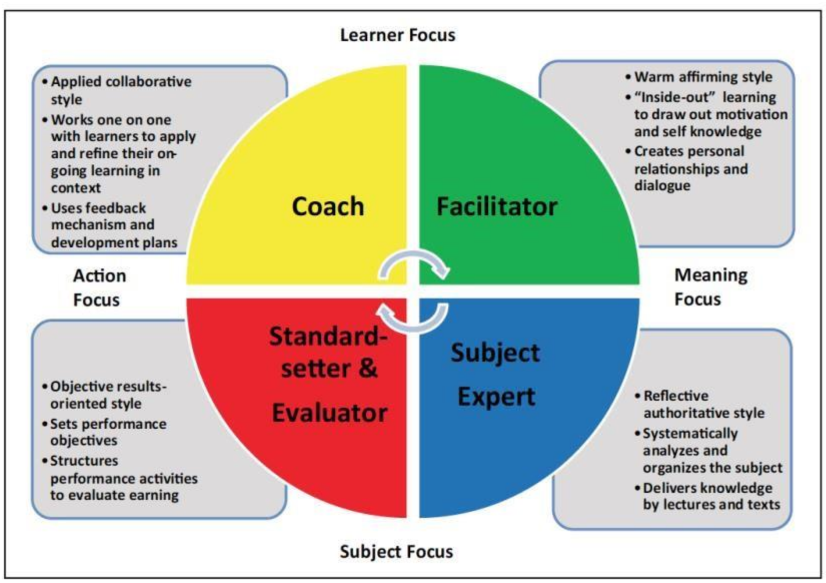

Figure 1. Educator Role Profile. Adapted from "On Becoming an Experiential Educator: The Educator Role Profile" by A. Kolb, D. Kolb, A. Passarelli, and G. Sharma, 2014, *Simulation and Gaming*, *45*(2), p. 220. Copyright 2014 by SAGE Publications.

Each of the roles are “bridging strategies” (p. 222) between the four modes of learning – concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE) (Kolb et al., 2014). In the grasping dialect, educators have either a student or subject focus. In the transformation dialect, educators focus on drawing meaning or moving to action. The ERP focuses on the role that educators play in interacting *with*, rather than *on*, students (Kolb et al., 2014), and includes key styles and strategies as noted in the model (see Figure 1).

Description of the Case

The collective instrumental case study included 12 undergraduate preservice agricultural educators enrolled in the teaching methods course at Oklahoma State University during the fall 2017 semester. The twelve cases ranged in age from 21 to 31 ($\square_{age}$ = 22.25) and were equally representative of the male and female genders. Cases were predominantly in- state students, with only two (17%) considered out-of-state. Each case reported previous enrollment in secondary school-based agricultural education (SBAE) programs. Five cases (42%) reported varying degrees of prior teaching experience, defined as formal, non-formal, or informal. KERP scores indicated coach (n = 8, 73%) as the most common preferred educator role among the cases and subject expert (n = 0, 0%) as the least preferred. The facilitato*r* role was preferred by 9% of the cases (n=1) and standard-setter/evaluator by 18% (n=2).

Assertions and Conclusions

Assertions are claims to knowledge made by researchers as a result of data analysis in a qualitative case study. They highlight salient findings and are followed by conclusions or inferences regarding the nature of the case. It is most appropriate to present the cases in this fashion for clarification of themes and their implications to practice. Initial analysis of transcriptions revealed 724 In Vivo codes. Researchers organized codes by categories indicative of a method or approach associated with Kolb et al.’s (2014) educator roles, or a belief, attitude, or intention about the role of an educator. Theoretical coding produced two overarching themes: 1) ERP theoretical perspectives, and 2) espoused theories. Six sub-themes were identified related to ERP theoretical perspectives and seven sub-themes of espoused theories were found. Generalization to other populations was not the goal of this study. Rather, transferability of these findings is the burden of the reader in assessing similarity of cases (Stake 1995).

ERP Theoretical Perspectives

The study uncovered preservice agricultural educators’ rationale behind preferences for each KERP option. Although Kolb et al. (2014) developed the ERP framework to help educators “teach around the learning cycle” (p. 220) and utilize within various contexts, this cases viewed completion of the KERP very pragmatic and contextually-bound in SBAE. To reflect the divergence of the cases’ conceptualization from the framework, the ERP was reframed into six theoretical categories and fourteen theoretical sub-categories (see Figure 2). Four theoretical categories described the cases’ conceptualization of the four educator roles as (a) the friend, (b) the know-it-all, (c) the sounding board, and (d) the career development event (CDE) coach. The remaining two theoretical categories captured the cases' conceptualization of the dialectic grasping and transforming learning dimensions as (a) student-first versus book-knowledge focus, and (b) dialogue versus hands-on focus. Fourteen theoretical sub-categories were asserted to describe the conceptualized key methods and approaches associated with the theoreticallycategorized educator roles and are discussed within the narrative of each role.

The friend. The collective case's strong emphasis on caring and collaborating with students indicated a conceptualization of the facilitator role as an attentive buddy rather than a helper in the learning process. A caring, relational, and logical demeanor was valued by all cases. The concern that students realize "I care more about them then if I know everything in the world" was expressed by Case 4, with similar sentiments mentioned by multiple cases. Relationships and "inside out" learning were extended beyond the student-teacher interaction to peers. "If students can learn from kids or their peers that's better than just listening to the old guy

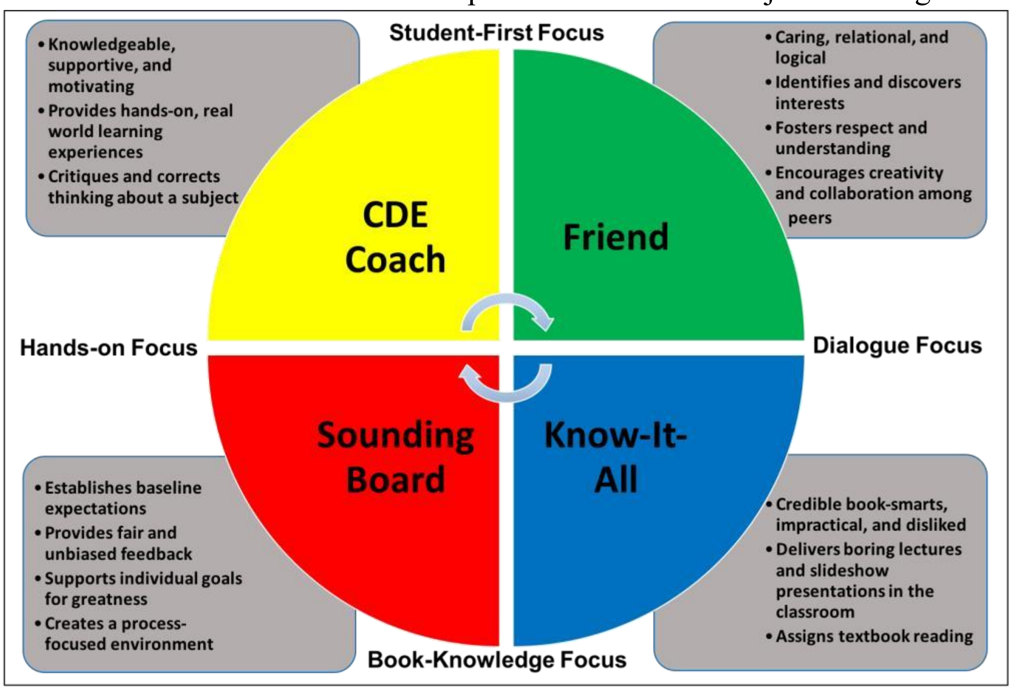

Figure 2. Adapted Educator Role Profile. Reframing of the educator roles and learning modes to reflect preservice agricultural educators' theoretically-coded understandings of the ERP based on KERP assessment conceptualizations.

from the college who came there to teach us," said Case 3. "We do the best learning from each other," remarked Case 4. The friend role also believed in the importance of fostering respect and understanding among students. Case 8 felt it was "really important to respect the people that you're around," while Case 4 believed students needed to "learn about ourselves and learn about the world we live in." Case 6 stated that educators needed to be logical to provide "a good contrast to the students that are a little more creative." Creativity was believed to help students learn to "think outside of the box" (Cases 1, 5, 7, 8, and 10). Ultimately, the friend role maintained a focus on the discovery of learner's interests. When describing why they preferred learners pursue the development of their interests, Case 6 said, “I feel like it’s the first step…you develop this interest and then later on down the road they can move to preparing for that career.”

The know-it-all. The collective case reframed the subject expert role as the know-it-all, conceptualized as someone with credible book-smarts but no practical skills. Case 6 described the know-it-all role as “a person that know[s] all this information but they’re not very good at it.” Likewise, Case 10 said the role “comes from a book” and that their mind “immediately goes to PowerPoint lecture.” A recurring reaction throughout the cases was disdain for teaching methods associated with the know-it-all role. “I hate lectures,” stated Cases 1, 4, and 10 bluntly. “I don’t think I’ll ever require a student to read information critically,” indicated Case 1. Though content knowledge was valued as the “keystone in teaching” (Case 3) in order to establish credibility, the know-it-all was targeted as the boring educator role. “It’s like a classroom, a board; it’s super boring, no one really likes that, and students don’t pay attention” said Case 8. “If you’re just [teaching] basic knowledge they’re going to be bored,” noted Case 2. Case 12 believed students “didn’t care that much what an expert thinks [*sic*].” A focus on analyzing, organizing, and finding meaning in subject content was lacking. Underlying the strong dislike, the know-it-all role was perceived as impossible to adopt. “As ag teachers, if we think we are going to know everything about every little subject that we teach in ag, it is foolish because we are not,” Case 3 firmly expressed. The belief that agricultural educators could not “be an expert in everything” was undisputed.

The sounding board. Deviating significantly from the theoretical framework of standard-setter/evaluator, the collective case conceptualized the role as the sounding board. Rather than being results and performance driven, the sounding board’s purpose was to establish baseline expectations in the classroom with unlimited freedom for student goals and self-defined outcomes. “They need to know what is expected of them,” said Case 12. But, these expectations and standards were only deemed necessary to help students “have a goal in mind” (Case 4), not measure learning. In the sounding board role, the cases believed focusing on performance outcomes did not account for “kids performing differently” (Case 11). “Being a teacher, you have to be able to take into account that everybody doesn’t learn at the same level,” expressed Case 9. Emphasis on the learning process over outcomes was indicated:

> As long as they’re learning something, however they get there is good… It should be them growing from where they started out in class to becoming more knowledgeable about something or doing better at something than what they did before; the best version of themselves rather than the outcome. (Case 7)

The sounding board’s process-focused environment was juxtaposed by a desire for objectivity, operationalized as fair and unbiased feedback. Case 1 felt teachers needed to be “fair and without bias to give [students] the best opportunities to succeed.” Being fair and unbiased meant the sounding board role “shouldn’t punish students that didn’t meet the standard if they tried” (Case 10).

The CDE coach. The coaching role was conceptualized as the CDE coach, influenced by value-laden language in the agricultural education context and its frequent association with training CDE/LDE teams. Aligning somewhat with its theoretical underpinnings to support individual learners, the CDE coach assumed more of the evaluative and expertise behaviors found in the ERP subject expert and standard-setter/evaluator roles. Case 1 viewed their responsibility as CDE coach to "teach [students] everything I know to get [them] where [they] want to be" and "ask questions to see what they're thinking and lead into where maybe the thought process should be." Similarly, Case 5 said they helped students learn by "see[ing] what you did wrong, hear[ing] how you did it wrong or right, and [telling] how to make it better." Case 8 clearly saw the role of CDE coach to "tell them…how you can get better at this." Case 11 believed "the basic concepts [were] going to come with coaching." When asked to expand on that belief, Case 11 said:

> For example [with] livestock judging and what I've experienced, I'll go through and have a class of four animals. I'll explain my personal views on why each one is a certain way…then try to see if they see that the same way. If not, then [I will] tell them why or [explain] what I am seeing.

It was emphasized that relationships were developed and strengthened through the CDE coach role, as Case 12 "enjoyed making relationships with my students." The CDE coach operationalized applied learning contexts as hands-on and real world. "If we can learn in a real life context, that's best," said Case 3. The application of learning in the real world was overwhelming preferred by the collective case because as Case 4 stated, "it's more practical" and "goes back to using hands-on."

Student-first versus book-knowledge focus. In the grasping dialect, the cases viewed subject focus with negative valence, preferring learner focus. Doing what was always considered ideal for students allowed the cases to evade subject content almost completely; preference was for anything *but* subject content. Case 7 believed that "students don't pay as much attention to the concepts as they do when they get to actually put their hands on something." The cases did not see much utility in subject content. "You can learn all this book knowledge as much as you want, but if you don't know how to apply it out in the real world it's not going to get you anywhere," affirmed Case 9.

Dialogue versus hands-on focus. Preferences in the transforming dialect were positively weighted toward action and inundated with language commonly amplified in agricultural education settings. The acting mode of learning was consistently described as *hands-on* or *doing*. Case 11 said hands-on learning was preferred because "…you experience it, you do it, you just know it. When you do something you usually hold on to it." The cases appeared to unanimously agree with Case 2 that with hands-on learning students would "…learn more [and] they'll be more interested… [I]t's overall better, period, for the kids." Discussion and reflection held some value in the learning process with the case, but lacked desire to create meaning and integrate critical thinking. Said best by Case 11, "It can be effective to discuss it…but I don't think it's as effective as actually doing it."

Espoused Theories

Strong beliefs appeared to ominously influence KERP option preferences of preservice agricultural educators. Though the ERP framework suggests educator methods and approaches to match students at each stage of the experiential learning cycle (Kolb et al., 2014), seven espoused theories (Argyris & Schön, 1974) appeared to lead the cases to choose options that (a) reflect how I was taught, (b) connect to what I am good at, (c) involve action and real-world, (d) let agricultural education be different, (e) focus on personal growth of students, (f) are what I think students like, and (g) I understand.

Reflect how I was taught. The cases repeatedly used their personal experience as students to rationalize option choices. "How I view an ag teacher is from my experience," admitted Case 6. Likewise, Case 10 described their agricultural teacher as "an excellent example of a coach…and that's kind of how I base my teaching off of."

Connect to what I am good at. Fixed beliefs about ability, performance, and knowledge guided the cases to select options reflective of their self-determined proficient areas. Case 8 chose to "focus more on what [they] really like and know" while Case 12's decision was based on the fact that the alternative was "not [their] forte or something [they] enjoy." Making option choices based on what they were good at was driven by the fear of being wrong. Case 8 stated honestly, "I'm afraid I would tell a student something wrong and make myself uncredible [*sic*]." This espoused theory supports the belief that educators are apt to teach how they learn (Davidson, 1990; Hartel, 1995).

Involve action and real-world. Strong preference existed for KERP items focused on the action mode of learning and real world application. Case 9's view that "real-world experiences are more important than any type of knowledge" is indicative of the cases' pro-bias for real-world and action. The need to equip students with "life skills" was communicated by Cases 4, 5, and 8. "[A]g as a whole is just really hands-on," said Case 6.

Let agricultural education be different. KERP option choices were not chosen if they were not conducive with the complexities of agricultural education. "There's so many diverse areas [in agriculture], you can't be an expert in it all," claimed Case 2. Teaching agriculture was considered unique from other disciplines because of the expectation "to teach the agriculture broad but then teach to your area, too" (Case 3). When subject matter options were chosen, it was because the discipline of agriculture held societal relevance. "Without food [we] wouldn't live, so agriculture takes precedence," purported Case 7.

Focus on personal growth of students. A commitment to the personal growth of students outweighed the importance of teaching agricultural content. For Case 3, certain options were chosen because "it goes further than ag." Case 2 desired to "ultimately make good people of the world." Being an agricultural teacher was seen as "part of a bigger picture…to grow them [students] as people" (Case 4).

What I think students like. The cases preferred options perceived as fun or well-liked by students. At the heart of the preference appeared to be a concern for student's motivation and enrollment in agricultural education courses. "You're going to hit more kids with hands-on experience," said Case 6. Similarly, Case 2 trusted "hands-on learning will make yours [*sic*] a class they look forward to coming to." Students were believed to find creativity more fun (Case 12) and learning from peers more enjoyable (Case 8). Positive social value was collectively attached to the term *coach* as well.

I understand. At times, KERP options were not chosen because the meaning was operationalized incorrectly or unknown by the cases. When discussing the meaning of *objective evaluator*, Case 9 defined the concept as, "to evaluate the objectives…because it's a way of assessing what you've learned." Case 10 admitted, "I guess I really don't even know the correct definition for intellectual." Concepts such as *application, field project, critical reading,* and *scholarship* were consistently operationalized incorrectly throughout the cases.

Issue Resolution

The adapted ERP framework provides significant insight to address the study's key issues. Table 1 summarizes the issues and how they were resolved. For preservice agricultural educators, KERP option choice was contextually and culturally laden, indicated by their conceptualizations of the ERP framework and prevalent espoused theories.

Table 1.

Key issues and resolution

Issue 2: What espoused theories (Argyris & Schön, 1974) guide preservice agricultural educators' choice between the KERP's dichotomous role options?	Preservice agricultural educators choose items that reflect how they were taught, connect to what they are good at, involve action and "real world," let agricultural education be different, focus on personal growth of students, are what they think students like, and they understand.
Issue 3: Are concepts embedded within the KERP that preservice agricultural educators operationalize differently than the ERP framework?	Yes. Objective evaluator, intellectual level, critical reading, scholarship, application, and field projects were not operationalized consistent with literature.
Issue 4: Why are preservice agricultural educators finding coach as their preferred role?	Preservice agricultural educators consistently prefer action and learner focused items, indicative of the coaching role, and hold a social value attached to the word *coach*.
Issue 5: Why are less than two percent of preservice agricultural educators finding subject expert or facilitator as their most preferred role?	Preservice agricultural educators' strong preference for action focused items caused meaning focused items to be selected minimally. Subject focused items are rarely chosen. Items associated with these roles contain words that hold negative social values such as lectures, textbooks, and extensive research.

Key issue	
Issue 1: How are preservice agricultural educators interpreting the ERP key concepts?	The ERP framework is bound contextually within the agricultural education classroom. Action, learner, and meaning focused modes are conceptualized positively and preferred, while the subject focused mode is conceptualized negatively and often evaded.
	Resolution

Discussion and Recommendations for Praxis

Pragmatically the KERP provides the opportunity to guide preservice agricultural educators toward a more balanced and systematic approach of teaching around the learner's experiential learning cycle (Kolb et al., 2014). While deemed a reliable instrument quantitatively, based on the qualitative findings of this study, if the intended use of the KERP is to train preservice agricultural educators, one must consider the context and use of the metric (Shultz & Whitney, 2005) before interpreting findings. The KERP quantifies educator roles, but may not explain the culturally and contextually laden factors impacting the educator's preferences. Reliance on the reported numbers from the KERP appears to provide an inaccurate picture of preservice agricultural educators' conceptualizations of teaching agriculture. Simply administering the KERP and determining preferred roles will not warrant the development of preservice agricultural educators into sound, experientially-based educators due to the fallacy of validity (Furr & Bacharach, 2005). Those administering the KERP should engage in discussion with learners to better understand the contextual and cultural factors influencing their preference before interpreting scores. Replication of this study is recommended for programs actively administering the KERP to preservice agricultural educators. Employing a case study approach while administering the KERP allows teacher educator programs to combine scores "with other relevant information" (Shultz &Whitney, 2005, p. 3), and may assist in the development of more robust growth and development plans for aspiring experiential educators in agricultural education.

ELT has been a longstanding theoretical framework adopted by the agricultural education discipline (Baker et al., 2012; Roberts, 2006); as such, teacher education programs are charged with incorporating the many facets of ELT into curriculum and programmatic design beyond the student-teaching experience. Yet, traditional teaching methods courses often focus on the *what* of teaching, instructing preservice teachers *how* to implement teaching strategies. This approach to teaching is often not aligned with ELT and fails to connect the preservice educator's role in the classroom with the student learning process. Programs committed to ELT should utilize teaching methods courses as the opportunity to expose and train preservice agricultural educators practically in ELT through discussions of the learning cycle, learning style preferences, and the ERP framework. In doing such, preservice agricultural educators begin with the *why* of various teaching methods, identifying the purpose and impact of teaching strategies in support of the student learning cycle.

The coaching phenomena in preservice agricultural education exists (Baker & Twenter, 2016) and is now understood to be a result of preservice agricultural educators' preference for action and learner focused behaviors. Acknowledged by Kolb et al. (2014), a person's educator role and learning style are often closely tied. Are students with more active-oriented learning styles naturally attracted to agricultural education because of its perception as an active and learner focused profession? Is this the case across educational disciplines, or within educator groups of varying experience as well? Does the coaching phenomena exist solely among preservice agricultural educators, or is it prevalent in other educator arenas as well? Further replication of the study and qualitative analysis of the KERP beyond preservice educators and the agricultural education discipline would help answer these questions.

The prevalence of contextually and culturally laden terms uniquely interpreted in agricultural education seem to have a much larger influence on the KERP option choices of preservice agricultural educators. While educators in other disciplines prefer the subject expert role (Kolb et al., 2014), preservice agricultural educators do not. By being mindful of the words used in our teaching and learning context, we can shift the valence of concepts commonly associated with the expert role, such as lecture, research, reading, and content, from a negative to a more positive and purposeful connotation. Teacher educator programs should focus more efforts on expanding understanding and value of the subject expert role to train and develop more experientiallybalanced agricultural educators.

To improve the metric's utility in preservice agricultural education, the language of the KERP options should be adapted to the agricultural education context. Interpretation of scores would perhaps be more accurate, increasing the instrument's validity (Furr & Bacharach, 2005). Instrument development measures should be followed and item response studies conducted to determine valid and reliable KERP options that reflect the common language, context, and culture of agricultural education.

References

American Educational Research Association, American Psychological Association, and National Council on Measurement in Education. (1999). *Standards for educational and psychological testing.* Washington, DC: American Educational Research Association.

Argyris, C., & Schön, D. A. (1974). *Theory in practice: Increasing professional effectiveness.* San Francisco, CA: Jossey-Bass, Inc.

Baker, M. A., Robinson, S. J., & Kolb, D. A. (2012). Aligning Kolb's experiential learning theory with a comprehensive agricultural education model. *Journal of Agricultural Education, 53*(4), 1-16. doi:10.5032/jae.2015.01221

Baker, M. A., & Twenter, J. (2016). *An exploratory examination of the Kolb experiential educator role profile.* Paper presented at the National Conference for American Association of Agricultural Education, Kansas City, MO. Abstract retrieved from http://aaaeonline.org/resources/Documents/National/2016AAAE%20Proceedings%20Final.pdf

Bethell, S., & Morgan, K. (2011). Problem-based and experiential learning: Engaging students in an undergraduate physical education module. *Journal of Hospitality, Leisure, Sport & Tourism Education, 10,* 128-134. doi:10.3794/johlste.101.365

Clark, R. W., Threeton, M.D., & Ewing, J. C. (2010). The potential of experiential learning model and practices in career and technical education & career and technical teacher education. *Journal of Career and Technical Education, 25*(2), 46-62. Retrieved from https://scholar.lib.vt.edu/ejournals/JCTE/v25n2/pdf/clark.pdf

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice, 39*(3), 124–130. doi:10.1207/s15430421tip3903_2

Davidson, G. V. (1990). Matching learning styles with teaching styles: Is it a useful concept in instruction? *Performance & Instruction, 29*(4), 36-38. doi:10.1002/pfi.4160290410

Eyler, J. (2009). The power of experiential education. *Liberal Education, 95*(4), 24–31. Retrieved from https://www.aacu.org/publications-research/periodicals/power-experientialeducation

Fuller, I. C. (2012). Taking students outdoors to learn in high places. *Area, 44,* 7-13. doi:10.1111/j.1475-4762.2010.00990.x

Furr, R. M., & Bacharach, V. R. (2008). *Psychometrics: An introduction.* Thousand Oaks, CA: Sage.

Hartel, R. W. (1995). Teaching and learning styles in food science. *Food Technology, 49*(4), 96109.

Itin, C. M. (1999). Reasserting the philosophy of agricultural education as a vehicle for change in the 21st century. *Journal of Experiential Education, 22*(2), 91-98. doi:10.1177/105382599902200206

Kelley, K. L. (2017). *The role of student teaching in balancing student teachers' educator role profile* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 10276031)

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist, 41*(2), 75-86. doi:10.1207/s15326985ep4102_1

Knobloch, N. A. (2003). Is experiential learning authentic? *Journal of Agricultural Education, 44*(4), 22-34. doi:10.5032/jae.2003.04022

Kolb, A. Y., & Kolb, D. A. (2017). *The experiential educator: Principles and practices of experiential learning*. Kaunakakai, HI: EBLS Press.

Kolb, A. Y., Kolb, D. A., Passarelli, A., & Sharma, G. (2014). On becoming an experiential educator: The educator role profile. *Simulation & Gaming*, *45*(2), 204–234. doi:10.1177/1046878114534383

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Upper Saddle River, NJ: Prentice Hall.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development.* Upper Saddle River, NJ: Prentice Hall.

Lewis, L. H., & Williams, C. J. (1994). Experiential learning: Past and present. In: L. Jackson & R. S. Caffarella (Eds.), *New directions for adult and continuing education: No. 62. Experiential learning: A new approach* (p. 5-16). San Francisco: Jossey-Bass.

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1), 17-29. doi:10.5032/jae.2006.01017

Roberts, J. W. (2012). *Beyond learning by doing: Theoretical currents in experiential education.* New York, NY: Routledge.

Saldaña, J. (2013). *The coding manual for qualitative researchers*. Thousand Oaks, CA: Sage.

Shultz, K. S., & Whitney, D. J. (2005). *Measurement theory in action: Case studies and exercises.* Thousand Oaks, CA: Sage.

Smith, G. A. (2002). Place-based education: Learning to be where we are. *Phi Delta Kappan, 83,* 584-594. doi:10.1177/003172170208300806

Stake, R. E. (1995). *The art of case study research.* Thousand Oaks, CA: Sage.

Stringer, E. T. (1999). *Action research* (2nd ed). Thousand Oaks, CA: Sage.

Tracy, S. J. (2010). Qualitative quality: Eight big tent criteria for excellent qualitative research. *Qualitative Inquiry, 16*(10), 837–851. doi:10.1177/1077800410383121

The Coach Phenomena: A Collective Case Study Examining the Validity of the Kolb Educator Role Profile in Preservice Agricultural Education
Discussant Remarks: Alexa Lamm

I appreciate that, as a new framework was developed, the authors chose to validate it as an appropriate measure to be used with preservice agricultural educators rather than just accepting it as a useful tool. So often we grab on to the latest/greatest thing without doing the research to determine if it is effective and I appreciate the due diligence put forth by this research team. The authors did a very nice job articulating the need for the study and aligning the question route driving the case study methodology with questions left in the literature. The introduction and theoretical framework of this study are presented in a unique and effective way others should take note of and think about emulating as they develop their own manuscripts.

I would challenge the authors to think about and discuss the limitations of their study. Broad statements are made in the discussion section about using the KERP with this audience yet the case study involved 12 individuals from a single state. I would pose to the authors the question: When is a case study exploratory and when do findings become a guide for others? Personally, I found the research intriguing and it made me want to see more research in the area. Considering the strong emphasis we place on experiential learning in all aspects of Agricultural Education it is an important topic to continue to explore in new ways.

Additional questions for the authors to consider:

Why do agricultural educators believe so strongly their context separates them from other disciplines and teaching and learning broadly? How does this perspective (especially seeing themselves as coaches) impact how agricultural educators are viewed as STEM educators? How do agricultural educator responses to these categories align or misalign with teachers in other disciplines?

Effects of Question Difficulty and Post-Question Wait-Time on Cognitive Engagement: A Psychophysiological Analysis

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Abstract

Educational research surrounding teaching methods and accepted practices is continually needed to improve teaching and teacher preparation programs. The revised Bloom's taxonomy is often used by teachers in question development. The effectiveness of these questions are often dependent, not on the question alone, but also in how the question is presented. One component of implementing effective questioning is the use of wait-time. Wait-time was defined by M.B. Rowe (1969) as the amount of time a teacher waits for a student response after having posed a question. Additionally, Rowe (1974) suggested that teachers should utilize wait times between three and five seconds in length. The purpose of this study was to utilize a psychophysiological measure of cognitive resource allocation (heart rate) to provide evidence of the magnitude and duration of cognitive engagement elicited after posing questions and to determine an appropriate amount of post-question wait-time needed by undergraduate agricultural students. Study results suggest that students were cognitively engaged for two to three seconds during the wait-time that followed a question. Additionally, students re-engaged cognitively after eight seconds of wait-time. The results of this study provide unique evidence in assisting teachers with effectively employing wait-time strategies.

Introduction

Educational research has been conducted for many decades to add to our body of knowledge for the improvement of teaching and learning. There is a continued need for educational research surrounding teaching methods and accepted teaching practices to improve both teaching and teacher education programs. This need is evident based on the advances in technology, especially when combined with the generational changes of students over time.

Since its development in 1956, educators have often used Bloom's taxonomy as a resource when developing questions that require varying levels of reasoning. Bloom's taxonomy (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956) originally consisted of six hierarchical levels of cognitive engagement ranging from knowledge to evaluation. In 2001, Anderson and Krathwohl reviewed and revised Bloom's original taxonomy by using action verbs to label each level of the taxonomy and by switching the evaluation and creating levels, making creating the highest level in the taxonomy.

Higher-level thinking skills have often been reported as important for an individual's education, as well as an important engagement technique for teachers (Whittington & Bowman, 1994: Torres & Cano, 1995; Geertson, 2003; Christopher, Thomas, & Tallent-Runnels, 2004; Ulmer & Torres, 2007; Clark & Paulsen, 2016; Ganapathy, Singh, Kaur, & Kit, 2017). While researching the cognitive discourse of professors, Whittington (1995) and Ewing and Whittington (2009) found that although professors wanted to teach at all cognitive levels, their discourse tended to be in the lower levels of cognition.

In addition to developing higher-level thinking skills, educators are often encouraged to employ post question wait-time (Rowe, 1969; Rowe, 1974; Shrum, 1984; Tobin, 1987; Tincani & Crozier, 2008). Rowe (1974) defined wait-time as the amount of time a teacher waits for a student response after having posed a question, and she suggested that three to five seconds was an adequate amount of time to wait for a student response. However, Burden and Byrd (1999) suggested three seconds is not enough time for a student to process and respond to a question, and thus recommend waiting at least five seconds before soliciting a response. Borich (2014) suggested that a wait-time that is too short or too long could be detrimental and posited that a wait-time that was too long would waste valuable instructional time. For this reason, Borich (2014) suggested a wait-time of at least three seconds. However, he also noted that more divergent questions might require much longer wait times. In light of these recommendations, it stands to reason that students may need longer to process information for more difficult, higher levels of questioning and could possibly need less time to process information for less difficult, lower levels of questioning. In fact, Gage and Berliner (1998) suggested that teachers provide three to four seconds of wait-time for lower-level questions and up to 15 seconds of wait-time for higher-level questions.

Although determining optimal wait-times could use a variety of empirical approaches, psychophysiological measures of cognitive resource allocation provide a novel means of examining this question. Although this approach has not been used in this context, Gorham et al. (2017) used psychophysiological assessment to measure cognitive resource allocation to determine that science-based messages better engage beginning farmers and livestock producers than testimonial-based video messages. Utilizing these tools can provide a look into the cognitive processes and emotions that occur during exposure to each level of question and help to determine the overall duration and intensity of cognitive engagement when a student is allowed “post question wait time” to process and formulate an answer.

Theoretical Framework

The use of psychophysiological measures of cognitive processing rest upon an information processing theoretical framework. Information processing is a theory commonly used in education to explain how an individual receives, stores, and uses information. Cognitive psychology often compares the mind to a computer, suggesting that humans are information processors. According to information processing theory, the human mind processes information by encoding data, storing the encoded data, and then retrieving the stored data when needed. Encoding is “the selection of incoming information for further processing, resulting in a short-term, working memory pattern of the neuronal activation that represents the selected information” (Potter & Bolls, 2012, p. 71). Storage refers to the creation of a new neuronal network that can be activated through retrieval (Potter & Bolls, 2012). Retrieval is more clearly explained as the activation of the neuronal networks that have been developed from previous exposure to selected information (Potter & Bolls, 2012). All three components of information processing happen simultaneously, allowing for the encoding, storage, and retrieval of information to concurrently be utilized by the information processor.

As a measurement paradigm, psychophysiology refers to the connection between the psychological and physiological responses an individual has to a stimulus. Bioelectrical signals are sent throughout the body by nerve cells within the central nervous system (CNS) and the peripheral nervous system (Potter & Bolls, 2012). These nerve cells contribute to either the sensory system or the motor system, meaning nerve cells either provide information to our brain based on our senses, or are used to activate muscles such as skeletal muscles, organs, and glands (Potter & Bolls, 2012). The nerves that control organs and glands are known as the Autonomic Nervous System (ANS) and is of primary importance to psychophysiological measures (Potter & Bolls, 2012). The ANS is composed of the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS) (Potter & Bolls, 2012). Most organs and glands are dually innervated, meaning that they are constantly receiving signals from both the SNS and PNS (Potter & Bolls, 2012). Activation of the sympathetic nervous system is tied to arousal, while activation of the parasympathetic nervous system is tied to the allocation of cognitive resources (Potter & Bolls, 2012).

Cognitive resource allocation can be measured through the activation of the PNS. Researchers have linked the activation of the PNS to cognition by means of the deceleration of heart rate, meaning that as resources are allocated to cognition an individual’s heart will slow down (Potter & Bolls, 2012). This cardiac deceleration increases the quality of sensory inputs being received by an individual during encoding (Graham, 1979). This decrease in heart rate is the physiological response that occurs in conjunction with the psychological response of cognitively processing information, thus making heart rate a reliable indicator of cognitive resource allocation and the intake of potentially significant information (De Pascalis, Barry, & Sparita, 1995).

Cognitive resource allocation takes place through both controlled processing and automatic processing, with both being equally important in how attention is allocated by an individual. Controlled processing refers to an individual's conscious effort to allocate cognitive resources based on that person's interests and goals (Lang, 2009) and is generally tonic in nature, meaning that it lasts over a longer period of time (Potter & Bolls, 2012). In contrast, automatic processing is generally elicited through an orienting response to an element of a message. An orienting response is also referred to as the "what is it" response to novel information in one's environment (Potter & Bolls, 2012). Automatic processing is referred to as a phasic response, meaning it is a shorter, temporary response to a stimulus (Potter & Bolls, 2012).

Purpose and Research Questions

This study supports Research Priority four – meaningful, engaged learning in all environments, of the American Association for Agricultural Education Research Agenda (Roberts, Harder, & Brashears, 2016). The purpose of this study was to provide evidence of the amount and duration of cognitive engagement elicited after posing questions and to determine an appropriate amount of post-question wait-time needed by undergraduate agricultural students. The following research questions were used to address this purpose:

> RQ_1: Is there a significant effect of question difficulty on cognitive resource allocation over five seconds of post question wait-time of Agricultural Education teacher certification students?
>
> RQ_2: Is there a significant effect of question difficulty on cognitive resource allocation over 10 seconds of post question wait-time of Agricultural Education teacher certification students?

Methods

Population

The population for this study was undergraduate students completing teacher certification requirements in Interdisciplinary Agriculture at Texas Tech University. A convenience sample consisted of 40 students who volunteered from the Department of Agricultural Education and

Communications, who are currently enrolled as agricultural science teacher certification students. Fraenkel, Wallen, and Hyun (2015) recommend a minimum of 30 subjects when conducting experimental and quasi-experimental research, and the present study employed a within-subject experimental design to preserve statistical power. Subjects were paid $20 for their participation in the study as an incentive. One subject was removed from the study due to an unreadable data set. Of the remaining 39 subjects, 27 were female and 12 were male. The subjects were primarily upperclassmen (n = 35) with a mean age of 21.21 years old (SD = 1.96). The mean GPA for the sample was 3.30 (SD = .43).

Design

According to Campbell and Stanley, (1963) an equivalent time samples design was utilized. In summarizing this design, they state that: "this is a recurrent design in physiological research, in which a stimulus is repeatedly applied to one animal, with care taken to avoid any periodicity in the stimulation, the latter feature corresponding to the randomization requirements for occasions demanded by the logic of the design" (Campbell & Stanley, 1963, p. 45). Each participant received all combinations of each treatment condition (Keppel & Wickens, 2004, Ary, Jacobs, & Sorenson, 2010) for this study. The first design was a 2 (question difficulty) x 2 (question repetition) x 5 (seconds in time) within-subject design. The second design was a 2 (question difficulty) x 10 (seconds in time) within-subject design.

Treatment Stimulus

The treatment stimuli consisted of five video lessons over characteristics of effective teachers. The first video presented an introduction to Rosenshine and Furst (1971), while the other four videos addressed the effective teacher characteristics of clarity, variability, enthusiasm, and task oriented and business-like behavior. At the end of each video, a question was asked by placing the question on the screen.

Following each question, the subjects were given either five or 10 seconds (post question wait time) to process and formulate a response. Subjects were not informed on the amount of time provided to process and formulate a response to the question. At the end of the post question wait-time, directions were presented on the screen instructing the subjects to deliver their response to the posed question by recording their answer in a pen and paper questionnaire packet. To control for the possible impact of order effects, a counterbalanced design was employed such that two different presentation orders of the stimulus videos were created (Keppel & Wickens, 2004; Fraenkel, Wallen, & Hyun, 2015).

Independent Variables

Question difficulty. Bloom's Taxonomy consists of six hierarchical levels of questioning and thinking. The six levels from lowest order to highest order are Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating. Bloom's taxonomy provides a framework for developing questions that provide an increasing level of difficulty. Question difficulty for this study was operationalized as low and high level of difficulty. Four questions were generated from the remember and understand (low difficulty) levels of Bloom's taxonomy (Anderson & Krathwohl, 2001) with two questions being written for the clarity video and two questions being written for the enthusiasm video. Four more questions were generated from the evaluate and create (high difficulty) levels of Bloom's taxonomy (Anderson & Krathwohl, 2001), with two questions being written for the variability video and two questions being written for the task oriented and businesslike behavior video. All eight questions were approved by a panel of experts on Bloom's taxonomy from various universities across the U.S (Ary et al., 2010). The panel received an instrument with all eight questions listed, and were asked to rate each question as a high or low level question based on their knowledge of the revised Bloom's taxonomy (Anderson & Krathwohl, 2001). All eight questions received a unanimous rating from the panel of experts. From these eight questions, one question was selected for each video to be included in the study for a total of four questions.

Post-question wait-time. Wait-time was defined as "the pause following any teacher utterance and preceding any student utterance" (Tobin, 1987, p. 90). Wait-time for this study consisted of two levels (five seconds and 10 seconds). At the completion of posing each question, a black screen was produced that lasted the duration of the wait-time, five seconds for the first level and 10 seconds for the second level of wait time. This was done to prevent measuring cognitive resource allocation dedicated to re-reading the question as opposed to processing the question after presentation.

Dependent Variables

Cognitive resource allocation. Cognitive resource allocation was used to determine the effectiveness of level of question difficulty and post question wait time on agricultural education undergraduate students. Cognitive resource allocation was operationalized through heart rate deceleration over time, as a decrease in heart rate is a physiological indicator for cognitive processing. Heart rate was collected during message viewing through the use of an electrocardiogram (ECG) that records the electrical signals produced by the heartbeat. ECG was collected by placing electrodes on the forearms and the non-dominant wrist of the participant (Potter & Bolls, 2012). The ECG collected the time between R spikes of the QRS pattern and was displayed as an ECG waveform.

The ECG data was transformed into the more common heart rate data of beats per minute (BPM). Furthermore, a baseline dataset was collected by averaging the heart rate data collected in the five seconds prior to exposure of the stimulus (Potter & Bolls, 2012). This baseline data was subtracted from each one second time period of heartrate data collected during exposure to the stimulus to create a change score that can be used for analysis (Potter & Bolls, 2012). Change scores are used to minimize the difference in the various resting heart rates of the subjects.

Cognitive resource allocation was analyzed by extracting data from the five and 10 second time segments corresponding to each post question wait time. The BioPac system used to collect the psychophysiology data recorded 1,000 measurements per second (Potter & Bolls, 2012). For this reason, the psychophysiology data was resampled offline into one-second segments for the ease of data analysis. One second segments were deemed adequate as this study explores the trends of heart rate change over five and 10 seconds.

Procedures

Subjects selected for the study were required to come to the psychophysiology research laboratory located in the Center for Communication Research at Texas Tech University. Prior to arrival of the subjects, electrodes were prepped for use to minimize the amount of time a subject had to wait prior to beginning the study. Disposable electrodes were used for the collection of heart rate data. Disposable electrodes can be prepped early and are easier to place than non-disposable electrodes, making them more efficient. Electrodes for heart rate require the addition of an electrolyte gel to increase conductivity of the electrode and provide a clearer signal for data collection (Potter & Bolls, 2012).

Upon arrival of the subjects, they were asked to complete a demographics questionnaire to record participant gender, age, and student classification. Once the questionnaire was completed, the subjects were seated in a reclining chair situated approximately four feet away from a flat-panel television. They were asked to turn off their cell phone to eliminate the risk of outside interference. Each participant's skin was cleaned and prepped prior to the attachment of the electrodes (Potter & Bolls, 2012). An alcohol swab was used to clean the skin where the ECG electrodes were placed. Heart rate data were collected by placing a ground source electrode on the non-dominant wrist of the participant and by placing an electrode 2-inches below the elbow crease on both forearms (Potter & Bolls, 2012).

Subjects were instructed to remain as still as possible during exposure to the stimulus to reduce movement artifact that can distort the collected signals (Potter & Bolls, 2012). The lights were lowered, and the door was shut prior to the beginning of the experiment. Subjects then viewed instructions on the screen and a 20 second period was utilized prior to the viewing of the first video to allow the subjects to become comfortable and their physiological responses to return to a normal state.

Each participant was randomly exposed to one of the two orders of the treatment videos. After exposure to the stimulus, the researcher removed all the electrodes and provided paper towels to wipe off any gel left on the skin from the electrode placement.

Data Analysis

For the five-second wait-time trials, a 2 x 5 factorial repeated-measures ANOVA was utilized to test research question one to determine the differences between low and high level difficulty of questions over five seconds of wait-time, and the interaction effect of question difficulty and time for cognitive resource allocation. For the 10-second wait-time trials, a 2 x 10 factorial repeated-measures ANOVA was utilized to test research question two to determine the differences between low and high level difficulty of questions over 10 seconds of wait-time, and the interaction effect of question difficulty and time for cognitive resource allocation. This design allowed the researcher to test for a main effect for level of question difficulty, a main effect for time (five seconds or 10 seconds), and an interaction effect between level of question difficulty and time for cognitive resource allocation for both research questions.

The research questions were tested with the alpha level for significance set *a priori* at $p = .10$. This is an acceptable level of risk, as this research utilizes new research tools and begins to explore cognitive resource allocation in a new setting (Gall, Gall, & Borg, 2007). Mauchly's test was used to test the assumption of sphericity (Field, 2014). Potter and Bolls (2012), indicate that psychophysiology research often does not meet the assumption of sphericity and thus recommends using the Greenhouse-Geisser estimate to correct the *F*-ratio. According to Stevens (2002), multivariate procedures are more powerful than univariate procedures when there is a large violation of sphericity and a sample size larger than ten subjects. P-values provide limited information and cannot determine the size of an effect (Wasserstein & Lazar, 2016) and appropriate effect sizes should be calculated for each analysis (Keppel & Wickens, 2004). Effect sizes are used to determine the size of the effect. Keppel and Wickens (2004) suggested using partial omega squared to calculate effect size. Effect sizes for this study were interpreted based on the recommendations of Keppel and Wickens (2004).

Results

Table 1 shows the means and standard deviations for heart rate on two levels of question difficulty and the five testing times. Mean scores for heart rate change in response to low level questions decreased through the first three seconds, and increased back towards the baseline over seconds four and five (see Figure 1). Mean scores for heart rate on high level question difficulty were slightly lower than the mean scores for heart rate on low level question difficulty, but display a similar pattern by exhibiting a decrease through the first three seconds, before beginning to rise back towards the baseline score over seconds four and five.

Table 1

Means and Standard Deviations for Change in Heart Rate on Two Levels of Question Difficulty and Five Testing Time Intervals (n=39)

	Low Level		High Level	
Testing Time	M	SD	M	SD
Second 1	-2.28	6.00	-2.78	6.39
Second 2	-2.63	7.24	-3.04	6.22
Second 3	-2.67	6.31	-3.34	6.73
Second 4	-1.79	5.72	-2.87	6.34
Second 5	-1.36	6.69	-2.08	6.30

Table 2 shows the results of the repeated-measures ANOVA for question difficulty and time over five seconds for cognitive resource allocation. Sphericity was not violated for the main effect of question difficulty as there was only two levels. Mauchly's test indicated that the assumption of sphericity had been violated for the main effect of time, $\chi^2(9) = 76.74$, $p < .001$, and the interaction effect of question difficulty and time, $\chi^2(9) = 86.40$, $p < .001$. Therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .628$ for the main effect of time and .505 for the interaction effect of question difficulty and time).

For the five-second wait-time trials, there was no main effect of question difficulty on cognitive resource allocation, $F(1.00, 38.00) = .927$, $p = .342$, $\omega_p^2 > .001$. There was a significant main effect of time on cognitive resource allocation, $F(2.514, 95.516) = 2.944$, $p = .046$, $\omega_p^2 = .047$. The pairwise comparisons for the main effect of time revealed the mean difference of -1.285 between time interval at three seconds and five seconds was significant at the .1 level ($p = .095$). There was no interaction between question difficulty and time on cognitive resource allocation, $F(2.021, 76.809) = .138$, $p = .873$, $\omega_p^2 >.001$.

Table 2

peated Measures ANOVA for Question Difficulty and Time Over Five Seconds.

	SS	*df*	*MS*	*F*	*p*	ω_p^2
ıestion Difficulty						
Within groups	90.04	1.00	90.04	.927	.342	>.001
Error	3689.40	38.00	97.09			
ne*						
Within groups	156.85	2.51	62.40	2.944	.046	.047
Error	2024.51	95.52	21.20			
Question Difficulty X Time**						
Within groups	10.18	2.02	5.04	.138	.873	>.001
Error	2806.13	76.81	36.53			

*Greenhouse-Geisser ε= .628, Mauchly's W= .122, $\chi^2(9)$ =76.744, p < .001

**Greenhouse-Geisser ε= .505, Mauchly's W= .093, $\chi^2(9)$ =86.395, p < .001

Figure 1 shows the estimated marginal means for heart rate by question difficulty over five seconds. For both question difficulty levels, heart declines over the first three seconds, before beginning to increase over seconds four and five.

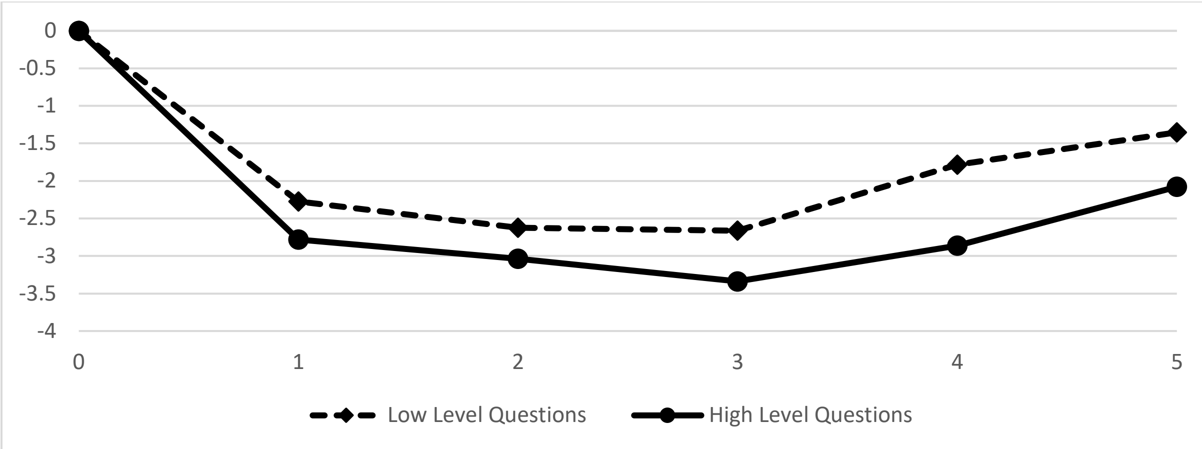

Figure 1. Estimated marginal means of heart rate change scores for question difficulty over five seconds, indicating a drop in heart rate during the first 3 seconds of wait-time.

Table 3 shows the means and standard deviations for heart rate on the four questions and the 10 testing times. Mean scores for heart rate on low-level question difficulty show a decrease over the first two seconds. Seconds three through five show the mean scores rising back towards the baseline score, before decreasing again over second six, and stabilizing through seconds seven and eight. In addition, the mean scores for low-level question difficulty show a decrease over seconds nine and ten. Mean scores for heart rate on high level question difficulty show a considerable decrease over the first two seconds, followed a gradual rise back towards the baseline score. Similarly to the low-level question difficulty mean scores, the high level difficulty mean scores a substantial decrease over seconds nine and 10.

Table 3

Means and Standard Deviations for Heart Rate Change Scores on Two Questions and Ten Testing Times (n=39)

	Low Level		High Level	
Testing Time	M	SD	M	SD
Time 1	-1.64	4.49	-4.82	8.77
Time 2	-1.67	6.61	-5.16	8.31
Time 3	-1.23	5.24	-4.71	6.65
Time 4	-.79	4.56	-3.91	6.49
Time 5	-.28	4.68	-2.87	6.97
Time 6	-1.30	3.91	-2.95	6.29
Time 7	-1.26	5.42	-2.69	5.65
Time 8	-1.01	6.62	-1.88	6.45

Time 9	-2.52	6.21	-3.59	7.07
Time 10	-3.77	5.88	-4.98	5.64

Table 4 shows the results of the repeated-measures ANOVA for question difficulty and time over 10 seconds for cognitive resource allocation. Sphericity was not violated for the main effect of question difficulty as there was only two levels. Mauchly's test indicated that the assumption of sphericity had been violated for the main effect of time, $\chi^2(44) = 165.28$, $p < .001$, and the interaction effect of question difficulty and time, $\chi^2(44) = 135.01$, $p < .001$. Therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .374$ for the main effect of time and .370 for the interaction effect of question difficulty and time).

For the 10-second wait-time trials, there was no main effect of question difficulty on cognitive resource allocation, $F(1.00, 19.00) = 2.56$, $p = .126$, $\omega_p{}^2 = .069$. There was no main effect of time on cognitive resource allocation. However, the main effect of time approached significance, $F(3.37, 63.97) = 2.01$, $p = .115$, $\omega_p{}^2 = .047$. There was no interaction effect between the question difficulty and time on cognitive resource allocation, $F(3.33, 63.31) = .57$, $p = .66$, $\omega_p{}^2 > .001$.

Table 4

peated Measures ANOVA for Question Difficulty and Time Over 10 Seconds.

	SS	*df*	*MS*	*F*	*p*	$\omega_p{}^2$
estion Difficulty						
Within groups	486.70	1.00	486.70	2.56	.126	.069
Error	3609.39	19.00	189.97			
ne*						
Within groups	304.21	3.37	90.35	2.01	.115	.047
Error	2881.51	63.97	45.04			
Question Difficulty X Time**						
Within groups	101.63	3.33	30.50	.56	.657	>.001
Error	3412.56	63.31	53.91			

*Greenhouse-Geisser $\varepsilon = .374$, Mauchly's W= .000, $\chi^2(44) = 165.281$, $p < .001$

**Greenhouse-Geisser $\varepsilon = .370$, Mauchly's W= .000, $\chi^2(44) = 135.008$, $p < .001$

Figure 2 shows a graph of the estimated marginal means of heart rate for question difficulty over 10 seconds. The graph shows a decline in heart rate for both levels of question difficulty over the first two seconds, followed by a steady increase in heart rate through second five. The low-level question difficulty sees a sudden drop at second six, followed by a steep drop in heart rate after second eight. The high-level question continues a steady climb after second five, then drops suddenly after second eight.

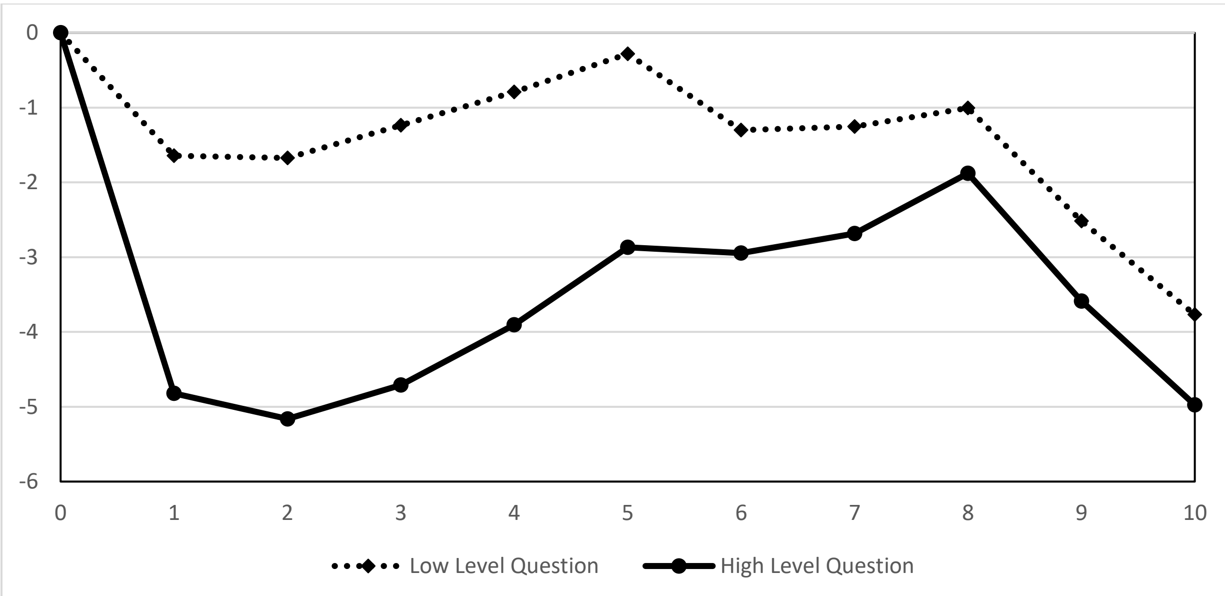

Figure 2. Estimated marginal means of heart rate change scores for question difficulty over ten seconds.

Conclusions and Recommendations

This study assessed the amount of cognitive resource allocation based on the theory of information processing for two levels of question difficulty (low level and high level) over time (five seconds and 10 seconds) following the solicitation of the question. Bloom's taxonomy (Bloom, et al., 1956) and the revised Bloom's taxonomy (Anderson & Krathwohl, 2001) suggest there is a difference in the amount of cognitive processing that takes place in low-level and high-level questions. This study found no statistical difference between the two levels. However, for both research questions the graphs of estimated marginal means showed a larger decrease in heart rate for high-level versus low-level questions. Likewise, there was a medium effect size ($\omega_p^2 = .069$) for question difficulty for the second research question. This suggests that, on average, high-level questions elicited slightly deeper cognitive processing than low level questions.

When examining the amount of cognitive processing over time, research question one found a significant difference between second three and second five. There was a small effect size ($\omega_p^2 = .047$) for time for research question one. The visual inspection of the graph indicates the subjects were primarily engaged cognitively for both low-level and high-level questions through the first three seconds of the post-question wait-time. This suggests that after the first three seconds, subjects had processed the question and developed an answer. This supports the suggested amount of wait-time provided by Rowe (1974) of three to five seconds.

The second research question was approaching significance on question difficulty and time. There was a small effect size for time ($\omega_p^2 = .047$) for research question two. The visual inspection of the graph revealed an initial similar pattern of cognitive engagement to that found in research question one. However, this initial cognitive engagement only lasted two seconds, rather than three, suggesting that the subjects processed the question and their response within those first two seconds before becoming cognitively disengaged. However, there was a trend for both low level and high level questions that indicated the subjects re-engaged with cognitive processing after eight seconds. This could be an indication that the subjects were beginning to reconsider their initial thought process, which would in part support the suggestions of Borich (2014) and Gage and Berliner (1998). However, Borich (2014) and Gage and Berliner (1998) only suggested longer wait-times for higher level or more divergent questions. The results of this study suggest that students may take advantage of longer wait-times for both high and low level questions.

Based on the results of this study, it is recommended that teachers utilize a wait-time of at least three seconds when asking a question regardless of the difficulty of that question. This will provide at least enough time for students to process and formulate a response. However, it may be beneficial to employ longer wait-times if a student does not provide an initial response to the question within the first five seconds.

Further research should be conducted to explore the cognitive engagement of students over a 15 second period of wait-time and address the specific thought process of the student to determine if the cognitive engagement in longer periods of wait-time are focused primarily on processing and answering the posed question. Additional studies should also be conducted to explore the best practices for teachers during extended wait-times where students fail to respond to the initial question, as well as how to proceed when students provide an incorrect or insufficient response to the initial question.

Piaget’s (1972) stages of cognitive development and Perry’s (1999) forms of intellectual development, suggest that individuals continue to rapidly form and develop their cognitive and intellectual abilities from teen years through their early twenties. This constant change in cognitive abilities might suggest that younger, high school aged subjects could have an entirely different cognitive response during post-question wait-time. Since this study was conducted with undergraduate students with a mean age of 21.21 years old and who were primarily enrolled in upper-level courses, it is recommended that further research be conducted with high school aged subjects.

References

Anderson, L. W. and Krathwohl, D. R. (Eds.) (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives*. Boston, MA: Pearson Education Group.

Ary, D., Jacobs, L.C., & Sorenson, C. (2010). *Introduction to research in education (8th ed.).* Belmont, CA: Wadsworth, Cengage Learning.

Bloom, B.S., Englehart, M.D., Furst, E.J., Hill, W.H., & Krathwohl, D.R. (1956). *Taxonomy of educational objectives-handbook 1: Cognitive domain*. New York: David McKay Company, Inc.

Borich, G.D. (2014). *Effective teaching methods: Research-based practice (8th ed.).* Canada: Pearson Education, Inc.

Burden, P.R. & Byrd, D.M. (1999). *Methods for effective teaching (2nd ed.).* Needham Heights, MA: Allyn & Bacon.

Campbell, D.T., & Stanley, J.C. (1963). Experimental and quasi-experimental designs for research. Boston, MA: Houghton Mifflin Company.

Christopher, M. M., Thomas, J. A., & Tallent-Runnels, M. K. (2004). Raising the bar: Encouraging high level thinking in online discussion forums. *Roeper Review*, *26*(3), 166-171. doi:10.1080/02783190409554262

Clark, T. K. & Paulsen, T. H. (2016). Analyzing student teacher critical thinking through blogs in an electronic community of practice. *Journal of Agricultural Education, 57*(2), 75-92. doi: 10.5032/jae.2016.02075

De Pascalis, V., Barry, R.J., & Sparita, A. (1995). Decelerative changes in heart rate during recognition of visual stimuli: Effects of psychological stress. *International Journal of Psychophysiology*, *20*, 21-31.

Ewing, J.C. & Whittington, M.S. (2009). Describing the cognitive level of professor discourse and student cognition in college of agriculture class sessions. *Journal of Agricultural Education*, *50*(4), 36-49. doi: 10.5032/jae.2009.04036

Field, A. (2014). *Discovering statistics using IBM SPSS statistics* (4th ed.). Mathura Road, New Delhi, India: Sage.

Fraenkel, J.R., Wallen, N.E., & Hyun, H.H. (2015). *How to design and evaluate research in education (9th ed.)* Columbus, OH: McGraw-Hill Education.

Gage, N.L. & Berliner, D.C. (1998). *Educational psychology (6th ed.).* Boston, MA: Houghton Mifflin.

Gall, M.D., Gall, J.P., & Borg, W.R. (2007). *Educational Research: An Introduction (8th ed.).* Boston, MA: Pearson Education Inc.

Ganapathy, M., Singh, M. K. M., Kaur, S., & Kit, L. W. (2017). Promoting higher order thinking skills via teaching practices. *3L: Language, Linguistics, Literature*, *23*(1), 75-85. doi: 10.17576/3L-2017-2301-06

Geertsen, H. R. (2003). Rethinking thinking about higher-level thinking. *Teaching Sociology*, *31*(1), 1-19.

Gorham, L.M., Cummins, R.G., Gilliam, K.C., Baker, M., Burris, S., & Irlbeck, E. (2017, May). Examining the critical moments in information processing of water conservation videos within young farmers and ranchers: A psychophysiological analysis. Paper presented at the National Conference of the American Association of Agricultural Education, San Luis Obispo, CA.

Graham, F.K. (1979). Distinguishing among orienting, defense, and startle reflexes. In H.D. Kimmel, E.H. Van Olst, & J.F. Orlebeke (Eds.), *The orienting reflex in humans* (pp. 137-167). Hillsdale, NJ: Lawrence Erlbaum Associates.

Keppel, G., & Wickens, T.D. (2004). *Design and analysis: A researcher's handbook (4th ed.)*. Upper Saddle River, NJ: Prentice Hall.

Perry, W.G. (1999). *Forms of intellectual and ethical development in the college years: A scheme.* San Francisco: Jossey-Bass

Piaget, J. (1972). Intellectual evolution from adolescent to adulthood. *Human Development,* 16, 346-370. doi: 10.1159/000271225

Potter, R. F., & Bolls, P. (2012). *Psychophysiological measurement and meaning: Cognitive and emotional processing of media*. New York, NY: Routledge.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Rosenshine, B., & Furst, N. (1971). Research on teacher performance criteria. In B.O. Smith Ed.), *Research in Teacher Education* (pp. 37–72). Englewood Cliffs, NJ: Prentice Hall.

Rowe, M.B. (1969). Science, silence, and sanctions. *Science and Children, 6*(6), 11-13.

Rowe, M.B. (1974). Pausing phenomena: Influence on the quality of instruction. *Journal of Psycholinguistic Research, 3*(3), 203-224. doi: 10.1007/BF01069238

Shrum, J.L. (1984). Wait-time and student performance level in second language classrooms. *The Journal of Classroom Interaction, 20*(1), 29-35.

Stevens, J.P. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Hillsdale, NJ: Erlbaum.

Tincani, M. and Crozier, S. (2008). Comparing brief and extended wait-time during small group instruction for children with challenging behavior. *Journal of Behavioral Education, 17*(1), 79-92.

Tobin, K. (1987). The role of wait time in higher cognitive level learning. *Review of Educational Research, 57*(1), 69-95. doi: 10.3102/00346543057001069

Torres, R.M. and Cano, J. (1995). Examining cognitive levels of students enrolled in a college of agriculture. *Journal of Agricultural Education*, *36*(1), 46-54. doi:10.5032/jae.1995.01046

Ulmer, J.D. and Torres, R.M. (2007). A comparison of the cognitive behaviors exhibited by secondary agriculture and science teachers. *Journal of Agricultural Education*, *48*(4), 106-116. doi: 10.5032/jae.2007.04106

Wasserstein, R.L. & Lazar, N.A. (2016). The ASA's statement on p-values: Context, Process, and Purpose. *The American Statistician*, 70:2, 129-133, DOI: 10.1080/00031305.2016.1154108

Whittington, M. S. (1995). Higher order thinking opportunities provided by professors in college of agriculture classrooms. *Journal of Agricultural Education, 36*(4), 32-38. doi: 10.5032/jae.1995.04032

Whittington, M. S., & Bowman, G. L. T. (1994, December). Assessment of cognitive level of instruction aspiration and attitude toward higher level instruction. Paper presented at the

21st Annual National Agricultural Education Research Meeting, Dallas, TX. Retrieved from http://aaaeonline.org/resources/Documents/Historical%20Proceedings/21st%20

NAERM%20Book.pdf

Effects of Question Difficulty and Post-Question Wait-Time on Cognitive Engagement: A Psychophysiological Analysis
Discussant Remarks: Alexa Lamm

Bloom's taxonomy and the use of Socratic dialogue are terms used often in our field. The literature explored in this study determining the effective amount of time to allow a student to ponder a question is intriguing and immediately caught my attention. The literature on heart rate as an approach to measuring cognitive resource allocation was unique and the research approach one I found new and inventive, adding to the literature base within the agricultural education field. I appreciated the use of an experimental design to address the research questions but found myself wondering what the research team hypothesized would occur. I also wonder how much cognitive style influences resource allocation and if those who are more adaptive versus innovative react differently. Questions I was left pondering include:

What other ways could we measure cognitive resource allocation other than heart rate?

Based on the literature, what did you expect to happen?

The authors mentioned waiting up to 15 seconds for a response to a question as a recommendation. Given we know some students jump in more quickly than others, and that cognitive differences alter the way we respond, is it realistic to expect all students in a classroom to stay quiet for this length of time?

Methods of Establishing Instrument Validity in Manuscripts Published in the *Journal of Agricultural Education* between 2007 and 2016

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Abstract

We examined authors' treatment of instrument validity in a stratified random sample (n = 94) of quantitative studies published in the Journal of Agricultural Education from 2007 to 2016. A majority (78.7%) of studies reported use of a researcher-developed instrument (41.5%) or an existing instrument modified by the researchers (37.2%). In 67.0% of articles, authors validated the instrument for the study reported; in 16.0%, the authors claimed instrument validity based on previous studies. Authors made no claim for instrument validity in 11.7% of articles and claimed an unspecified form of validity in another 11.7%. Among the 72 articles where specific validity claims were made, 67 (93.1%) claimed face and content validity, either alone or in combination with other forms of validity. Claims for content, concurrent, and discriminant validity, either alone or in combination with other forms of validity, were made in 11 (15.3%) of the 72 articles. Among 70 articles claiming face, content, or construct validity, 91.4% included a description of the validation panel; panelists were most often described as 'experts' (70.3%), although their area(s) of expertise were specified in only 29.7% of articles. We conclude with specific recommendations intended to shift the profession's subjective norms related to instrument validity.

Introduction

The rigorous process of inquiry into social and behavioral questions via use of "systematic observation and measurement methods, standardized tests, sophisticated coding schemes for analyzing verbal and observational data, carefully constructed questionnaires, individual and group interview techniques, and large masses of data" (Krathwohl, 2009, p. 4) began only in the 20th century. While a relatively new field of research, progress within social science continues to accelerate. Growth within a knowledge base occurs through the creation of improved research methods and development of well-trained researchers (Krathwohl, 2009); disciplinary faculty members are expected to contribute to that knowledge base through research and are evaluated on their ability to effectively do so (Knobloch, 2010).

When conducting research, faculty members contribute to the knowledge base through published works in peer-reviewed journals; within the agricultural education profession, the premier peer-reviewed journal is the *Journal of Agricultural Education* (*JAE*) (Knobloch, 2010). The review process of manuscripts submitted to *JAE* includes an evaluation of research methods, requiring that reviewers critique with the following three questions in mind:

1. Are the essentials of methods/procedures reported?
2. Are the methods/procedures correct?
3. Are weaknesses in the methods/procedures accounted for and/or explained? (American Association for Agricultural Education, n.d.)

Reviewers are able to reject manuscripts based on this criteria, suggesting that researchers who are unable to carry out methodologically sound studies are less likely to contribute to the knowledge base via published works.

Many components contribute to the "correctness" of a study's methods. Among those is the quality of the instrument used to collect data; "the conclusions drawn and the recommendations made in such studies can be no better than the data on which they are based" (Huck, 2008, p. 75). Shoulders, Johnson, and Flowers (2015), VanLeeuwen (1997), VanLeeuwen, Dormody, and Seevers (1999), and to a greater degree, Warmbrod (2014) addressed the concept of instrument reliability within agricultural education manuscripts. Equally important, but yet to be the focus the agricultural education profession, is "evidence researchers present in journal articles documenting the validity of test scores, including a description of item-generating strategies to establish content validity, judgements of experts attesting face validity, and empirical evidence documenting criterion and construct validity" (Warmbrod, 2014, p. 30). As has been recommended by Johnson and Shoulders (2017), Lindner, Murphy and Briers (2001), Miller and Smith (1983), Roberts, Barrick, Dooley, Kelsey, Raven, and Wingenbach (2011), and Warmbrod (2014), this study sought to examine the profession's treatment of instrument validity as a means of establishing quality among research published within *JAE*.

Theoretical Framework

This study described the use of instrument validity within manuscripts published in *JAE* between 2007 and 2016 using the theory of planned behavior as a framework (Ajzen, 1991). The theory of planned behavior posits that an individual's attitude toward a behavior, his or her perceived control over the behavior, and the subjective norms regarding the behavior interact to influence the individual's intention to perform the behavior, which in turn influences the individual's actual behavior (see Figure 1) (Ajzen, 1991).

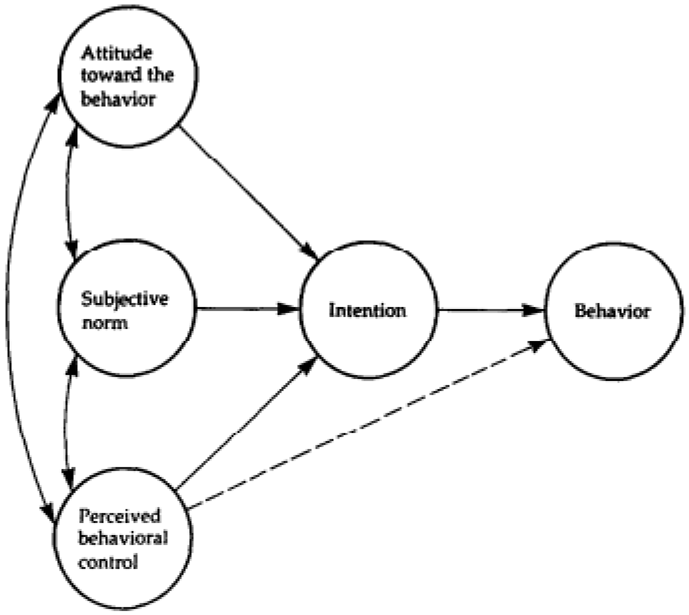

Figure 1. Theory of Planned Behavior (Ajzen, 1991).

Within this study, we assumed researchers publishing in *JAE* hold positive attitudes regarding instrument validity and the employment of methods used to establish instrument validity, as they continue to publish in a journal that includes validity as a criterion. Multiple publications within *JAE* have called for an examination of the use of validity within the journal's works, establishing a subjective norm that expects the employment of methods to establish validity of instruments within agricultural education research. By including within this manuscript a primer on establishing instrument validity, we aim to improve readers' perceived behavioral control by "reducing unfamiliar elements within the behavioral situation" (Johnson & Shoulders, 2017, p. 303). The theory of planned behavior states that successful efforts to improve individuals' perceived behavioral control can encourage individuals to engage in an intended behavior. Therefore, by bringing to light authors' practices as stated within *JAE* manuscripts and by providing a primer on methods to establish instrument validity, this manuscript enables researchers to examine, and potentially improve upon, their current behaviors regarding the establishment of instrument validity.

Conceptual Framework

Research in the social sciences often seeks to quantify attributes that cannot be measured directly (Kimberlin & Winterstein, 2008). Example attributes studied by agricultural education researchers include leadership, agricultural literacy, job satisfaction, burnout, creative thinking, and professionalism, among others (Radhakrishna & Wu, 1997). In studying an attribute, researchers must first develop a conceptual definition of the attribute and then translate this conceptual definition into an operational definition with associated instrument items and measurement scales (Kimberlin & Winterstein, 2008). According to Kimberlin and Winterstein (2008), "the ability to operationally define and quantify a construct is the core of measurement" (p. 278). Thus, fidelity between measurement items, the operational definition, and the original conceptual definition is an essential element of quality research (Trochim, 2006).

Instrument, or measurement, validity refers to the degree of accuracy achieved by the instruments used within a study (Huck, 2008), and the appropriateness of the inferences or decisions made from the results generated by the instrument (McMillan & Schumacher, 2010). While reliable data is consistent, it is possible for data to be simultaneously reliable and invalid – reliable data can consistently report something other than what the researcher intends to measure. The reverse, however, is not true; while reliable data is not necessarily valid, valid data must be reliable, as data cannot be accurate if it is not consistent. "Thus high reliability is a necessary but not sufficient condition for high validity" (Huck, 2008, p. 89). Instrument validity is a product of the specific situation and subjects in which the instrument is given; therefore, "in order to assure others that the procedures have validity in relation to the research problems, subjects, and setting of the study, it is incumbent on the investigator to describe validity in relation to the context in which data are collected" (McMillan & Schumacher, 2010, p. 173). Thus, instruments validated in different situations and with different subjects cannot be simply assumed to be valid in different situations and with different subjects.

Researchers can establish one or more of several types of instrument validity, as "there are different ways in which scores can be accurate" (Huck, 2008, p. 89). While works detailing research methods organize the same types of validity in various ways, we adhered to Huck's (2008) conceptual framework of validity, which aligns methods of establishing validity with three overall types: content validity, criterion-related validity, and construct validity. Content validity refers to the degree to which the content intended to be measured is covered by the instrument's items (Huck, 2008; McMillan & Schumacher, 2010). Content validity is established via a panel of experts who examine the instrument to determine whether alignment exists between the instrument's items and the content on which the instrument is intended to assess subjects (Huck, 2008; McMillan & Schumacher, 2010). Experts should be selected based on their technical expertise, as they should be capable of making sound judgements regarding the content. "When reporting on efforts made to assess content validity, researchers should describe in detail who examined the content, what they were asked to do, and how their evaluative comments turned out" (Huck, 2008, p. 95). While content validity requires a detailed description of the content to serve as a checklist when evaluating an instrument, face validity is a less systematic method of establishing whether an instrument's items align with the intended content (McMillan & Schumacher, 2010; Trochim, 2006). Face validity relies on the subjective opinions of experts to determine whether the instrument, "on its face" (Trochim, 2006, para. 6) appears to measure the intended content. Because of the subjectivity required to establish face validity, it is considered by some researchers to be the weakest way to demonstrate validity (Lund Research, 2012; Trochim, 2006).

Criterion-related validity is established by comparing scores on an instrument with scores on an instrument known to accurately measure a relevant criterion variable (Huck, 2008). Relevancy of variables with which the comparison is made is crucial; "if the other variables are illogical or if the validity of the scores associated with such variables is low, then the computed validity coefficients conceivably could make a truly good instrument look as if it is defective" (Huck, 2008, p. 95). Correlating subjects' scores between the two instruments results in a validity coefficient; higher *r* values indicate higher validity. Criterion-related validity can be established via concurrent instrument administrations, wherein subjects are given both instruments within a short time frame, or via a predictive format, wherein the criterion is measured years before or after the instrument is administered (Huck, 2008; McMillan & Schumacher, 2010).

Construct validity establishes the degree to which an instrument is able to measure "how much of a personality or psychological construct is possessed by the examinees to whom the instrument is administered" (Huck, 2008, p. 92). Researchers establish construct validity by employing one or more of the following three actions:

1. provide correlational evidence showing that the construct has a strong relationship with certain measured variables *and* a weak relationship with other variables, with the strong and weak relationships conceptually tied to the new instrument's construct in a logical manner;
2. show that certain groups obtain higher mean scores on the new instrument than other groups, with the high- or low-scoring groups being determined on logical grounds *prior to* the administration of the new instrument; or
3. conduct a factor analysis on scores from the new instrument (Huck, 2008, p. 92).

When providing correlational evidence, strong relationships establish convergent validity, while weak relationships establish divergent, or discriminant, validity.

The multitrait-multimethod matrix (MTMM) method can also be used to establish construct validity in studies examining two or more constructs. MTMM uses correlations between multiple measures of each construct to examine construct validity through simultaneous consideration of the resulting matrix of convergent and divergent validity coefficients (Trochim, 2006).

Purpose and Objectives

The purpose of this study was to describe authors' practices in addressing instrument validity for selected articles published in the *Journal of Agricultural Education* from 2007 to 2016. Specific objectives were to:

1. describe the primary purpose of research reported in selected articles published in *JAE* from 2007 to 2016;

2. describe the nature of the dependent variables studied in selected articles published in *JAE* from 2007 to 2016;
3. describe the source of research instruments used in selected articles published in *JAE* from 2007 to 2016;
4. describe the nature of instrument validity claims made in selected articles published in *JAE* from 2007 to 2016; and
5. describe the specific types of validity claimed in selected articles published in *JAE* from 2007 to 2016.

Methodology

This study utilized a content analysis strategy to make inferences from communication observed using replicable and reliable methods (Krippendorff, 1980). The articles identified for this study were observed from 559 manuscripts published by *JAE* between 2007 and 2016. One hundred thirty-five articles were randomly selected through stratified random sampling by volume and issue to ensure equal representation throughout the years. Ninety-four of the selected articles were deemed to be quantitative in nature; 41 articles were removed from the originally selected 135 because they conducted qualitative inquiry, for which instrument validity does not apply.

Researchers developed and employed a standardized coding sheet to document the following information from each article: (a) purpose of research, (b) whether the instrument used existed previously or was researcher-developed, (c) whether instrument validity was addressed by researchers, (d) whether the instrument was validated for the study, (e) type(s) of validity addressed, (f) number of people on panel if face or content validity was used, (g) description of people on panel if face or content validity was used, (h) correlations presented if criterion-related validity was used, and (i) in-text citations used to support validity methods. The content coded for this study was considered to be manifest content. According to Potter and Levine-Donnerstein (1999), manifest content "is that [content] which is on the surface" (p. 259) and is easily observable. In coding manifest content, validity is achieved by defining content with "binary rules based on definitions" (p. 261). The coding sheet used in this study contained specific binary definitions and rules, based on the validity literature (Huck, 2008) that guided coding decisions.

Identification numbers were assigned to each article and the article's title page, purpose and objectives, and methods sections were printed and keyed to the identification number on the coding sheet to allow for data verification. All coding was completed by one researcher. A second researcher coded a randomly selected sample of 10 manuscripts (10.1%), with an overall agreement percentage of 88.6%. The resulting in a Cohen's *kappa* of .77 indicated "substantial" agreement between raters (Viera & Garrett, 2005). Data were analyzed using frequencies and percentages.

Results

Of the 559 articles published in *JAE* from 2007 to 2016, 135 (24.2%) articles were randomly selected to be included in the sample; of these selected articles, 94 (69.6%) articles met the criteria for inclusion and were analyzed as part of this study. The primary objective of the vast majority (90.1%) of all articles was to describe characteristics or phenomena. Relatively few articles sought to predict or to establish cause and effect relationships (Table 1).

Table 1

Primary Objective(s) of Selected Articles Published in the Journal of Agricultural Education, 2007-2016

Purpose(s) of study	*f*	%
Describe	89	90.1
Predict	8	8.2
Establish cause and effect	1	1.0
Total	98	100.0

Note. Four of the 94 (4.2%) articles had primary objectives in two categories.

Approximately 86% of articles studied dependent variables measuring achievement, attitudes or perceptions, and/or behavior(s) (Table 2). The remaining studies reported dependent variables categorized as ‘other’ and included measurements of adequacy, relationships, and skills. Over one-half of all articles studied variables in two or more categories.

Table 2

Nature of Dependent Variables in Selected Articles Published in the Journal of Agricultural Education, 2007-2016

Nature of dependent variable(s)	*f*	%
Achievement	42	31.3

Attitudes or perceptions	38	28.4
Behavior(s)	35	26.1
Other	19	14.2
Total	134	100.0

Note. Fifty-five of the 94 (58.5%) articles had dependent variables in two or more categories.

The largest single percentage (41.5%) of articles reported use of researcher-developed instruments; however, the combined categories of existing instruments and existing instruments modified by the researchers constituted over one-half (56.4%) of all reported instruments. Two studies (2.1%) reported use of both modified and researcher-developed instruments (Table 3).

Table 3

Source of Research Instruments Used in Selected Articles Published in the Journal of Agricultural Education, 2007-1016

Instrument source	*f*	%
Existing - no modifications	18	19.2
Existing - modified by researcher(s)	35	37.2
Researcher-developed	39	41.5
Existing - modified by researcher(s) and researcher-developed	2	2.1
Total	94	100.0

Instrument validity was addressed in some manner by authors in 83 of the 94 (88.3%) selected articles published in *JAE* between 2007 and 2016 (Table 4). Of those 83 articles, over three-fourths (75.9%) reported the instrument(s) were validated for the current study, while 18.1% reported validation based on previous research and the remaining 6% reported validation based on both current and previous research.

Table 4

Nature of Validity Claims Made in Selected Articles Published in the Journal of Agricultural Education, 2007-1016

Nature of validity claim	*f*	%
None made	11	11.7
Based on validation from previous research	15	16.0
Based on validation for current research	63	67.0
Based on both validation from previous research and validation for current research	5	5.3
Total	94	100.0

As previously indicated 11.7% of articles made no validity claims while an additional 11.7% claimed some unspecified form of validity, generally using wording similar to, ‘the instrument was examined by a panel of experts and judged to be valid.” A combination of face and content validity was claimed in 42 (58.3%) of the 72 articles where specific validity claims were made. In addition, single claims for either face (11.1%) or content (15.3%) validity were made in slightly over one-fourth of the 72 articles. Claims for face and content validity, either alone or in combination with other forms of validity, were claimed in 67 (93.1%) of the 72 articles. Claims for content, concurrent, and discriminant validity, either alone or in combination with other forms of validity, were made in 11 (15.3%) of the 72 articles.

Table 5

Type(s) of Validity Claimed in Selected Articles Published in the Journal of Agricultural Education, 2007-2016

Type(s) of validity claimed	*f*	%
None	11	11.7
Not specified	11	11.7
Face	8	8.5
Content	11	11.7
Construct	2	2.1
Discriminant	2	2.1
Face and content	42	44.7
Content and construct	4	4.3
Face, content and construct	2	2.1
Construct, concurrent and discriminant	1	1.1
Total	94	100.0

Among the 70 studies reporting some combination of face, content, or construct validity, 64 (91.4%) described the composition of the instrument validation panel. Panel members were most frequently described as 'experts' (*f* = 45, 70.3%), although the specific area of expertise was specified in only 22 cases (29.7%). The most frequently specified area of expertise was agricultural and extension education (*f* = 10, 45.5%). Panelists were described as 'faculty experts' or 'expert faculty' in 11 of the 64 (17.2%) studies with no additional information provided. The number of individuals serving on the validation panel was reported for 27 (38.6%) of 70 studies and ranged from two to 13, with a mean of 5.22 (*SD* = 2.59) members.

Conclusions/Implications/Recommendations

Previous scholars have examined the methods agricultural education researchers use to review the literature (Kildow, Zimmerman, Shoulders, & Johnson, 2014; Swafford & Anderson, 2007), develop theoretical frameworks (Camp, 2001), control for nonresponse error (Johnson & Shoulders, 2017; Linder et al., 2001; Miller & Smith, 1983), analyze and report results based on Likert-type scales (Warmbrod, 2014), describe effect sizes (Kotrlik, Williams, & Jabor, 2011), and select papers for presentation at scholarly conferences (Shoulders et al., 2015). The purpose of these efforts has been to improve the quality and impact of the research conducted and reported by the profession. The current study addresses the profession's approach to instrument validity in a continued effort to improve research in agricultural education.

Consistent with Fuhrman and Ladewig (2008), a majority (90.1%) of the quantitative studies examined were primarily descriptive in nature. The primary dependent variables studied were achievement (31.3%) attitudes or perceptions (28.4%), and behaviors (26.1%). The use of existing instruments, which is commonly used to ensure accuracy (Huck, 2008), was seen most frequently (56.4%) with and without modifications. Despite the criteria established for acceptance in *JAE*, 22 (23.4%) articles reviewed for this study either made no claim toward the nature of their instruments' validity, or did not specify what type of validity was employed. These findings suggest researchers did not attempt to establish instrument validity. Huck (2008) identified a lack of validity as a threat to the overall correctness of the study itself. The high value placed on quality research within *JAE* is not represented through this practice; therefore, we recommend researchers take efforts to establish and thoroughly report test validity within manuscripts. Additionally, we recommend that reviewers consider offering feedback related to the sufficient reporting of test validity to authors when reviewing submitted manuscripts.

Sixteen percent of the studies established instrument validity via the validity established and cited in previously published research. McMillan and Schumacher (2010) stated that instrument validity should be established within the context in which data are collected in order to ensure the instrument is valid in relation to the research problems. Therefore, we recommend reviewers for *JAE* evaluate studies attempting to establish validity via previous studies accordingly and provide feedback to authors that encourages them to establish validity within their own studies.

The use of face validity, which has been considered by researchers to be the weakest measurement of validity due to its subjective nature (Lund Research, 2012; Trochim, 2006), was reported by over half (53.2%) of the 72 articles. The use of an instrument validation panel was described in a majority (91.4%) of articles reporting face, content, and construct validity. Huck (2008) recommended the use of an instrument validation panel be accompanied with a description of who the experts are, what they do, and how their comments were evaluated. Panel members were most frequently described as 'experts' (70.3%), with information pertaining to what they do or who they are limited to 'faculty experts' or 'expert faculty' (17.2%) with no additional information or in the field of agricultural and extension education (45.5%). We recommend manuscript space be devoted by researchers to thorough descriptions of the merits of members of expert panels responsible for establishing face, content, and construct validity.

Fewer than 10% of the articles included efforts to establish concurrent or discriminant validity, considered to be most rigorous among validity methods (Huck, 2008). We posit this low rate of inclusion may be attributed to researchers' lack of awareness or confidence in performing these tests. Alternately, the low rate of inclusion of these types of validity may be a reflection of authors' understanding and acceptance of the subjective norms related to validity within the agricultural education profession. Therefore, adhering to the theory of planned behavior, we recommend the findings of this study be disseminated with researchers in order to stimulate conversation related to expectations of establishing test validity. Through these discussions, we can shift subjective norms of describing phenomena based on face-validated instruments, thereby stimulating progress within agricultural education through quality research (Krathwohl, 2009).

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. doi: 10.1016/0749-5978(91)90020-T

American Association for Agricultural Education. (n.d.). JAE review process. Retrieved from http://jae-online.org/index.php/review-process.

Camp, W. G. (2001). Formulating and evaluating theoretical frameworks for career and technical education research. *Journal of Vocational Education Research*, *26*(1), 4-25.

Fuhrman, N. E., & Ladewig, H. (2008). Characteristics of animals used in zoo interpretation: A synthesis of research. *Journal of Interpretation Research, 13*(2), 31-42.

Huck, S. W. (2008). *Reading statistics and research.* (5th ed.). Boston, MA: Pearson Education.

Johnson, D. M., & Shoulders, C. W. (2017). Power of statistical tests used to address nonresponse error in the Journal of Agricultural Education. *Journal of Agricultural Education, 58*(1), 300-312. doi:10.5032/jae.2017.01300

Kildow, H., Zimmerman, B., Shoulders, C. L., & Johnson, D. M. (2014). Use of citations within manuscripts published by the Journal of Agricultural Education. *Journal of Agricultural Education*, *55*(5), 78-92. doi:10.5032/jae.2014.05078

Kimberlin, C. L., & Winterstein, A.G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health System Pharmacists, 65*: 2276-2284. doi:10.2146/ajhp070364

Knobloch, N. A. (2010). Becoming a scholar as a teacher educator. In R. M. Torres, T. Kitchell, & A. L. Ball (Eds.), *Preparing and advancing teachers in agricultural education* (pp. 42-85). Columbus, OH: The Ohio State University.

Kotrlik, J. W., Williams, H. A., & Jabor, M. K. (2011). Reporting and interpreting effect size in quantitative agricultural education research. *Journal of Agricultural Education, 52*(1), 132-142. doi:10.5032/jae.2011.01132

Krathwohl, D. R. (2009). *Methods of educational and Social Science Research.* (3rd ed.). Long Grove, IL: Waveland Press.

Krippendorff, K. (1980). Validity in content analysis. In E. Mochmann (Ed.), *Computer strategies for communication analysis* (pp. 69-112). Frankfurt, Germany: Campus.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43-53. doi:10.5032/jae.2001.04043

Lund Research. (2012). Face validity. Retrieved from http://dissertation.laerd.com/facevalidity.php

McMillan, J. H., & Schumacher, S. (2010). *Research in Education.* (7th ed.). Upper Saddle River, NJ: Pearson Education.

Miller, L. E., & Smith, K. L. (1983). Handling nonresponse issues. *Journal of Extension*, *21*(5), 45-50.

Potter, W. J., & Levine-Donnerstein, L. (1999) Rethinking validity and reliability in content analysis. *Journal of Applied Communication Research*, *27*(3), 258-284, doi: 10.1080/00909889909365539

Radhakrishna, R. B., & Xu, W. (1997). A review of subject matter topics researched in agricultural and extension education. *Journal of Agricultural Education, 38*(3), 59-69. doi: 10.5032/jae.1997.03059

Roberts, T. G., Barrick, R. K., Dooley, K. E., Kelsey, K. D., Raven, M. R., & Wingenbach, G. J. (2011). Enhancing the quality of manuscripts submitted to the *Journal of Agricultural Education*: Perceptions of experienced reviewers. *Journal of Agricultural Education, 52*(3), 1-5. doi: 10.5032/jae.2011.03001

Shoulders, C. W., Johnson, D. M., and Flowers, J. (2015). Peer review in agricultural education: Interrater reliability of manuscript reviews for the 2014 National Agricultural Education Research Conference. *Journal of Agricultural Education, 56*(3), 121-133. doi:10.5032/jae.2015.03121

Swafford, M., & Anderson, R. (2007). A two decade (1981-2000) analysis of the literature cited in the Journal of Agricultural Education. *Journal of Agricultural Education,* 48(3), 37-45. doi:10.5032/jae.2007.03037

Trochim, W. M. (2006). Research methods knowledge base. Retrieved from https://www.socialresearchmethods.net/kb/measval.php

VanLeeuwen, D. M. (1997). Assessing reliability of measurements with generalizability theory: An application to inter-rater reliability. *Journal of Agricultural Education, 38*(3), 36-42. doi: 10.5032/jae.1997.03036

VanLeeuwen, D. M., Dormody, T. J., & Seevers, B. S. (1999). Assessing the reliability of student evaluations of teaching (sets) with generalizability theory. *Journal of Agricultural Education, 40*(4), 1-9. doi: 10.5032/jae.1999.04001

Viera, A. J., & Garrett, J. M. Understanding interobserver agreement: The kappa statistic. *Family Medicine, 37*(5), 360-363.

Warmbrod, R. J. (2014). Reporting and interpreting scores derived from Likert-type scales. *Journal of Agricultural Education, 55*(5), 30-47. doi:0.5032/jae.2014.05030

Methods of Establishing Instrument Validity in Manuscripts Published in the *Journal of Agricultural Education* between 2007 and 2016
Discussant Remarks: Alexa Lamm

If we want to increase the rigor (and proceeding impact) of our scholarship, studies such as this one must be conducted. I commend the authors on taking a look at the level of instrument validity (just one aspect of rigor) represented in our journal in an attempt to increase the impact of the research within the profession. The manuscript is well written with a foundation in theory, despite it being methodological in nature. I appreciated the use of a second coder within the methods to confirm analysis but wonder why they were only used to analyze 10 articles and not for further analysis (where the two coders split the remaining items to be reviewed) which is classically done in a content analysis. I was surprised that 23.4% of the articles examined (that made it through the JAE review process) made no validity claims or specific the type. Just as the authors stated, this is of concern and should be addressed. The authors make several recommendations to enhance the JAE review process but I would like to hear more about how we can work, as a profession, to emphasize rigor within our work. I would encourage anyone publishing quantitative research in the JAE or reviewing for JAE to read this manuscript and keep in mind the findings. They were eye-opening. Questions I would ask the authors to expand upon include:

What should we be including in our graduate level research methods courses to ensure new researchers are thinking about rigor (and validity specifically) when conducting and writing up their research?

Beyond reviewer education, what type of professional development should we be offering to members of AAAE to help mitigate concerns about rigor?

Discussant – Daniel Foster; Timekeeper – Peyton Beattie

Curriculum & Instruction
Allocation of Time Among Preservice Teachers During Their Clinical Experience *Keith Frost, Dr. John Rayfield, Dr. David Lawver, Dr. Rudy Ritz*
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Evaluating Interdisciplinary Teaching: Curriculum for Agricultural Science Education *Catlin M. Pauley, Aaron J. McKim, Kevin W. Curry Jr., R. Bud McKendree, Tyson J. Sorensen*
Literacy-Related Considerations of Secondary Agriculture Teachers *Laura Hasselquist, Tracy Kitchel*

Allocation of Time Among Preservice Teachers During Their Clinical Experience

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Dr. John Rayfield, Texas Tech University
Dr. David Lawver, Texas Tech University
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Student teaching is one of the most profound opportunities that teaching candidates experience as part of their preparation program (Clark, Byrnes, & Sudweeks, 2015). This process is an opportunity for the student to make the transition from student to professional and take knowledge of theory and change it, through experience, into practice. During student teaching, university students are expected to mirror the actual job expectations of their cooperating teachers. For preservice teachers in agricultural education, this process also includes assuming the role of FFA advisor, project supervisor, adult educator, and program administrator, in addition to the more typical roles of classroom teacher and student. This study described the allocation of time among preservice teachers over their student teaching experience. Weekly reports were submitted by cohort students to university supervisors and compiled for data analysis. Among the five general categories used, the most time was allocated to serving as an FFA advisor and secondary instructor, a smaller amount was spent in "student" roles with the remainder of time dedicated to program administrative roles and adult education. Analysis of sub-categories within the broader roles revealed that student teachers were having exceptionally different experiences in terms of time allocation.

Introduction, Purpose, and Objectives

Self-efficacy is a predictor of job satisfaction and career longevity (Ross, 1992; Coldarci, 1992; Walker, Garton, & Kitchel, 2004). Factors that influence development of self-efficacy are mastery and vicarious experiences, social persuasion, and the emotional state of the individual (Bandura, 1986). These factors are influenced by relationships with the cooperating instructor(s) (Harlin, Edwards & Briers, 2002), length of the placement (Clark, Byrnes, & Sudweeks, 2015), number of courses taught (McKim & Velez, 2016), and nature of the feedback provided (Edgar et. al., 2009). Within the specific field of leadership in agricultural education, McKim and Velez (2017) noted that there was a relationship between amount of time a student-teacher spent on leadership activities and their perceived self-efficacy in leadership. With this in mind, the researchers and faculty at Texas Tech University wanted to examine exactly how their student teachers were allocating their time during student teaching. The intent was to develop a better understanding of program activities as part of review process that could lead to programmatic changes.

The purpose of this study was to describe the amount of time dedicated by preservice teachers during their student teaching experience in the areas of serving as a secondary classroom instructor, FFA advisor duties, learning as a student, other administrative duties, and adult education. The objectives guiding this study were to:

1. Describe the number hours spent corporately by student teachers in the general categories of FFA advisor, secondary instructor, college student, adult educator, and other professional responsibilities.

2. Describe the hours included in the broader categories of objective one in more specific sub-categories.
3. Describe the time spent observing, preparing, and teaching by the cohort through the progression of the student teaching experience.
4. Describe the differences in the number of hours spent by student teachers in the general categories of FFA advisor, secondary instructor, college student, adult educator, and other professional responsibilities.
5. Compare the hours spent by individual student teachers in the aggregate categories of FFA advisor and secondary instructor.

Theoretical Framework and Conceptual Model

There is a teacher shortage in the United States. Within the field of agricultural education, there have been unfilled vacancies every year since 1965 (Kantrovich, 2007). Much of the research focus on this shortage has been on retention and attrition. Unrealistic expectations (external or self-imposed), scheduling conflicts regarding time and energy, as well as continual pressures and conflicts from working with parents, administration and community members were reasons cited for teachers leaving the profession (Lemons, Brashears, Burris, Myers, & Price, 2015). Similar challenges were noted in different phases of a career but the study also recognized that the impacts of these issues were mitigated by a positive support structure (Clark, Kelsey, & Brown, 2014).

One of the key challenges noted in studies of attrition and retention among agriculture teachers focused on balance between a teacher's professional and personal obligations. A study of Georgia agriculture teachers reported an average work week of 57 hours plus an additional 20+ hours attending to family obligations put a strain on potential career longevity (Murray, Flowers, Croom, & Wilson, 2011). This aligned with a national study that concluded work interfering with family was a factor in turnover intentions (Sorensen, McKim, & Velez, 2016a; Sorensen, McKim, & Velez, 2016b). Self-efficacy is a factor in job satisfaction (Blackburn & Robinson, 2008) and job satisfaction is linked to attrition.

While professional attrition will always be present, part of the shortfall in teachers is caused by licensure program completers not entering the workforce. Roberts, Greiman, Muphy, Ricketts, and Harlin (2009) noted that only 70% of qualified candidates chose to enter the profession. Kantrovich (2007) reported that only 53% of candidates from the same time-period entered the profession specifically to teach high school agriculture.

The theoretical framework for this study is rooted in the concepts of self-efficacy and the subsequent research that followed. Self-efficacy is defined as an individual's perceptions regarding their capabilities, both cognitive and physical, to plan, organize and execute certain activities (Bandura, 1986). Teacher self-efficacy relates to the beliefs teachers hold about specific competencies in the profession (Pendergast, Garvis, & Keogh, 2011) but not necessarily their actual ability to complete the competencies (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).

In education, self-efficacy has been an important construct associated with increased student performance (Ross, 1992). The increase in student performance could be connected to other studies that linked increased teacher self-efficacy with teachers who spend more time working with struggling students (Gibson & Dembo, 1984) and who are more prepared and organized (Allinder, 1994). Additionally, working teachers with higher perceived levels of self-efficacy and job satisfaction noted an intent to stay in the profession longer (Blackburn & Robinson, 2008; Caprara, Barbaranelli, Borgogni, & Steca, 2003). The level of job-satisfaction is linked to commitment to teaching and attrition (Coldarci, 1992; Walker, Garten, & Kitchel, 2004).

The idea of cultivating self-efficacy in teachers has been posited as essential in creating a profession of committed and effective teachers (Tschannen Moran & Woolfolk Hoy, 2001). Studies have sought to identify areas of where teachers' self-efficacy are low and generated recommendations for professional development areas with investigations into perceived efficacy in mathematics (Stripling & Roberts, 2012), science (Hamilton & Swortzel, 2007), dealing with students with special needs (Aschenbrener, Garton, & Ross, 2010), as well as the relationship of self-efficacy and community connectedness (Langley, Martin, & Kitchell, 2014).

Beyond measuring self-efficacy of agriculture teachers, studies have investigated self-efficacy in teachers based on certification method (traditional or alternate) as well as measuring self-efficacy at different stages in a teacher's career. One particular study found that there was no difference in self-efficacy when comparing traditionally and alternately certified teachers (Rocca & Washburn, 2006). Another study from the same region noted conflicting data and found that traditionally certified teachers were more efficacious in content knowledge, program development, and FFA/SAE activities (Duncan & Ricketts, 2008).

It has been found that perceptions of self-efficacy are highest at the completion of student teaching and lowest after the completion of a teachers' first year in the profession (Swan, Wolf, & Cano, 2011). Studies show that self-efficacy appears to grow with continued experience in the classroom beyond the first year. When comparing first and fifth year teachers, those later in their career had higher perceptions of self-efficacy (Burris, McLaughlin, McCulloch, Brashears, & Fraze, 2010). This pattern of increasing self-efficacy was also found by Hartfield (2011) when comparing experienced teachers to those with five or less years of teaching.

Other studies measured perceptions of self-efficacy before, during, and immediately after the student-teaching experience. Knobloch (2001) measured changes in self-efficacy before and after peer-teaching experiences and early field experiences. Swan (2005) noted that learning style was not linked to efficacy but career intentions were. Two longitudinal studies noted that there was a decrease in efficacy midway through student teaching, but that efficacy was at its highest at the conclusion of student teaching (Roberts, Harlin, & Ricketts, 2006; Roberts, Mowen, Edgar, Harlin, & Briers, 2007). A similar study measured self-efficacy before and after a teaching methods course, as well as after student teaching and found that perceived self-efficacy increased at each subsequent measurement (Stripling, Ricketts, Roberts, & Harlin, 2008).

Bandura (1986) suggested that there were four primary experiences that shape self-efficacy: mastery experiences, vicarious experiences, social persuasion, and physiological, psychological, and/or emotional state. Of these, Bandura noted that mastery experiences were the most powerful and posited that perceptions of self-efficacy for a given task is related to the individual having more positive (successful) experiences in that task. This is supported by a study that reported the more time a preservice teacher spent on leadership related activities, the more their leadership self-efficacy increases (McKim & Velez, 2017).

Vicarious experiences take place before and during the student teaching experience. The experience of observation and reflection can be a strong opportunity to build self-efficacy in the absence of mastery experiences (Bandura, 1977). In teacher preparation programs, these observation activities can include watching other student teachers as part of a teaching methods or other preparatory class, observing cooperating teachers during field experiences or during student teaching, and observing first year teachers or teachers from other fields. All opportunities have shown to increase self-efficacy in pre-service teachers (Wolf, Foster, & Birkenholz, 2010; Knobloch, 2001).

The element of social persuasion has been defined as positive feedback or encouragement on one's ability to complete a task successfully. This feedback is most often in the form of communication from a cooperating teacher, but may also include feedback from university supervisors, teacher educators, or peers (McKim & Velez, 2016). Wolf et al. (2010) noted that written and verbal feedback increased self-efficacy in student teachers. Another study found that providing formal structure to the feedback showed less increase in self-efficacy than unstructured feedback (Edgar, Roberts, & Murphy, 2009).

The last element listed by Bandura (1986) as a factor of self-efficacy are the combined ideas of physiological, emotional, and/or psychological states. These include the thoughts and feelings one is experiencing prior to, during, and after completing a task. There is limited research in agricultural education on this topic. One author suggested that this was due to difficulty in measuring the construct (Wolf et al., 2010) while another suggested that the more positive feelings are during or following an experience, the more self-efficacy will result from it (Clark et al., 2015).

The types of experiences are not the only factor in self-efficacy. Quantity and pace of experience plays a role as well. In a study comparing 15-week to year-long placement, it was suggested that the year-long internship provided more opportunity for vicarious experiences (Clark et al., 2015). In their review of self-efficacy in agricultural education, McKim and Velez (2016) posited that there may need to be flexibility in student teacher class load and noted that some students may gain self-efficacy from the increased rigor but others may find it detrimental. Similarly, there may be a link between guidance and structure provided by the cooperating instructor and workload in creating burnout in student teachers (Fives, Hamman, & Oliverez, 2007).

Student teaching has been regarded as being an extremely important capstone experience for agricultural education programs (Borko & Mayfield, 1995; Edgar, Roberts, & Murphy, 2009; Smalley, Retallick, & Paulsen, 2015). The experience is a culminating event that provides the opportunity for agricultural education students to learn from a real world high impact experience (Smith & Rayfield, 2017). Student teaching is cited as being of great importance in the preparation and training of agricultural science teachers (Myers & Dyer, 2004; Kitchel & Torres, 2007).

The quantity of work placed on student teachers and the quality of the experiences needs to be key considerations in examining and developing student teaching opportunities. Studies indicated that student teachers who had a positive teacher preparation experience, or considered their student teaching as positive, have increased self-efficacy (Ronfeldt & Reininger, 2012; Knobloch, 2006; Whittington, McConnel, & Knobloch, 2006). Conversely, a lack of positive experiences leads to diminished self-efficacy and that can lead to lower levels of job satisfaction and a decrease in the planned career longevity of the early career teacher (Blackburn & Robinson, 2008; McKim & Velez 2015).

A study at the University of Missouri found that student teachers in their program spent most of their time planning for instruction, teaching, and on teaching-related activities, and the smallest amount of their time on administrative related activities (Torres & Ulmer, 2007). A similar study noted student teachers spending much of their time observing their mentor teachers and teaching class (Robinson, Krysher, Haynes, & Edwards, 2010). Both studies align well with the results of the perceptions of the importance of various student teaching activities by Smalley, et al. (2015a; 2015b) and Paulsen, Smalley, and Retallick (2016).

Studies have been conducted on the perceived relevance of student teaching activities by university supervisors, cooperating teachers, and student teachers. In one study, university supervisors identified the most important constructs of student teaching as being planning for instruction, teaching, evaluating students, and SAE's (Paulsen et al., 2016) A similar study reported that cooperating teachers perceived the most important construct of student teaching as being the evaluation of student performance, while at the same time they perceived almost no value in adult education (Smalley, Retallick, & Paulsen, 2015a). A parallel study reported the perceptions of student teachers on the relevance of student teaching activities, finding that student teachers identified planning for instruction as being the most important activity during the student teaching experience (Smalley et al., 2015b).

Adding to the complexity, agriculture teachers work long hours with changing schedules and varying responsibilities that keep them busy throughout the week and on weekends. Studies report that agricultural education teachers work more than 55 hours during the week and an additional 4.04 hours over the weekend (McKim & Velez, 2016) in addition to responsibilities at home (Murray et al., 2011). The volume and diversity of time spent by agricultural educators increases the challenge for the student teacher and cooperating universities. A balance needs to be achieved between providing an experience that models reality and providing opportunities for preservice teachers to successfully transition into effective educators.

With a theoretical foundation grounded in Bandura's work and a review of the current literature, the authors developed the conceptual model shown in Figure 1. This model is based on the premise that a student teacher enters student teaching with a certain level of self-efficacy from prior classes and experiences, and an emotional and psychological state that is influenced by many factors including social persuasion inputs. The student then has a series of vicarious or mastery experiences that create a new psychological state that determines the student's perceptions of self-efficacy following the student teaching experience. This sense of capability has been shown to impact decisions to enter the profession and/or impact the new teacher's longevity in field.

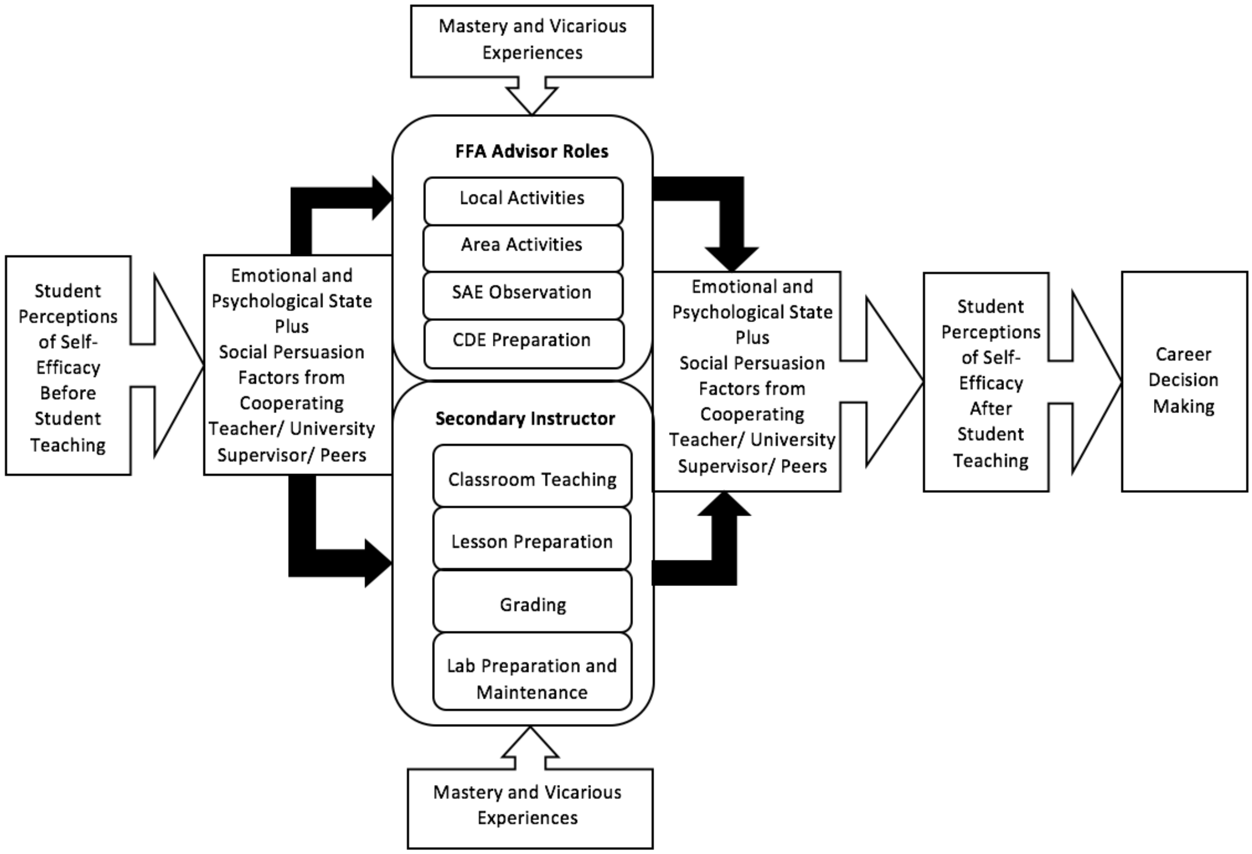

Figure 1. Conceptual model of self-efficacy development during the student teaching experience.

Methods

The student teachers from the Spring 2017 cohort at Texas Tech University (N = 15) were used as the source for data in this study. Utilizing a provided Microsoft Word template, based on an instrument utilized by Torres and Ulmer (2007), students completed weekly work summaries and reflections. Student teachers used these documents to self-report the number of hours spent in: 1) Observing Cooperating Teacher, 2) Preparation for Instruction, 3) Classroom and Laboratory Teaching, 4) Laboratory Preparation and Maintenance, 5) Grading/Scoring of Student Work, 6) Administrative Duties/Program Management, 7) Professional Activities (meetings, in-service), 8) SAE Observations and Recording, 9) FFA Activities – Local, 10) FFA Activities – Area, District, and/or State, 11) CDE Preparation, 12) Adult Education, and 13) Conference time with Cooperating Teacher. The reflective portion of these reports provided brief explanations of how the time was specifically used and any reflections or thoughts the students had on their experiences. These reports were emailed to the university supervisors and cc'd to a common recipient who managed the files and helped facilitate data entry.

The reports were analyzed for completeness and any missing records were addressed by contacting the individual students for clarification or correction. The self-reported hours were totaled and entered into Microsoft Excel worksheets by week. The 13 categorical totals were compiled into a separate cohort data sheet. In each of the 13 areas, means, standard deviations, and percentages were calculated using the included functions in Microsoft Excel and verified using processes provided by Field (2014) and Lane (n.d.).

The researchers generated a broader view of the cohort's experience by grouping the thirteen teaching areas into five different general categories within the student teaching experience: 1) Learning as a Student, 2) Serving as a Secondary Classroom Instructor, 3) Other Administrative Duties, 4) Advisor Duties, and 5) Adult Education. The data sets for these general categories were analyzed using descriptive statistics for mean, standard deviation, percentages of the sum of all time reported, and percentages of the category.

Findings

The first research objective was to describe the hours dedicated by the cohort in generalized categories specified by the researchers. During their clinical experience, the 15 student teachers averaged 713.8 hours over their 15-week placement. Over the same time-period; the average time spent serving as an FFA Advisor was 281.7 hours and accounted for the 39.5% of the total time. The next largest block of time included activities serving as a secondary level classroom instructor with an average of 271.1 hours. Activities as a preservice college student averaged 130.5 hours, followed by other professional and administrative duties, and adult education.

Table 1
Time Allocation of Preservice Teachers in General Categories

Activity	Hours	*M*	*SD*	% of Time
FFA Advisor	4,226.0	281.7	166.6	39.5
Secondary Instructor	4,067.0	271.1	126.2	38.0
Student	1,957.4	130.5	80.8	18.3
Program Administrator	325.0	21.7	39.1	3.0
Adult Educator	132.0	8.8	17.4	1.2
Total	10,707.4	713.8	155.4	-

The second research objective was to describe the hours dedicated by the cohort specific to the existing instrument. Serving as an FFA Advisor represented the largest allocation of time with efforts dedicated to FFA activities at the area, district, or state level accounting for 1719.0 hours (16.1%) of the cohort's total time over 15 weeks with a per-student mean of 114.6 followed by 1,000.0 hours of SAE observations. Local FFA activities represented 777.0 hours, and CDE preparation 730.0 hours.

Serving as a secondary level classroom instructor represented the next largest allocation of time. Within this category classroom instruction accounted for 2,310.5 hours (21.6%) of the total time invested by the cohort. This was followed by lesson preparation at 904.0 hours, grading (530.0 hours), and laboratory preparation and maintenance (322.5 hours).
Activities associated with being a college student represented the third largest time usage. Observing the cooperating teacher accounted for 1,306.5 hours (12.2%). Corporately 650.9 hours were spent meeting with the cooperating teacher (6.1%). Administrative activities accounted for

the next largest block of time with program administration (e.g. membership, stock show entries) accounting for 199.5 hours (1.9%) and other professional obligations (staff meetings, professional development, staff duty) representing 125.5 hours (1.2%) of the cohort total.

Table 2
Distribution of Hours Among Student Teachers for Specific Activities Associated with Serving as a FFA Advisor, Secondary Instructor, Student, and Program Administrator

Activity	Hours	*M*	*SD*	% of Time	% of Category
FFA Advisor					
Area, District, State FFA Activities	1,719.0	114.6	132.4	16.1	40.7
SAE Observations	1,000.0	66.7	101.0	9.3	23.7
Local FFA Activities	777.0	51.8	55.9	7.3	18.4
CDE Preparations	730.0	48.7	22.1	6.8	17.3
Secondary Instructor					
Classroom Instruction	2,310.5	154.0	80.2	21.6	56.8
Lesson Preparation	904.0	60.3	40.0	8.44	22.2
Grading	530.0	35.3	17.4	4.95	13.0
Lab Preparation and Maintenance	322.5	21.5	29.2	3.01	29.2
College Student					
Observing Cooperating Teacher	1,306.5	87.1	60.8	12.2	66.8
Meeting with Cooperating Teacher	650.9	43.4	30.6	6.1	33.2
Professional Obligations					
Program Management	199.5	13.3	32.7	1.9	61.4
Professional Activities	125.5	8.4	7.7	1.2	38.6

The third objective sought to determine the progression of time spent observing cooperating teachers, preparing for instruction, and teaching throughout the progression of the clinical experience. Table 3 provides the mean time spent by the cohort in the three categories. The amount of time student teachers spent observing was highest in the first three weeks (M = 28.70, SD = 20.91), decreased through the second (M = 17.57, SD = 12.25) and third (M = 12.60, SD = 10.63), before increasing during the last phase of the student teaching experience.

There was an increase in the time spent preparing for instruction from the first interval (M = 11.10, SD = 7.92) to the second (M = 11.50, SD = 10.08) before a drop in the third interval (M = 9.60, SD = 6.90) and a peak in the fourth (M = 15.10, SD = 10.90). Finally, time spent preparing for instruction decreased in the fifth interval (M = 13.00, SD = 11.30).

The time student teachers spent teaching classes was the lowest during the first interval (M = 19.10, SD = 13.92) and increased in the second interval (M = 38.00, SD = 29.32). There was a decrease of hours spent teaching in the third interval (M = 24.30, SD = 17.02) before increasing through the remainder of the student teaching experience.

Table 3

Time Spent Observing, Preparing, and Teaching by Preservice Teachers (N = 15)

	Observing		Preparing		Teaching	
Interval	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	28.70	20.91	11.10	7.92	19.10	13.92
2	17.57	12.25	11.50	10.08	38.00	29.32
3	12.60	10.63	9.60	6.90	24.30	17.02
4	12.77	14.63	15.10	10.90	32.40	22.30
5	15.47	14.73	13.00	11.30	40.30	19.44

Note: The weekly reports were aggregated into five three-week intervals.

The fourth objective sought to describe the range in time allocation among individual preservice teachers in the different general areas of work. The preservice teachers in this group dedicated a majority of their time to responsibilities associated with serving as an FFA advisor. The amount of time spent in this category had the greatest range of time reported, with a minimum of 92.5 hours invested to a maximum of 658.0 hours over the 15-week experience (*M* = 281.7, *SD* = 165.6). Activities associated with being a secondary agricultural science teacher were the second largest use of the student teacher's time (*M* = 271.1, *SD* = 126.2). Within this category, there was a 431.5-hour difference between the highest and lowest number of hours invested in classroom instruction. On average, the cohort spent 130.5 hours (*SD* = 80.8) learning by observing and conferencing with their cooperating teachers. Preservice teachers spent the least amount of time participating in administrative duties (*M* = 21.7, *SD* = 39.1) and adult education (*M* = 8.8, *SD* = 17.9).

Table 4
Time Allocation of Preservice Teachers in General Categories (N = 15)

Activity	Minimum	Maximum	Range	*M*	*SD*
FFA Advisor Duties	92.5	658.0	565.5	281.7	165.6
Secondary Instructor	111.5	543.0	431.5	271.1	126.2
Student	33.5	325.0	291.5	130.5	80.8
Program Administrator	1.0	161.5	160.5	21.7	39.1
Adult Educator	0.0	70.0	70.0	8.8	17.9

The fifth objective sought to compare the number of hours spent by individual student teachers within the activities associated with serving as an FFA advisor and a secondary classroom instructor. The total hours reported by individuals in the cohort in roles associated with serving as classroom instructor (*M* = 271.1 *SD* = 126.2) and FFA Advisor (*M = 281.7 SD =* 165.6) are shown in Table 5. Six students accumulated hours that were between one and two standard deviations from the mean and three students had scores that were beyond two standard deviations. One of these (Student 3) was the highest in hours (543) spent as an instructor equivalent to 2.16 standard deviations above the mean. However, this student was within one standard deviation in hours as an advisor. Students 1 and 11 were the two highest in hours spent as and FFA advisor and were and the lowest in hours spent as an instructor. Student one recorded 376.3 hours more than the mean as an advisor and 157.1 hours below the mean as an instructor. In the same categories, student 11 was above the mean by 355.8 hours as an advisor and 159.6 hours below the mean for serving as a classroom instructor. Three students reported scores that were below the mean in both categories and the remaining 12 students were above the mean in one category and below in the other.

Table 5
Student Teacher Hours as FFA Advisor and Secondary Instructor

	FFA Advisor (M = 271.1 SD = 126.2)		Secondary Instructor (M = 281.7 SD = 165.6)	
Student	Reported Hours	Deviation	Reported Hours	Deviation
1	658.0	376.3	114.0	-157.1
2	262.0	-19.7	441.0	169.9
3	178.0	-103.7	543.0	271.9
4	220.0	-61.7	364.0	92.9
5	188.0	-93.7	426.0	154.9
6	92.5	-189.2	189.0	-82.1
7	307.5	25.8	286.5	15.4
8	264.0	-17.7	296.5	25.4
9	349.0	67.3	157.5	-113.6
10	196.0	-85.7	129.5	-141.6
11	637.5	355.8	111.5	-159.6
12	114.0	-167.7	262.0	-9.1
13	367.0	85.3	192.0	-79.1
14	95.0	-186.7	333.0	61.9
15	297.5	15.8	221.5	-49.6

Conclusions, Implications, and Recommendations

During the clinical experience, preservice teachers collectively dedicated over three quarters of their time as FFA advisors and secondary classroom instructors and related activities. This is consistent with previous research (Paulsen et al., 2016; Harlin, Edwards, & Briers, 2002). Within these areas, the most time was dedicated to serving as an FFA advisor (39.5%) compared with 38% of the total time spent as a secondary classroom instructor. This result conflicts with the importance placed on teaching noted by Smalley et al. (2015a; 2015b) and the results of Torres and Ulmer (2007) who reported students spending the most time in classroom teaching. These findings beg the question: Are the three-circles equal? If so, how do we as teacher educators convey the concept of a balanced program? Or is the role of the of the FFA advisor more time-consuming than serving as a classroom teacher?

When analyzing data for more specific activities, the largest portion of time was spent in the classroom as an instructor followed by advising the FFA chapter at the regional and state levels, observing the cooperating teacher, and SAE supervision. What was most notable across these, and other, categories were the variation of hours among the student teachers. Across the cohort, direct classroom instruction averaged 154 hours (SD = 80), regional and state FFA activities averaged 115 (SD = 132), SAE observations and visits averaged 67 hours (SD = 101), and observation time of the cooperating teacher averaged 87 hours (SD = 61). These dispersions suggest that individual student teachers are having widely differing placement experiences in all areas of agricultural education (FFA, SAE, and Classroom Instruction).

This disparity among time allocation is reinforced by the findings of objectives four and five. Among the three largest uses of time, there was a 565.5-hour range of time for FFA advising activities, 431.5 hours for activities associated with serving as a secondary instructor, and a difference of 291.5 hours for activities as a post-secondary student. When looking at hours spent by individuals in the roles of FFA advisors and secondary instructors, the differences in experiences become clearer. The two students with the most hours as FFA advisors recorded time over 350 hours above the mean (M = 271.1) and yet were over 150 hours below the mean (M = 281.7) as classroom instructors. Conversely, the individual reporting the most hours as a secondary instructor (543 hours) was over 100 hours below the average as an FFA advisor.

While no two preservice teachers will have identical student teaching experiences, it is vital to ensure student teachers are confident and qualified in all areas before they are certified. Krysher, Robinson, and Edwards (2015), found that student teachers who spent more time teaching during their placement time were more self-assured about their abilities to teach. Additionally, the implication of the dis-similarities among the time allocation of the student-teachers is the possibility for a corresponding difference in positive experiences and self-efficacy among the roles required of an agricultural educator. Furthermore, the potential imbalance of experience may be generating new teachers who are particularly strong in one area of agricultural education, but decidedly weaker in another.

Krysher et al. (2015) found that students who identified themselves as "self-assured" spent more time teaching in the classroom setting. McKim and Velez (2017) reported an increase in self-efficacy in specific areas of agricultural education with an increase in the time spent in the respective areas. The implications for the dis-similarities of hours spent as instructor and advisors among the student teachers in this study is that the program completers may also have similarly different levels of self-efficacy in these areas. Additionally, limited experience in an activity can lead to reduced self-efficacy and low feelings of self-efficacy among preservice teachers has been associated with a reduced self-projection of longevity in the field (Pfitsner-Eden, 2016).

It is recommended that more thorough and detailed guidelines are established by teacher preparation programs regarding time commitment and allotment expectations. Prior to the beginning of the field experience, these expectations should be clearly communicated to the members of the student teaching cohort. Additionally, a clear line of communication needs to be established with cooperating centers to help assure that student teachers are getting a well-rounded, complete experience and spending a sufficient number of hours completing the diverse job responsibilities of an agricultural science teacher.

The distribution of time spent observing by student teachers at Texas Tech University started out high then decreased through the conclusion of the student teaching experience until the slight increase through the final weeks of student teaching. This is consistent with the results of Torres and Ulmer (2007) with the exception of the increase in the final interval. Additionally, this cohort was consistent in the amount of time they spent planning for instruction as Torres and Ulmer (2007) suggested should happen.

Wentz (2001) outlined three phases of student teaching: 1) orientation and observation, 2) assisting, and 3) assuming responsibility in the total school program. The student teachers in this cohort followed these phases in the teaching aspect with the exception of the drop reported in hours spent teaching in the third-time interval. This reduction in hours spent teaching is potentially due to the timing of Career Development Events and livestock shows in Texas.

At the university level, the individuals involved in planning for the student teaching experience determine guidelines to ensure student teachers are receiving the practice they need during that time of year. Torres and Ulmer (2007) stated, there is a need for a “phase-out” period of student teaching. As student teachers reported spending the most time teaching in the final weeks of their experience, it is recommended that a plan for phasing out of the role of the teacher be outlined as an expectation.

It is further recommended that cooperating teachers be invited to a professional development training hosted by the university prior to the beginning of the field experience. This training should outline expectations for both the student teacher and cooperating center. During the student teacher placement process, teacher preparation programs should ensure that selected cooperating teachers will provide opportunities in all aspects of the agricultural education program. It is imperative that cooperating teachers are willing and prepared to involve their student teacher and allow them to be active program participants (Jones, Kelsey, & Brown, 2014).

This study is a snapshot of one undergraduate agricultural education program. Further discussions of statewide, regional, and national trends may clarify acceptable parameters for time allocation in the diverse areas of a student teacher experience in agricultural education. The scope of this study should be increased to include additional universities from across the region and nation. Additional analyses should be made to compare time allocation to geographic location within Texas or the nation to help determine if regional differences exist in programmatic priorities.

Programs and instructors have localized control over the areas of emphasis and act within the preferences of their administration and community. It is recommended that a better understanding of the preferences, priorities of the partnering district and instructor are established prior to placement of students at a given site. With this information, university faculty may need to discontinue utilizing particular programs if the localized priorities do not align with desired teacher preparation outcomes.

One of the key components of programmatic improvement is a willingness and an ability to take an objective and critical look at current practice. The faculty at Texas Tech University are taking the first steps in this process. We encourage our colleagues to be willing to examine their own programs and practices and look forward to the discussions that will follow. Moreover, a critical look should be placed on the priorities of the communities of local high school agricultural education programs. These localized needs and desires should then be compared with State and National Association priorities to investigate alignment and discuss disparities. This careful examination will aid teacher preparation programs in agricultural education to make adjustments where needed in order to provide the best possible teacher candidates.

References

Allinder, R. M. (1994). The relationship between efficacy and the instructional practices of special education teachers and consultants. *Teacher Education and Special Education, 17*(2), 86-95. doi: 10.1177/088406494017002003

Aschenbrener, M. S., Garton, B. L., & Ross, A. L. (2010). Early career agriculture teachers' efficacy toward teaching students with special needs. *Journal of Agricultural Education*, *51*(4), 105-117. doi: 10.5032/jae.2010.04105

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191-215. doi:10.1037/0033-295X.84.2.191

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Blackburn, J. J., & Robinson, J. S. (2008). Assessing teacher self-efficacy and job satisfaction of early career agriculture teachers in Kentucky. *Journal of Agricultural Education*, *49*(3), 1-11. doi: 10.5032/jae.2008.03001

Borko, H., & Mayfield, B. (1995). The roles of the cooperating teacher and university supervisor in learning to teach. *Teaching and Teacher Education, 11,* 501–518. doi: 10.1016/0742-051X(95)00008-8

Burris, S., McLaughlin, K. E., McCulloch, A., Brashears, T., & Fraze, S. (2010). A comparison of first and fifth year agriculture teachers on personal teaching efficacy, general teaching efficacy and content efficacy. *Journal of Agricultural Education*, *51*(1), 22-31. doi: 10.5032/jae.2010.01022

Caprara, G.V., Barbaranelli, C., Borgogni, L., & Steca, P. (2003). Efficacy beliefs as determinants of teachers' job satisfaction. *Journal of Educational Psychology, 95*(4), 921-832. doi: 10.1037/0022-0663.95.4.821

Clark, M. S., Kelsey, K. D., & Brown, N. R. (2014). The thornless rose: A phenomenological look at decisions career teachers make to remain in the profession. *Journal of Agricultural Education*, *55*(3), 43–56. https://doi.org/10.5032/jae.2014.03043

Clark, S., Byrnes, D., & Sudweeks, R. (2015). A comparative examination of student teacher and intern perceptions of teaching ability at the preservice and inservice stages. *Journal of Teacher Education 66*(2) 170-183. doi:10.1177/0022487114561659

Coldarci, T. (1992). Teachers' sense of efficacy and commitment to teaching. *Journal of Experimental Education 60*(4), 323-337. Retrieved from: https://umaine.edu/edhd/wp-content/uploads/sites/54/2010/03/Coladarci-1992.pdf

Duncan, D., & Ricketts, J. C. (2008). Total program efficacy: A comparison of traditionally and alternatively certified agriculture teachers. *Journal of Agricultural Education 49*(4), 38-46. doi: 10.50.3/jae.2008.04038

Edgar, D. W., Roberts, T. G., & Murphy, T. H. (2009). Structured communication: Effects on teaching efficacy of student teachers. *Journal of Agricultural Education 50*(1), 33-44 doi: 10.5032/jae.2009.01033

Field, A. (2014). *Discovering statistics using IBM SPSS statistics.* Thousand Oaks, CA: Sage

Fives, H., Hamman, D., & Olivarez, A. (2007). Does burnout begin with student teaching? Analyzing efficacy, burnout, and support during the student-teaching semester. *Teaching and Teacher Education, 23,* 916-934. doi: 10.1016/j.tate.2006.03.013

Gibson, S., & Dembo, M. (1984). Teacher efficacy: A construct validation. *Journal of Educational Psychology, 76*(4), 569.582. doi: 10.1037/0022-0663.76.4.569

Hamilton, R., & Swortzel, K. (2007). Assessing Mississippi AEST teachers' efficacy capacity science integrated skills process skills. *Journal of Southern Agricultural Education Research 57*(1), 1-12.

Harlin, J. F., Edwards, M. C., & Briers, G. E. (2002). A comparison of student teachers' perceptions of important elements of the student teaching experience before and after a 12-week field experience. *Journal of Agricultural Education, 43*(3), 72–83. doi: 10.5032/jae.2002.03072

Hartfield, K. N. (2011). *Perceived levels of teacher self-efficacy among secondary Arizona agricultural education teachers.* (Electronic Master's Thesis). University of Arizona, Tuscon. Retrieved from: https://aed.cals.arizona.edu/sites/aed.cals.arizona.edu/files/Hartfield_Thesis.pdf

Jones, C.K., Kelsey, K.D., & Brown, N.R. (2014). Climbing the steps toward a successful cooperating teacher/student teacher mentoring relationship. *Journal of Agricultural Education, 55(2), 33-47.* doi: 105032/jae.2014.02033

Kantrovich, A. J. (2007). *A national study of the supply and demand for teachers in agricultural education from 2004-2006*. Morehead, KY: Morehead State University

Kitchel, T., & Torres, R. M. (2007). Possible factors in matching student teachers with cooperating teachers. *Journal of Agricultural Education, 48*(3), 13-24. doi: 10.5032/jae.2007.03013

Knobloch, N. A. (2001). The influence of peer teaching and early field experiences on teaching efficacy beliefs of preservice educators in agriculture. *Proceedings of the National Agricultural Education Research Conference, New Orleans, LA, 28,* 119-131. Retrieved from: http://www.academia.edu/32648987/

Knobloch, N. A. (2006). Exploring relationships of teachers' sense of efficacy in two student teaching programs. *Journal of Agricultural Education, 47*(2), 36-47. doi: 10.5032/jae.2006.02036

Krysher, S., Robinson, J. S., & Edwards M. C. (2015) How time allocation impacts teacher efficacy of student teaching interns in agricultural education: A Q-sort study. *Journal of Agricultural Education*, 56(2), 93-109. doi: 10.5032/jae.2015.02093

Lane, D. (n.d.). *Online statistics education: An interactive multimedia course of study.* Available from: http://onlinestatbook.com/

Langley, G. C., Martin, M., & Kitchel, T. (2014). Novice agriculture teachers' general self-efficacy and sense of community connectedness, *Journal of Agricultural Education 55*(4), 1–11. doi: 10.5032/jae.2014.04001

Lemons, L. L., Brashears, M. T., Burris, S., Meyers, C., & Price, M. A. (2015). Factors contributing to attrition as reported by leavers of secondary agriculture programs, *Journal of Agricultural Education*, *56*(4), 17–30. doi: 10.5032/jae.2015.04017

McKim, A.J., & Velez, J.J. (2015). Exploring the relationship between self-efficacy and career commitment among early career agriculture teachers. *Journal of Agricultural Education, 56(1),* 127-140. doi: 10.5032/jae.2015.01127

McKim, A.J., & Velez, J.J. (2016). An evaluation of self-efficacy theory in agricultural education. *Journal of Agricultural Education, 57*(1), 73-90. doi: 10.50.2/jae.2016.01073

McKim, A.J., & Velez, J.J. (2017). Developing self-efficacy: exploring preservice coursework, student teaching, and professional development experiences. *Journal of Agricultural Education, 58*(1), 172-185. doi: 10.5032/jae.2017.01172

Murray, K., Flowers, J., Croom, B., & Wilson, B. (2011). The agricultural teacher's struggle for balance between career and family. *Journal of Agricultural Education, 52*(2), 107-117. doi: 10.5032/jae.2011.02107

Myers, B. E., & Dyer, J. E. (2004). Agriculture teacher education programs: A synthesis of the literature. *Journal of Agricultural Education, 45*(3), 44-52. doi: 10.5032/jae.2004.03044

Paulsen, T.H., Smalley, S.W., & Retallick, M.S. (2016). Student teacher activities – are they relevant? The university supervisor's perspective. *Journal of Agricultural Education, 57*(3), 33-54. doi: 10.5032/jae.2016.03033

Pendergast, D., Garvis, S., & Keogh, J. (2011). Pre-service student-teacher self-efficacy beliefs: An insight into the making of teachers. *Australian Journal of Teacher Education, 36*(12) 46-58. doi: 10.14221/ajte.2011v36n12.6

Pfitzner-Eden, F. (2016). I feel less confident so I quit? Do true changes in teacher self-efficacy predict changes in preservice teachers' intention to quit their teaching degree. *Teaching and Teacher Education*, *55*(1), 240-254. doi:10.1016/j.tate.2016.01.018

Roberts, T. G., Greiman, B. C., Murphy, T. H., Ricketts, J. C., & Harlin, J. F. (2009). Changes in student teachers' intention to teach during student teaching. *Journal of Agricultural Education, 50*(4), 134-145. doi: 10.5032/jae.2009.04134

Roberts, T. G., Harlin, J. F., & Ricketts, J. C. (2006). A longitudinal examination of teaching efficacy of agricultural science student teachers. *Journal of Agricultural Education, 47*(2), 81-92. doi: 10.5032/jae.2006.02081

Roberts, T. G., Mowen, D. L., Edgar, D. W., Harlin, J. F., & Briers, G. E. (2007) Relationships between personality type and teaching efficacy of student teachers. *Journal of Agricultural Education*, *48*(2), 92-102. doi: 10.5032/jae.2007.02092

Robinson, J.S., Krysher, S., Haynes, J.C., & Edwards, M.C. (2010). How Oklahoma State University students spent their time student teaching in agricultural education: A Fall versus Spring semester comparison with implications for teacher education. *Journal of Agricultural Education, 51*(4). 142-153. doi: 10.5032/jae.2010.04142

Rocca, S.J., & Washburn, S. G. (2006). Comparison of teacher efficacy among traditionally and alternatively certified agriculture teachers. *Journal of Agricultural Education, 47*(3), 58-69. doi: 10.5032/jae.2006.03058

Ronfeldt, M., & Reininger, M., (2012). More or better student teaching?. *Teaching and Teacher Education 28*, 1091-1106. doi: 10.1016.j-tate.2012.06.003

Ross J.A. (1992). Teacher efficacy and the effects of coaching on student achievement. *Canadian Journal of Education, 17*(1), 51-65. doi: 10.2307/1495395

Smalley, S.W., Retallick, M.S., & Paulsen, T.H. (2015a). Cooperating teachers' perspectives of student teaching skills and activities. *Journal of Agricultural Education 56(*4). 123-137. doi: 10.5032/jae.2015.04123

Smalley, S.W., Retallick, M.S., & Paulsen, T.H. (2015b). Relevance of student teaching skills and activities from the perspective of the student teacher. *Journal of Agricultural Education, 56*(1), 73-91. doi: 10.5032/jae.2015.01073

Smith, K., & Rayfield, J. (2017). Student teaching changed me: a look at Kolb's learning style inventory scores before and after the student teaching experience. *Journal of Agricultural Education*, *58*(1), 102-117. https://doi.org/10.5032/jae.2017.01102

Sorensen, T. J., McKim, A. J., & Velez, J. J. (2016a). A national study of work-family balance and job satisfaction among agriculture teachers. *Journal of Agricultural Education*, *57*(4), 146-159. doi: 10.5032/jae.2016.04146

Sorensen, T. J., McKim, A. J., & Velez, J. J. (2016b). Why agriculture teachers leave : A national examination of turnover intentions and work-family conflict, *57*(4), 186–201. doi: 10.5032./jae.2016.04120

Stripling, C., & Roberts, T. (2012). Florida preservice agricultural education teachers' mathematics ability and efficacy. *Journal of Agricultural Education, 53*(1), 109-122. doi: 10.5032/jae.2012.01109

Stripling, C., Ricketts, J., Roberts, G., & Harlin, J. (2008). Preservice agricultural education teachers' sense of teaching self-efficacy. *Journal of Agricultural Education*, *49*(4), 120–130. doi: 10.5032/jae.2008.04120

Swan, B. G. (2005). *The relationship between the 2004 Ohio State University Agricultural Education student teachers' learning style, teacher heart, and teacher sense of efficacy. (Electronic Thesis or Dissertation).* Retrieved from https://etd.ohiolink.edu/

Swan, B. G., Wolf, K. J., & Cano, J. (2011). Changes in teacher self-efficacy from the student teaching experience through the third year of teaching. *Journal of Agricultural Education*, *52(*2), 128-139. doi: 10.5032/jae.2011.02128

Torres, R. M., & Ulmer, J. D. (2007). An investigation of time distribution of pre-service teachers while interning. *Journal of Agricultural Education*, *48*(2), 1-12. doi: 10.5032/jae.2007.02001

Tschannen-Moran, M., & Woolfolk Hoy, A (2001). Teacher efficacy: Capturing an elusive construct. *Teacher and Teacher Education 17*, 783-805. doi: 10.1016/S0742-081X(01)00036-1

Tschannen-Moran, M., Woolfolk Hoy, A., & Hoy, W.K. (1998). Teacher efficacy: Its meaning and measure. *Review of Educational Research*, *68*, 202-248. doi: 10.3102/00346543068002202

Walker, W., Garton, B., & Kitchel, T. (2004). Job satisfaction and retention of secondary agriculture teachers. *Journal of Agricultural Education*, *45*(2), 28-38. doi: 10.50.32/jae.2004.02028

Wentz, P. J. (2001). *The student teaching experience: Cases from the classroom* (2nd ed.). Upper Saddle River, NJ: Prentice-Hall.

Whittington, M. S., McConnell, E., & Knobloch, N. A. (2006). Teacher efficacy of novice teachers in agricultural education in Ohio at the end of the school year. *Journal of Agricultural Education*, *47*(4), 26-38. doi: 10.5032/jae.2006.04027

Wolf, K. J., & Foster, D. D., & Birkenholz, R. J. (2010). The relationship between teacher self-efficacy and the professional development experiences of agricultural education teacher candidates. *Journal of Agricultural Education*, *51*(4), 38-48. doi: 10.5032/jae.2010.04038

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Allocation of Time Among Preservice Teachers During Their Clinical Experience

I appreciate the scholarly effort of all who work to advance impactful agricultural and extension education. Congratulations on navigating the peer review process and sharing your hard work at our profession's national conference. I appreciate your efforts and look forward to seeing the future fruits of your labor. Please feel free to reach out directly to discuss the comments provided further.

Points of Excellence

- Excellent concept. Time management and use by all of our teachers is a pressing concern as we look to recruitment and retention of educators with factors of "burnout" and "lack of compensation" being cited.
- Well-developed theoretical foundations.
- Relevant and timely literature reviewed and connected to for the study.

Opportunities for Improvement

- Their might be opportunity to refine the objectives of the study to add clarity by reducing/combining objectives.
- Consider aligning documentation of hours categories with National Quality Program Standards.

Future Questions

- I wonder if a smart-phone based application (app) (for example: TopTracker) would present different findings from a word-based form submitted once a week? Perhaps if the candidate could do it from their phone and the researcher could view results in real time accuracy would increased with the validity threat of time estimates mitigated. ***Does use of technology/data collection system impact findings of time utilization by preservice candidates or in-service educators?***
    - Resource: Swendeman, D., Comulada, W. S., Ramanathan, N., Lazar, M., & Estrin, D. (2015). Reliability and Validity of Daily Self-Monitoring by Smartphone Application for Health-Related Quality-of-Life, Antiretroviral Adherence, Substance Use, and Sexual Behaviors Among People Living with HIV. *AIDS and Behavior*, *19*(2), 330–340. http://doi.org/10.1007/s10461-014-0923-8

- ***Would there be a difference in perceptions based on role?*** It might be interesting to see the perceptions of time utilization of a teacher candidate by the teacher candidate comparted to the cooperating teacher, students or university supervisor.

- ***Are there inherent social pressures/expected norms to report certain time investment?*** Would there be a difference between expected time utilization prior to internship, actual time usage reported, and expected time needed after an internship?

- ***Is there a relationship between quality of instruction and preparation by the candidate?*** While preparation time decreased in segment three, did this impact the quality of instruction? Or did the candidate simply develop the skills to be more proficient at preparing for instruction?

Global Exposure’s Effect on Intercultural Effectiveness Among Secondary Agricultural Education Youth

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Abstract

This study evaluated the impact varying amounts of global exposure and previous travel experiences have on secondary agriculture students’ intercultural effectiveness and global experiences through the Mere Exposure Theory. Using a descriptive correlational approach, the researchers surveyed 387 secondary agriculture students from 11 random schools in Kentucky to evaluate participant self-awareness, exploration, global mindset, relationship interest, positive regard, and emotional resilience. Findings revealed the majority of participants excelled in exploration and lacked in global mindsets. Furthermore, the majority of participants represented a homogeneous population, indicating agricultural educators should take action to increase their level of cultural competence and intercultural effectiveness and continue to incorporate cultural activities and conversations in their curriculum, which may aid in recruitment of diverse students to their program.

Introduction

An increasingly diverse population coupled with constant advances in technology results in the world growing smaller and smaller with each passing day. An enormous shift in the American population’s diversity is evidenced by each census. The U.S. Census Bureau (2012) projects that the U.S. may become a majority-minority nation for the first time in 2043. As the population makeup steadily continues to shift, so will the exposure to different cultures. One of the most impactful places of cultural exposure is within classrooms across the U.S. and this exposure plays a key role in developing global mindsets and awareness of a diverse array of cultures (VanderStel, 2014). For the first time in history, many schools are on the verge of becoming majority-minority schools where the overall number of Latino, African American, and Asian students in public K-12 classrooms surpassed the number of non-Hispanic whites. The success of these students is inseparably linked to the well-being of our nation (Maxwell, 2014). In addition to enrollment changes, educators must be mindful of a multitude of other challenges to students’ education, including an increase in students living in poverty, an increase in English as a Second Language (ESL) learners, and an increase in students with vast differences in life experiences from those of their teachers, who remain overwhelmingly white. According to the National Center for Educational Statistics (2013), in the 2011-12 academic year, 82 percent of 3.4 million public school teachers were non-Hispanic whites, while only seven percent were non-Hispanic and eight percent were Hispanic. Previously in the 2003-04 academic year data, 83 percent of all public-school teachers were non-Hispanic white- only a one percent difference within eight years (National Center for Education Statistics, 2013).

The shift is beginning to cause a disconnect between teacher and student cultures, extending into classroom instruction. Unfortunately, many of America's teachers lack professional competence in the areas of diversity, experience in multicultural classrooms, and cross-cultural experiences. As a result, these teachers are not providing students with an education that expands their worldviews and allows them to become more informed of other cultures and nationalities (Cushner, McClelland, & Stafford, 2000). Furthermore, most teacher education programs do not provide pre-service teachers with significant intercultural experiences. Pre-service teachers are relatively inexperienced about global affairs, leaving a gap in classroom curriculum (Cushner et al., 2000; Melnick & Zeichner, 1998). Regardless of their backgrounds, teachers will be called upon to teach individuals from very diverse backgrounds (Littleford & Nolan, 2013). This draws attention to a need to better educate our teachers in these areas in which research shows they are lacking important experience and knowledge. In the world of agricultural education, experience and knowledge is especially important, as agriculture is not just a local phenomenon; rather, it spans across centuries and impacts every country in the world. Though the need for better cultural education of teachers and students applies to all areas of education, this work focuses specifically on the impact global exposure and the experiences of students have at the secondary level within the agriculture classroom.

Need for the Study

A study by Lawrence, Rayfield, Moore, and Outley (2013) revealed that of the 7,487 FFA chapters in existence in 2010, the collective racial composition of the chapters did not accurately reflect the racial composition of the U.S. population. While the study did not consider the representation of individual school districts, the results showed a clear lack of diversity within these chapters. It is very concerning that the current demographics of FFA and agricultural education do not align with the demographics of public schools nationwide.

In another study by Lavergne, Larke, Elbert, and Jones (2011), researchers stated that "the members of FFA and other agricultural education programs along with graduates in agricultural education teacher education programs across the nation do not reflect the 'ethnic influx'" (p. 140). Agriculture teachers are remaining homogenous while the student population continues to become extremely diverse. As a result, those involved in agricultural education must begin a critical assessment of recruitment, engagement, and retention practices for ethnically diverse youth or risk losing agricultural education programs to student attrition (Bowen, 2002).

With these challenges in mind, one of the items listed on the 2011-2015 national research agenda for agricultural education contains a scientific focus to “examine the role of diversity and multiple perspectives in meaningful learning across agricultural education contexts” (Doerfert, 2011, p. 9). To begin this process, it is vital to first gain an idea of the level of cultural proficiency, or effectiveness, of both agricultural students and agricultural educators. Once the intercultural effectiveness of students is known, teachers can then work on ways to increase their global exposure both in and out of the classroom.

Theoretical Framework

This study was guided by the Mere Exposure Theory (Zajonc, 1968). According to Zajonc (1968), familiarity and exposure to other cultures impact the formation of one’s thoughts and ideas about individuals who are culturally different. The theory is shaped by two main ideas: 1) repeated exposure to a stimulus increases ones’ perceptual fluency (how easily one processes a stimulus) and 2) increased perceptual fluency increases positive affect, or the tendency for one to “like” something (Reber, Winkielman, & Schwarz, 1998).

Mere exposure theory is based on the phenomenon by which people tend to develop a preference for things merely because they are familiar with them and have been repeatedly exposed to them. This theory is often called the familiarity principle. In early research, the effects have been demonstrated with paintings, faces, characters, and sounds (Zajonc, 1968). This principle was demonstrated by a study conducted by Carlson and Widaman (1988), in which students who were repeatedly exposed to another culture showed higher levels of concern and interest in the areas of international political concern, cross-cultural interest, and cultural cosmopolitanism.

When testing mere exposure, Zajonc found a strong connection between “familiarity” and “liking.” This connection would later be known as the affective primacy hypothesis. This hypothesis states that affective reactions can be elicited with minimal stimulus input (Zajonc, 1980). In other words, the ability of someone to have an affective response to something (for example, liking something) requires very minimal stimuli. This was demonstrated in an experiment when subjects showed a positive bias or preference towards Chinese ideographs that they had been previously exposed to during the experiment. Additionally, the time that subjects spent making their decisions for liking an image, or not, decreased significantly on those images they had been exposed to previously (Kunst-Wilson & Zajonc, 1980).

While the theory of mere exposure is versatile and can be applied to multiple scenarios, it may hold the key to some of the world’s cultural hostility issues. When something or someone is familiar, people unconsciously perceive that person or object as being more likeable and friendly. Is it possible much of the cultural dissonance that exists today is simply due to the lack of familiarity of one culture with another?

When taking the idea of mere exposure into consideration, one can see the power that this theory holds within the classroom context. The idea of mere exposure may be able to help expand the worldviews of our students by exposing them to individuals who are different from them. Regarding to this study, the mere exposure theory is the underlying basis for the idea that cultural exposure can happen within the walls of the classroom and extend far beyond the lesson curriculum. Mere exposure within the context of this study seeks lasting impacts on each of the students and teachers who are exposed to its effects.

Purpose

The purpose of this descriptive correlational study is to examine the impact varying amounts of global exposure and previous travel experiences have on secondary agriculture students' Intercultural Effectiveness Survey (IES) performance. The guiding research questions for this quantitative study are as follows:

1) What international exposure have the participants encompassed?
2) What are the results of the student participants perceived Intercultural Effectiveness?
3) What is the relationship of students' Intercultural Effectiveness factors with one another?
4) What is the relationship of students' Intercultural Effectiveness by their own international exposure?

Methods

To determine if there is any correlation between a student's score on the Intercultural Effectiveness Survey and their amount of global experiences and exposure, this correlational study consisted of conducting a survey on secondary students in agricultural education in Kentucky. Prior to the collection data, the Office of Research Integrity approved the use of human subjects. During data collection, participants completed a paper survey consisting of the IES questions in a Likert scale format, demographics, international exposure questions, and questions related to their agricultural education classrooms.

Instrument

The instrument utilized during this study was adapted from the original Intercultural Effectiveness Scale (IES) created by the Kozai Group, Inc. (2015). The IES assessment survey evaluates competencies critical for effective interaction with people who are from cultures other than one's own based on their national culture, gender, generation, ethnic group, religious affiliation, etc. There are three main Intercultural Adaptability factors assessed by the survey: Continuous Learning, Interpersonal Engagement, and Hardiness. Each of these three are broken down into two additional dimensions for a total of six different constructs of assessment (Kozai Group, Inc., 2015). The following figure illustrates this breakdown of Intercultural Adaptability factors and their sub-sections. Table 1 further defines the six constructs (Mendenhall, Stevens, Bird, Oddou, & Osland, 2012).

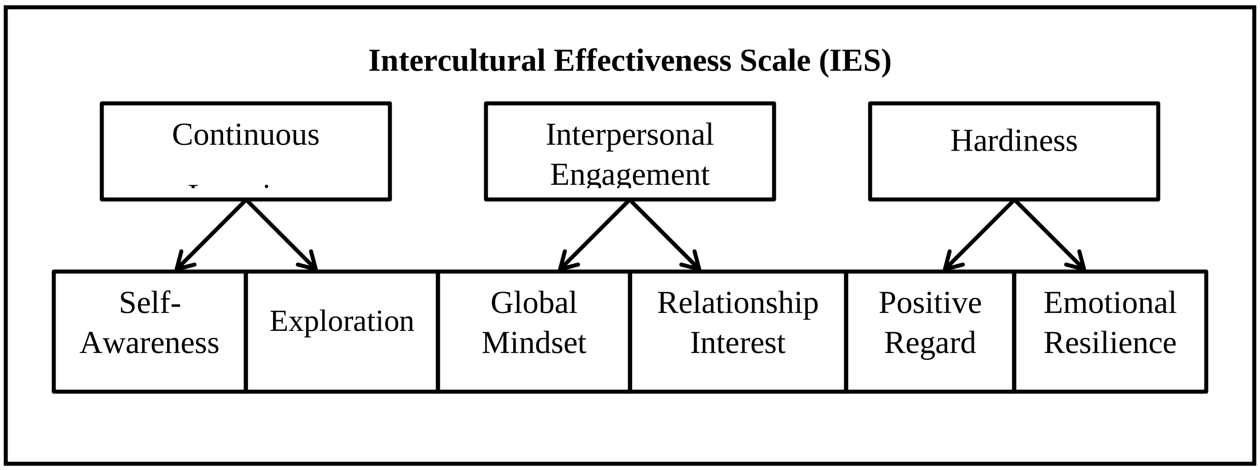

Figure 1

Intercultural Effectiveness Scale (Kozai Group, Inc., 2015)

Table 1

Defining Constructs in the Intercultural Effectiveness Scale (Mendenhall, et al., 2012)

Construct	**Defintion**
Self-Awareness	The degree to which people are aware of their strengths and weaknesses in interpersonal skills, philosophies and values, how past experiences have helped shape them into who they are as a person, and the impact personal values and behavior have on relationships with others
Exploration	An openness and active pursuit of the understanding of ideas, values, norms, situations, and behaviors that are new and different
Global Mindset	The degree to which one is interested in and seeks to actively learn about other cultures and the people that live in them
Relationship Interest	The degree to which people have a desire and willingness to initiate and maintain relationships with people from other cultures

Positive Regard	The predisposition to view other cultures from a positive perspective
Emotional Resilience	A person's emotional strength and ability to cope with challenging cross-cultural situations

In terms of reliability measures for this instrument, the Kozai Group published reliability measures for the six intercultural effectiveness survey constructs and reliability scores are: self-awareness (a = 0.76), exploration (a = 0.82, global mindset (a = 0.84), relationship interest (a = 0.80), positive regard (a = 0.79), and emotional resilience (a = 0.81) (Mendenhall, et al., 2012). The instrument included all original Intercultural Effectiveness Survey questions in their entirety. In addition, the PI added additional demographic questions, which were tailored for high school students as the original survey was created for adults ages 18 and up. The PI also added questions related to the student's agricultural education experiences. A panel of experts (n = 9) reviewed the questionnaire, as amended, for face and content validity. The panel consisted of college professors with international experience as well as future agriculture teachers. The panel provided feedback that resulted in minimal amendments to the questionnaire, but not, of which, affected the overall intent of the questions and questionnaire.

Population and Sample

To be considered for the study, each agricultural education program in Kentucky was considered for the overall population (N = 126). A variety of factors limited the overall population. Such limitations that led to the decrease in population were the presence of a teacher whose employment at the school was a minimum of four years. From the narrowed list, a random selection of 15 schools were selected and invited to participate. Due to scheduling conflicts or inability to gain administration permission for participation, 11 schools consented to participate.

From the selected agricultural education programs, a total of 401 students participated in the study. Due to missing answers or the inability to complete the survey, 14 surveys were omitted from the dataset; thus, a total 387 responses were analyzed in the study with the majority identifying themselves as White (f = 326, 84.24%) males (f = 226, 58.40%), and enrolled at sophomore status (f = 134, 34.63%). The largest number of students had taken only one year of agriculture courses (f = 181, 46.77%).

Data Analysis

Surveys were inputted manually into Google Forms and downloaded into a Microsoft Excel worksheet to allow for data analysis. Utilizing Google Forms allowed the researcher to see the breakdown of individual questions in a more user-friendly and readable format. Teacher surveys were removed from the student data to a separate spreadsheet for comparisons. Quantitative data from Likert scale and demographic questions were analyzed and correlations were derived using Pearson product-moment correlation and reported as an *r*. To provide a magnitude adjective to explain the correlations sought, Miller's (1994) descriptors were utilized. The descriptors, as provided by Miller, are: 0.0-0.1 "very small"; 0.1-0.3 "small"; 0.3-05 "medium"; 05.-07 "large"; 0.7-0.9 "very large"; 0.9-1.0 "nearly perfect".

Findings

Research question 1 sought to describe a variety of international exposures the students encompassed. When evaluating the languages spoken, many were English only (f = 350, 90.44%), followed by students who spoke two languages fluently (f = 33, 8.53%), students who spoke three languages fluently (f = 3, 0.78%), and students who could speak four languages, or more, fluently (f = 1, 0.26%). In terms of citizenship in another country, many of the participants were citizens of the U.S. only (f = 365, 94.32%). Most students surveyed had an agriculture teacher who had travelled outside of the U.S. (f = 271, 70.03%). Therefore, out of six teachers, five had travelled outside of the U.S. Table 2 displays data related to the various international experiences and exposure of the students recorded using the survey instrument. Many students reported having no family members from another country (f = 318, 82.17%). Many of the students reported having no friends from another country (f = 260, 67.18%). When asked about the student's family members' military service overseas, the majority had a family member (f = 227, 58.66%) in the armed forces who had served, or are serving, overseas. Most students reported never living in another country (f = 374, 96.64%). The overwhelming majority of students reported that they had never completed a high school study abroad trip (f = 386, 99.74%). Unfortunately, only one student (f = 1, 0.26%) had taken advantage of a high school study abroad experience. Similarly, a majority of students reported that they had never travelled outside of the U.S. (f = 284, 73.39%). The final category in table 2 below describes the number of trips that the participants have taken outside of the U.S. The majority of students had never been outside of the U.S. (f = 280, 72.35%), followed by students who had taken one trip outside of the U.S. (f = 48, 12.40%), students who had taken two trips outside of the U.S. (f = 29, 7.49%), students who had taken three trips outside of the U.S. (f = 12, 3.10%), students who had taken six or more trips outside of the U.S. (f = 10, 2.58%), students who had taken four trips outside of the U.S. (f = 6, 1.55%), and students who had taken five trips outside of the U.S. (f = 2, 0.52%). Ten students (2.58%) had travelled six or more trips outside of the U.S. (f = 10, 2.58%).

Table 2
Student Participant Demographics (*n* = 387)

Languages Spoken	***f***	**%**
One	350	90.44
Two	33	8.53
Three	3	0.78
Four or more	1	0.26
Citizenship in Other Country	***f***	**%**
None	365	94.32
One	22	5.68
Ag. Teacher has Travelled Outside the U.S.	***f***	**%**
Yes	271	70.03
No	116	29.97
Do You Have Family from Another Country?	***f***	**%**
Yes	69	17.83
No	318	82.17
Do You Have Friends from Another Country?		
Yes	127	32.82
No	260	67.18
Do You Have Family in the Armed Forces Who Have Travelled/Served Overseas?	*f*	%
Yes	227	58.66
No	160	41.34
Have You Lived in Another Country?	*f*	%
Yes	13	3.36
No	374	96.64
Participation in a High School Study Abroad Program?	*f*	%
Yes	1	0.26
No	386	99.74
Have You Ever Travelled Outside of the U.S.?	*f*	%
Yes	107	27.65
No	280	72.35
Number of Trips Outside of the U.S.	***f***	**%**
None	280	72.35
One	48	12.40
Two	29	7.49
Three	12	3.10
Four	6	1.55
Five	2	0.52
Six or More	10	2.58

Table 3 describes the Intercultural Effectiveness of the student participants (*n* = 387). The students provided responses regarding the six areas of Intercultural effectiveness including: Self-Awareness, Exploration, Global Mindset, Relationship Interest, Positive Regard, and Emotional

Resilience. Once this data was collected, the mean, standard deviation, and range of the data were determined. When looking at each construct from the Intercultural Effectiveness Survey (IES) the following mean, standard deviation, and range were found for: Self-Awareness (*m* = 3.82; *SD* = 0.08); Exploration (*m* = 3.95; *SD* = 0.46); Global Mindset (*m* = 2.22; *SD* = 0.71); Relationship Interest (*m* = 3.05; *SD* = 0.46); Positive Regard (*m* = 3.47; *SD* = 0.60); and Emotional Resilience (*m* = 3.32; *SD* = 0.51).

Table 3
Description of Student Intercultural Effectiveness (*n* = 387)

IES Construct	**Mean (*m*)**	**Standard Deviation (*SD*)**	**Range (Low – High)**
Exploration	3.95	0.46	2.60 – 5.00
Self-Awareness	3.82	0.08	2.33 – 5.00
Positive Regard	3.47	0.60	1.44 – 5.00
Emotional Resilience	3.32	0.51	1.67 – 5.00
Relationship Interest	3.05	0.46	1.00 – 4.63
Global Mindset	2.22	0.71	1.00 – 4.57

Research question three sought to determine whether a correlative relationship between the Intercultural Effectiveness Constructs exist. Self-Awareness has a large, positive relationship with Exploration (*r* = 0.575), a very small positive relationship with Global Mindset (*r* = 0.087), a small positive relationship with Relationship Interest (*r* = 0.179), and a very small positive relationship with Positive Regard (*r* = 0.095). Self-Awareness has a very small negative relationship (*r* = -0.044) with Emotional Resilience. Exploration has a large positive relationship with Self-Awareness (*r* = 0.575); a small positive relationship with Global Mindset (*r* = 0.178); a small positive relationship with Relationship Interest (*r* = 0.163) and Emotional Resilience (*r* = 0.109); and a very small positive relationship with Positive Regard (*r* = 0.079). Global Mindset has a very small positive relationship with Self Awareness (*r* = 0.087) and Positive Regard (*r* = 0.058); a small positive relationship with Exploration (*r* = 0.178) and Emotional Resilience (*r* = 0.135); and a medium positive relationship with Relationship Interest (*r* = 0.319). Relationship Interest has a very small positive relationship with Self-Awareness (*r* = 0.179), Exploration (*r* = 0.163) and Emotional Resilience (*r* = 0.173); a medium positive relationship with Global Mindset (*r* = 0.319); and a small positive relationship with Positive Regard (*r* = 0.225). Positive Regard has a very small positive relationship with Self-Awareness (*r* = 0.095), Exploration (*r* = 0.075) and Global Mindset (*r* = 0.058); and a small positive relationship with Relationship Interest (*r* = 0.225) and Emotional Resilience (*r* = 0.171). Emotional Resilience has a small positive relationship with Exploration (*r* = 0.109), Global Mindset (*r* = 0.134), Relationship Interest (*r* = 0.173) and Positive Regard (*r* = 0.171). Emotional Resilience has a very small negative relationship with Self-Awareness (*r* = -0.044). See Table 4.

Table 4
Relationship of Intercultural Effectiveness Constructs

	SA	EX	GM	RI	PR	ER
SA	-	0.575	0.087	0.179	0.095	-0.044
EX		-	0.178	0.163	0.079	0.109
GM			-	0.319	0.058	0.134
RI				-	0.225	0.173
PR					-	0.171
ER						-

Research question four sought to determine if a relationship existed among the various Intercultural Effectiveness Survey constructs (Self-Awareness, Exploration, Global Mindset, Relationship Interest, Positive Regard, and Emotional Resilience) and student characteristics (have/had citizenship in another country; high school agriculture teacher has travelled international; number of languages spoken; including having family from another country; having friends from another country; having family in the armed forces who have been overseas; having lived in another country; having participated in a school study abroad trip; travelled outside of the U.S.; and number of international experiences).

Table 5 explains Self-Awareness with a very small positive relationship with teacher travel (r = 0.036), student travel (r = 0.047), and citizenship (r = 0.032); however, Self-Awareness also has a very small negative relationship with having family from another country (r = -0.035), having friends from another country (r = -0.006), having family in the armed forces who have served overseas (r = -0.024), the number of languages spoken (r = -0.041), and having participated in a high school study abroad (r = -0.054). Self-Awareness has a small positive relationship with having lived in another country (r = -0.106). Exploration has a very small positive relationship with teacher travel (r = 0.024), having family from another country (r = 0.028), having family in the armed forces who have served overseas (r = 0.018), having lived in another country (r = 0.056), having participated in a high school study abroad (r = 0.016), citizenship (r = 0.075), and student travel (r = 0.068). Exploration has a small positive relationship with having friends from another country (r = 0.147). In addition, exploration has a very small negative relationship with the number of languages spoken (r = -0.029). Global Mindset has a very small positive relationship with having family from another country (r = 0.064), having friends from another country (r = 0.051), having family in the armed forces who have served overseas (r = 0.055), having lived in another country (r = 0.051), having participated in a high school study abroad (r = 0.056), and student travel (r = 0.019). The number of languages spoken (r = 0.199) and citizenship (r = 0.130) both have a small positive relationship. However, Global Mindset has a very small negative relationship with teacher travel (r = -0.051). Relationship Interest has a very small positive relationship with having family from another country (r = 0.010), having family in the armed forces who have served overseas (r = 0.035), and having participated in a high school study abroad (r = 0.036), the number of languages spoken (r = 0.038), and citizenship (r = 0.079). However, Relationship Interest has a small negative relationship with teacher travel (*r* = -0.166), and a very small negative relationship with having friends from another country (*r* = -0.020), having lived in another country (*r* = -0.062), and student travel (*r* = -0.093). Positive Regard has a very small positive relationship with having family from another country (*r* = 0.013), having friends from another country (*r* = 0.046), having family in the armed forces who have served overseas (*r* = 0.035), having lived in another country (*r* = 0.067), and having participated in a high school study abroad (*r* = 0.017). However, Positive Regard has a very small negative relationship with teacher travel (*r* = -0.080) and student travel (*r* = -0.028). Emotional Resilience has a very small positive relationship with having family from another country (*r* = 0.043), having friends from another country (*r* = 0.062), having family in the armed forces who have served overseas (*r* = 0.019), and having lived in another country (*r* = 0.35). Emotional Resilience also has a very small negative relationship with teacher travel (*r* = -0.077) and student travel (*r* = -0.022).

Table 5
Relationship of Intercultural Effectiveness Constructs to Student Characteristics

IES Construct	**Teacher Travel**	**Family from Other Country**	**Friends from Other Country**	**Family in Armed Forces**	**Lived in Another Country**	**High School Study Abroad**	**Student Travel**
SA	0.036	-0.035	-0.006	-0.024	-0.106	-0.054	0.047
EX	0.024	0.028	0.147	0.018	0.056	0.016	0.068
GM	-0.051	0.064	0.051	0.055	0.051	0.056	0.019
RI	-0.166	0.010	-0.020	0.035	-0.062	0.036	-0.093
PR	-0.080	0.013	0.046	0.035	0.067	0.017	-0.028
ER	-0.077	0.043	0.062	0.019	0.019	0.035	-0.022

Conclusion, Implications, and Limitations

After examining this data, it can be concluded that the majority of student participants represented a homogenous population. Therefore, it is important to look at ways to increase student exposure to cultural diversity within the classroom to allow students to increase their level of cultural competence and intercultural effectiveness. Teachers should also continue to incorporate cultural activities and conversations within their curriculum and recruit diverse students to their programs.

Of the six constructs tested by the Intercultural Effectiveness Scale survey, students reported highest on Exploration. In a study conducted by Kealey (1996), having an interest in Exploration was an important part of global competency. According to Kealey (1996), one’s willingness to learn and their intrigue regarding different cultures usually leads to a desire to get to know a country, its people, and its traditions. Furthermore, studies conducted by those in the education field suggest that overseas teaching experiences for pre-service teachers are vital to expanding their intercultural effectiveness, developing an appreciation for the places they visit, and critiquing their own culture in the process. This causes increased respect for diverse cultures and more tolerance and understanding of educational differences and barriers to education (Cushner & Mahon, 2002; Carlson & Widaman, 1988). Based on the findings from this study, as well as that of research similar in style, it is recommended that secondary agricultural educators find ways to include more cross-cultural examples within their classrooms and curriculum in addition to continuing to increase their own level of intercultural effectiveness. As the Exploration data indicates, students are more interested in learning about other cultures or individuals who are culturally and globally different from them. One approach to the recommendation includes teachers incorporating examples of agricultural practices from other countries around the world and then comparing them to practices found in the U.S. Teachers may also look to their local community for assistance in incorporating other cultures into their classrooms. One example of this could include a cultural lunch/dinner where students learn how to make a dish from another culture and must also present on the origins of this dish and agricultural practices used to grow the ingredients.

The second highest-scoring construct was Self Awareness. Jokinen (2005) stated that this competency was fundamental to one's ability to effectively work with people from other cultures. Similarly, Varner and Palmer (2005) argued that, "conscious cultural self-knowledge is a crucial variable in adapting to other cultures" (p. 1). Based on these findings, it is suggested that all teachers and students take an intercultural effectiveness survey to identify their strengths and weaknesses in intercultural communication and begin to work towards increasing their cultural competence in these six construct areas. High Self Awareness indicates that these secondary agriculture students would be more comfortable with who they are as individuals and also more adaptable to situations when they were exposed to other cultures. Students who perform higher in self-awareness appreciate classroom discussions about global policies and issues affecting agriculture. Because of the significance of this data in Self-Awareness teachers should encourage their students to discuss more controversial and analytical topics within the agricultural classroom. Topics such as animal rights/welfare, the ethics of cloning, and the perception of antibiotics in conventional farming methods may be examples of controversial issues to discuss.

Global Mindset was a low-scoring construct. In his research on international experiences in creating a teacher that is both culturally competent and internationally-minded, Cushner (2002) believed "humans, as social beings, learn best in situations when the complexity of social reality is encountered, examined, and understood" (p. 36). Furthermore, he discovered that the lived intercultural experience is the most beneficial type of experience in gaining a meaningful understanding of other cultures. In 2007, Cushner further found that lived experiences expanded cross-cultural knowledge and developed a global perspective. This data implies that students who are familiar with other countries or cultures (through having family, friends, or other connections) will also be more likely to keep up with what is going on in these countries or cultures. Therefore, to improve students' Global Mindset, it is suggested that teachers require students to complete assignments that include participation in cultural interactions. The most beneficial and logical suggestion for increasing one's Global Mindset scores is to have these students (and teachers) interact with people who are culturally different from them. This includes utilizing residents from the community (i.e. local restaurant and store owners for specialty foods), utilizing an educational trip that is centered on agriculture (i.e. a tour of the major agricultural regions of France to learn about their major products and exports), or utilizing other means of technology to infuse cultural experiences into the classroom curriculum (i.e. video conference calls, videos, documentaries, or social media).

In terms of the relationships between the students' Intercultural Effectiveness, as shown by Table 3, a positive relationship existed between Self-Awareness and Exploration; while students who scored high in Global Mindset positively scored high in Relationship Interest. Remember from the construct descriptions earlier that Relationship Interest refers to the degree to which people have a desire and willingness to initiate and maintain relationships with people from other cultures. People high on this dimension work hard to develop relationships with others (Mendenhall et al., 2012) and Black, Morrison, and Gregersen (1999) describe it as the ability to emotionally connect with others. Based upon the data, it can be concluded that when students are more aware of themselves, they are also more likely to be interested in learning about other people. Students who have an elevated Global Mindset are also more likely to be interested in forming and keeping relationships with those who are culturally different from them. Therefore, the recommendation for all students to take the IES survey is strengthened. This will allow them to identify their cultural strengths and weaknesses and allow them to find ways in which they can improve their abilities in those lower-scoring constructs.

Discussions and Limitations

In addition to increasing our students' Global Mindset scores, it may also be beneficial to increase our teachers' Global Mindset scores. Therefore, it is suggested to pre-service teachers to participate in a study or student teaching abroad experience to enhance their teaching skills, intercultural effectiveness, and ability to adapt to various situations within the classroom. Along these same lines, it is suggested to teacher educators to offer such experiences, or work with the international student affairs office to create or seek out such experiences for students within the Agricultural Education major. Lastly, as a suggestion to Kentucky FFA State Staff members, it would be beneficial to offer an intercultural effectiveness professional development opportunity for current agricultural educators in the state. This opportunity could take place at summer conference and include a variety of topics ranging from teaching diverse students, ways to increase diversity in a chapter, or how to incorporate culture into classroom curriculum.

There are several limitations in this study. Though the researcher sought to collect accurate data, results may still be somewhat skewed. In utilizing the IES survey, which was created for an adult demographic, some examples given in the survey may have been dated or contained language that was confusing for some high school students. For example, many students did not know the definition of words such as “interpersonal” and were not familiar with “BBC news.” These issues could have been avoided by piloting the survey with high school youth in addition to other adults. It is possible that students answered incorrectly or not at all due to confusing language or simply not understanding the statement/question. A second limitation to this study may be the length of the survey itself. It is possible that students may have started out answering the survey questions truthfully, but lost interest after the first page. It would be ideal to have an online survey or simply a shorter survey to keep students more engaged and attentive to the questions being asked.

Despite these limitations, the results of this study may help current agricultural educators to better understand the needs of their increasingly diverse student population, see where the average secondary student ranks in terms of intercultural awareness, and introduce the conversation of increasing intercultural effectiveness both in and out of the classroom. Furthermore, in the ever-shifting cultural climate of America’s schools, agricultural educators must take care to recruit and retain students from all races, ethnicities, genders, religions, and statuses. The very nature of education and the future of agriculture depend upon the diverse interactions that take place between those students and the lessons that are learned, not only through the content of each lesson, but also through interactions with other students. Students should first learn to respect agriculture as one of the oldest traditions that has allowed us all to be part of an established society, and at the same time, learn to respect others for their diverse contributions, perspectives, and opinions no matter how similar or different they may be.

References

Black, J.S., Morrison, A. & Gregersen, H.B. (1999). *Global explorers: The next generation of leaders*. New York, NY: Routledge.

Bowen, B. E. (2002). Advancing agricultural education within the context of an increasingly diverse society. *Journal of Agricultural Education*, *43*(1), 1-11. doi:10.5032/jae.2002.01001

Carlson, J. S., & Widaman, K. F. (1988). The effects of study abroad during college on attitudes toward other cultures. *International Journal of Intercultural Relations*, 1-17.

Cushner, K. (2007). "The Role of Experience in the Making of Internationally-Minded Teachers." *Teacher Education Quarterly, 31*(1), 27-38.

Cushner, K., & Mahon, J. (2002). Overseas Student Teaching: Affecting Personal, Professional, and Global Competencies in an Age of Globalization. *Journal of Studies in International Education*, *6*(1), 44-58.

Cushner, K., McClelland, A., & Safford, P. (2000). *Human diversity in education: An integrative approach* (3rd Ed). Boston, MA: McGraw-Hill.

Doerfert, D. L. (Ed.) (2011). National research agenda: American Association for Agricultural Education's research priority areas for 2011-2015. Lubbock, TX: Texas Tech University, Department of Agricultural Education and Communications.

Jokinen, T. (2005). Global leadership competencies: a review and discussion. *Journal of European Industrial Training*, *29*(3), 199-216.

Kealey, D. J. (1996). *Handbook of intercultural training. The challenge of international personnel selection*. Thousand Oaks, CA: Sage Publications, 81-105.

Kunst-Wilson, W. R., & Zajonc, R. B. (1980). Affective discrimination of stimuli that cannot be recognized. *Science*, *207*, 557-558.

Lavergne, D. D., Larke, Jr. A., Elbert, C. D., & Jones, W. A. (2011). The benefits and barriers toward diversity inclusion regarding agricultural science teachers in Texas secondary agricultural education programs. *The Journal of Agricultural Education*, *52*(2), 140–150. doi:10.5032/jae.2011.02140

Lawrence, S., Rayfield, J., Moore, L. L., & Outley, C. (2013). An analysis of FFA chapter demographics as compared to schools and communities. *Journal of Agricultural Education 54*(1), 207-219. doi: 10.5032/jae.2013.01207

Littleford, L., & Nolan, S. (2013, May). *Your sphere of influence: How to infuse cultural diversity into your psychology classes*. Retrieved Nov. 28, 2015, from http://www.apa.org/ed/precollege/ptn/2013/05/cultural-diversity.aspx

Maxwell, L. A. (2014). U.S. school enrollment hits majority-minority milestone." *Education Week 34*(1), 1,12,14-15.

Melnick, S. L., & Zeichner, K. M. (1998). Teacher educations responsibility to address diversity issues: Enhancing institutional capacity. *Theory Into Practice, 37*(2), 62-69.

Mendenhall, M. E., Stevens, M. J., Bird, A., Oddou, G. R., & Osland, J. (2012). *Specification of the content domain of the Intercultural Effectiveness Scale*. The Kozai Monograph Series. Chesterfield, MO.

Miller, L. E. (1994). Correlations: Description or inference?. *Journal of Agricultural Education 35*(1), 5-7. doi: 10.5032/jae.1994.01005

National Center for Education Statistics. U.S. Department of Education. (2013). *Number and percentage distribution of teachers in public and private elementary and secondary schools, by selected teacher characteristics: Selected years, 1987-88 through 2011-12*.

National FFA Organization. (2016). National FFA Organization, https://www.ffa.org

Reber, R., Winkielman., P., Schwarz, N. (1998). Effects of perceptual fluency on affective judgments. *Psychological Science, 9*(1), 45-48.

The Kozai Group, Inc. (2015). Intercultural Effectiveness Scale (IES). Retrieved December 19, 2016, from http://www.kozaigroup.com/intercultural-effectiveness-scale-ies/.

U.S. Census Bureau, U.S. Department of Commerce. (2012, December 12). *U.S. Census Bureau Projections Show a Slower Growing, Older, More Diverse Nation a Half Century from Now* [Press release]. *Newsroom Archive*. Retrieved July 7, 2016, from https://www.census.gov/newsroom/releases/archives/population/cb12-243.html

VanderStel, A. (2014). The Impact of Demographics in Education. Honors Projects. G. V. S. University. *329***,** 1-18. http://scholarworks.gvsu.edu/honorsprojects/329

Varner, I. I., & Palmer, T.M. (2005). Role of cultural self-knowledge in successful expatriation. *Singapore Management Review, 27*(1), 1-25.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9*(2), 1-27.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, *35*, 151-217.

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Global Exposure's Effect on Intercultural Effectiveness Among Secondary Agricultural Education Youth

I appreciate the scholarly effort of all who work to advance impactful agricultural and extension education. Congratulations on navigating the peer review process and sharing your hard work at our profession's national conference. I appreciate your efforts and look forward to seeing the future fruits of your labor. Please feel free to reach out directly to discuss the comments provided further.

Points of Excellence

- I would be remiss if I did not immediately share my fondness for your topical selection of global engagement, especially the focus on impact on intercultural effectiveness. Global engagement is specific tool to expand knowledge and increase multicultural competency; thus, increasing the possibility for inclusivity in our profession.
- I love your target population of secondary students. Just because a population may be difficult to reach, does not mean it is not worth reaching!
- I appreciate you using an externally created/validated instrument to collect data from a specialized population (agricultural education) that could be compared to other populations.

Opportunities for Improvement

- There might be opportunity to engage in the most recent National Research Agenda when evidencing the need for the study.
- A description of the educators for each program included might provide interesting insights.

Future Questions

- ***Does exposure to Global Learning opportunities other than traveling/studying abroad have any impact on student's intercultural effectiveness?*** While resource limitations might prevent many students from ever traveling, instructional interventions of global learning through curriculum/projects in our schools could be widely available. Additionally, instead of going to the world, what if the world came to you? Partnering with migrant communities, international scholars or using technologies to expose students to people not like themselves are readily available. While not as rich as immersion, it would be interesting to see what the difference is on a student's measurement of an IE scale comparing immersion to domestic global learning opportunities to neither immersion or instruction.
- ***What role/influence does the intercultural effectiveness of the agricultural educator play on that intercultural effectiveness of their students?*** While we might not be able to find resources to send all students abroad, would we receive an adequate return on investment by increasing the IE of educators who would interact with hundreds of students annually?

Evaluating Interdisciplinary Teaching: Curriculum for Agricultural Science Education

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Abstract

Interdisciplinary learning experiences (i.e., experiences which illuminate learning of, and connections among, multiple disciplines) are essential to building a more robust understanding of the interconnections of multiple systems. Having an interdisciplinary understanding positively influences the ability of learners to contribute to solving wicked problems (e.g., soil degradation, climate change), most of which fall within the realm of agriculture, food, and natural resources (AFNR). Therefore, within AFNR Education, preparing learners via interdisciplinary experiences could empower the next generation of problem solvers. The Curriculum for Agricultural Science Education (CASE) has emerged as a potential method for teaching AFNR and science in an interdisciplinary way. However, research has yet to evaluate the impact of CASE on teachers' intentions to teach science within curricula. In this study, intentions to teach science were compared between CASE-certified and non-CASE-certified educators via a national survey of 212 randomly sampled teachers, 81 of whom were CASE-certified. Within four of the eight courses evaluated, CASE-certified teachers intended to teach more science than non-CASE-certified teachers, while non-CASE-certified teachers intended to teach more science in the remaining four courses. Findings suggest opportunities to enhance the interdisciplinary structure of CASE curriculum and/or explore alternative models for facilitating interdisciplinary learning within AFNR Education.

Introduction

Comparing traditional education systems to the expectations of professionals and society members yields more discrepancies than similarities. In fact, upon completing formal education, very few individuals operate within distinct disciplinary (e.g., math, science, reading) silos (Berg, Hrabowski, Zerhouni, 2016). This calls into question traditional education systems which, evidence suggests, ardently support knowledge and skill building within these silos (Boix Mansilla, Miller, & Gardner, 2000; Stember, 1991). As an alternative to traditional approaches, a burgeoning trend is to break down disciplinary silos and offer educational experiences which illuminate how multiple disciplines converge when solving authentic problems or issues (Chettiparamb, 2007; Newell, 2007). As expected, there exists a myriad of methods for melding disciplines. To provide a reference for how disciplines can be combined, the authors created a *continuum of disciplinary melding* (see Table 1).

Table 1

Continuum of Disciplinary Melding

Terminology	Definition
Intradisciplinary	Work occurring within a discipline.
Crossdisciplinary	Analyzing work that occurs within a discipline from the perspective of a different discipline.
Multidisciplinary	Work to solve a problem or issue that requires the perspectives of multiple, distinct disciplines.
Interdisciplinary	Work to solve a problem or issue in which components of existing disciplines are integrated into a new discipline or solution.
Transdisciplinary	Work to solve a problem or issue transcending traditional disciplines.

Note. Continuum based on research by Boix Mansilla et al. (2000), Stember (1991), and Nikitina (2006).

As educators shift learning experiences from intradisciplinary into more multidisciplinary, interdisciplinary, and transdisciplinary spaces, students and society benefit. Among the most salient benefits is preparing students to understand, and operate within, complex systems (Chettiparamb, 2007; Newell, 2007). The ability to negotiate complex systems is an essential outcome of agriculture, food, and natural resources (AFNR) education (Culhane, Niewolny, Clark, McConnell, & Friedel, 2016). In fact, many do not view AFNR as distinct disciplines, but applied disciplines; most commonly AFNR as applied sciences (Dyer & Osborne, 1999; Thompson & Warnick, 2007). Although differences exist in how the connection between AFNR and science is framed, there exists agreement in the value of learning experiences which illuminate the relationship between AFNR and science (McKim, Velez, Lambert, & Balschweid, 2017). As an example, learning experiences which connect AFNR and science can empower students to identify, investigate, and implement solutions to agricultural practices which damage the environment (McKim, Velez, & Sorensen, 2017).

The importance of multidisciplinary, interdisciplinary, and transdisciplinary learning experiences in AFNR necessitates more research exploring educational models linking AFNR and science. One such model is the Curriculum for Agricultural Science Education (CASE), which combines professional development and curriculum with the intention of empowering school-based AFNR educators to offer both multidisciplinary and interdisciplinary AFNR and science learning experiences. A review of CASE curriculum suggests the use of both multidisciplinary and interdisciplinary teaching; however, to conserve space, the remainder of the manuscript will use the term “interdisciplinary.” Currently, a lack of research exploring the relationship between CASE and the science teaching intentions of AFNR educators limits understanding the efficacy of CASE with regard to the establishment of interdisciplinary learning opportunities. Therefore, the current analysis explores science teaching intentions, science knowledge, and CASE certification(s) among school-based AFNR educators.

Theoretical Framework

The *Model of Teacher Change* (MTC; Guskey, 2002) serves as the theoretical framework for the current study. The MTC suggests change in student learning outcomes, as opposed to professional development, is the direct precursor to meaningful change among teachers (see Figure 1). This perspective contrasts alternative models of teacher change, which suggest teacher change is a direct result of professional development. Within the MTC, professional development should encourage teachers to try out an intervention within their classroom instead of attempt to change teacher beliefs and attitudes (Guskey, 2002). Trying out an intervention allows teachers to observe student outcomes, which subsequently influences their beliefs and attitudes. Within the MTC, evaluating the impact of professional development requires exploring the relationship between a professional development and intentions to enact a specified classroom practice. In the current study, this relationship was operationalized by exploring perceived science knowledge, intentions to teach science (i.e., classroom practice), and teacher engagement in CASE (i.e., professional development).

The Model of Teacher Change

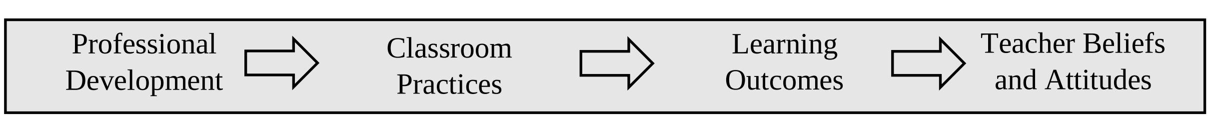

Figure 1. The *Model of Teacher Change* (Guskey, 2002).

Literature Review

CASE Curriculum

Established by the National Council for Agricultural Education, CASE provides curriculum and professional development emphasizing the interdisciplinary nature of AFNR and science (CASE, 2017b). At the point of data collection, CASE offered curriculum for eight courses (i.e., Introduction to Agriculture, Food, and Natural Resources; Principles of Agricultural Science – Animal; Principles of Agricultural Science – Plant; Agricultural Power and Technology; Natural Resources and Ecology; Animal and Plant Biotechnology; Food Science and Safety; and Agricultural Research and Development [CASE, 2017b]). The alignment of each CASE course to national AFNR Common Career and Technical Core Content Standards, Next Generation Science Standards, and Common Core High School Mathematics and Grades 9-10 English Language Arts Standards (CASE, 2017a), ensures various opportunities for students to establish connections between disciplines and enhance problem-solving skills.

To assist AFNR educators in the implementation of interdisciplinary curriculum, CASE requires 50-100 hours of professional development, after which course-specific certification is received (CASE, 2017b). The purpose of the professional development is to provide AFNR educators with a deep understanding of course format, pedagogy, and content as well as "confidence in teaching STEM-related concepts" (CASE, 2017b, p. 1). Improved STEM teaching confidence through CASE is supported in a study by Ulmer et al. (2013), which found an increase of AFNR educator science teaching self-efficacy after participation in the CASE institute. Additionally, AFNR educators in a study by Lambert, Velez, and Elliott (2014) indicated positive outcomes of the CASE curriculum in relation to perceptions of preparation, effectiveness, and efficiency. While existing research has identified positive outcomes associated with engagement in CASE, there is a lack of research exploring CASE certification(s) and science teaching intentions. Acknowledging this limitation, the current study sought to explore CASE certifications and intentions to teach science across CASE certifications and curriculum.

Perceived Science Knowledge

Essential to the effectiveness of interdisciplinary teaching is knowledge of multiple disciplines. The importance of the relationship between knowledge of multiple disciplines and interdisciplinary teaching is evident in various studies identifying high levels of perceived science knowledge as a positive predictor of science teaching intentions (Hamilton & Swortzel, 2007; Scales, Terry, & Torres, 2009; Wilson, Kirby, & Flowers, 2001). The emphasis on understanding course content during CASE professional development (CASE, 2017b) may provide an opportunity for AFNR educators to increase science knowledge perceptions; however, no prior research has studied the relationship between CASE certification and perceived science knowledge. Given the importance of science knowledge perceptions on the quality of interdisciplinary learning offered, the current study explored CASE certification(s) and perceived science knowledge.

Science Teaching Intentions

The illumination of science within AFNR curriculum is critical to the advancement of interdisciplinary education. Two studies were identified which address the degree AFNR educators intended to teach science within their curriculum. A study by McKim et al. (2017) identified AFNR educators intended to include science concepts and practices in over half the curriculum for pathways aligned to the life sciences while intentions fell below 20% in other pathways. Specific to the relationship between science teaching intentions and CASE, Carraway, Ulmer, Burris, and Irlbeck (2015) identified overwhelming intentions of preservice AFNR educators to teach science with CASE curriculum after completion of a semester-long CASE certification course. This study, however, did not address the amount of science pre-service educators intended to teach within the curriculum nor did it explore intentions to teach science across curricular offerings.

The current study sought to add to existing scholarship by exploring CASE certification(s), perceived science knowledge, and intentions to teach science across CASE certifications and AFNR curriculum. Acquisition of this knowledge will serve as a foundation in which to inform future research exploring the relationship between CASE certification(s) and interdisciplinary teaching, as well as inform practitioner decisions regarding the potential interdisciplinary value of CASE to their teaching and student learning.

Purpose and Objectives

The purpose of this study was to explore CASE certification(s), perceived science knowledge, and intentions to teach science among a national sample of AFNR educators. This study was guided by two objectives; (a) explore perceived science knowledge among AFNR educators with varying CASE certification(s), and (b) explore intentions to teach science among AFNR educators with varying levels of CASE certification.

Methods

The current exploration of perceived science knowledge and intentions to teach science among AFNR educators with varying levels of CASE certification(s) was completed using survey research and descriptive statistics. Selected methods afforded data collection from a large breadth of respondents to inform practice and research relating to science knowledge, science teaching intentions, and CASE certification(s).

Instrumentation

Data were collected as part of a larger research project modeling AFNR educator intentions to teach leadership, mathematics, and science. Two constructs and one demographic question were leveraged from the larger dataset. The first construct of interest was perceived science knowledge, which was adapted from Diamond, Maerten-Rivera, Rohrer, and Lee (2013). The perceived science knowledge construct included eleven items, corresponding with themes in the Next Generation Science Standards (e.g., Energy, Earth's Systems, Ecosystems Interactions). Respondents rated themselves either 1 *(Not Knowledgeable)*, 2 *(Somewhat Knowledgeable)*, 3 *(Knowledgeable)*, or 4 *(Very Knowledgeable)* for each of the eleven items. Responses on the eleven items were summated, with findings reporting the average perceived knowledge across the eleven items.

The second construct of interest was intentions to teach science, a researcher-created construct. Intentions to teach science were sought within different courses; therefore, identification of courses familiar to the teacher was required. To accomplish this, respondents identified courses they had taught, were teaching, or planned to teach. If courses met one of these criteria, they were deemed familiar enough to teachers, allowing respondents to report intentions to teach science based on familiarity with the curriculum. In total, the AFNR pathways (e.g., Animal Systems) and General Agriculture were included in the list. For familiar courses, respondents reported the percentage of curriculum in which science content/practices were intended. Responses were not summated across courses, as interest was in understanding science teaching intentions across different courses.

The demographic variable of interest was CASE certification(s). Respondents were asked to report their CASE certification(s) across the eight available CASE certifications (e.g., Principles of Agricultural Science – Animal; Agricultural Power and Technology) with an option to report no CASE certifications.

A panel of experts, including four faculty in AFNR Education, were used to evaluate face and content validity. Reliability was evaluated via a pilot test of the instrument among 31 preservice teachers at Oregon State University and Utah State Universtiy. The summated construct utilized in the current study (i.e., perceived science knowledge) met the threshold for reliability among the pilot population (Cronbach's Alpha = .85) as well as among respondents to the current study (Cronbach's Alpha = .88) via a *post hoc* analysis (Warmbrod, 2014).

Population, Sample, and Data Collection

The population of interest included all school-based AFNR educators during the 2015-2016 school year. The frame utilized was the National FFA Organization list of AFNR educators. Appropriate sample size was determined by requirements of structural equation modeling (Kline, 2005), used to accomplish objectives of the broader study. In total, a request was made for names and contact information of 950 school-based AFNR educators, randomly selected from the National FFA population frame. Due to frame error, the list of potential respondents was reduced to 828. Data were collected using Dillman's (2007) tailored design method in November through December 2015. A total of 212 respondents provided useable data (n = 212), resulting in a 25.60% useable response rate. A lack of alternative contact information (e.g., phone numbers) required non-response bias be analyzed by comparing on-time respondents (i.e., those responding within the first three points of contact; n = 168) to late respondents (i.e., those responding after the last two points of contact; n = 44) within the variables of interest, with no evidence of statistically significant differences, indicating non-response bias was not an issue in the current analysis (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983).

Data Analysis

The first research objective, exploring perceived science knowledge among AFNR educators with varying CASE certification(s), was analyzed by comparing descriptive statistics of perceived science knowledge for teachers reporting no CASE certifications as well as those reporting certifications within each of the eight areas of CASE certification. The second objective, exploring intentions to teach science among AFNR educators with varying levels of CASE certification, was initiated by identifying three levels of CASE certification. The three levels of CASE certification were (a) no CASE certification, (b) CASE-certified educator teaching a course outside their area of CASE certification, and (c) CASE-certified educator teaching a course within their area of CASE certification. Identifying the three levels required that researchers “link” CASE certifications to the list of courses/pathways in which respondents were asked to report science teaching intentions (see Table 2). Descriptive statistics corresponding to science teaching intentions for the three identified groups were reported across each CASE certification/pathway linkage. Importantly, inferential statistics were not used to compare groups due to small in-group sizes (e.g., 10 CASE Animal and Plant Biotechnology certified educators teaching within the Biotechnology Systems pathway).

Table 2

CASE Certifications Linked to Course(s)/Pathway(s)

CASE Certification	Linked Course(s)/Pathway(s)
Introduction to AFNR	General Agriculture
Principles of Agricultural Science - Plant	Plant Systems
Principles of Agricultural Science - Animal	Animal Systems
Agricultural Power and Technology	Power, Structure, and Technical Systems
Natural Resources and Ecology	Environmental Service Systems & Natural Resource Systems
Animal and Plant Biotechnology	Biotechnology Systems
Food Science and Safety	Food Products and Processing Systems

Note. The CASE certification area “Agricultural Research and Development” and the pathway “Agribusiness Systems” did not have a corresponding link.

Findings

Research objective one sought to compare the perceived science knowledge of AFNR educators by CASE certification (see Table 3). On average, AFNR educators perceived their science knowledge between “somewhat knowledgeable” and “knowledgeable.” Comparisons revealed highest perceived science knowledge amongst AFNR educators certified in the *CASE Natural Resources and Ecology* and *Agricultural Research and Development* courses. Teachers certified in the *CASE Animal and Plant Biotechnology* course perceived the lowest knowledge of science, just below AFNR educators with no CASE certification.

Table 3

Comparing Perceived Science Knowledge by CASE Certification

CASE Certification	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	127	2.77	0.48	1.64	4.00
Introduction to AFNR	40	2.80	0.52	1.64	4.00
Principles of Agricultural Science - Plant	36	2.85	0.47	2.00	3.73
Principles of Agricultural Science - Animal	34	2.82	0.47	2.00	3.73
Agricultural Power and Technology	23	2.83	0.41	2.00	3.55
Natural Resources and Ecology	23	2.93	0.42	2.00	3.64
Animal and Plant Biotechnology	19	2.74	0.51	2.00	3.64
Agricultural Research and Development	18	2.93	0.50	2.00	4.00
Food Science and Safety	17	2.91	0.42	2.00	3.55

Note. Frequencies represent the number of teachers with specified CASE certification. Perceived science knowledge was measured on a four-point scale from 1 *(No Knowledge)* to 4 *(Very Knowledgeable).*

The second objective was to compare intentions to teach science among AFNR educators by CASE certification. For comparisons between CASE and non-CASE courses, CASE certified courses were aligned to AFNR pathways. Findings are displayed in tables represented by these course/pathway alignments.

Within a General Agriculture course, educators certified in *CASE Introduction to AFNR* intended to teach more science (M = 45.95, SD = 17.98) than their peers (see Table 4). However, educators certified in a CASE area other than *Introduction to AFNR* intended to teach the least amount of science (M = 37.16, SD = 14.43) among the three groups.

Table 4

Science Teaching Intentions by CASE Certification: Introduction to AFNR

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	114	43.21	19.52	0.00	100.00
CASE Certified, Non-CASE Course	38	37.16	14.43	10.00	70.00
CASE Certified, CASE Course	37	45.95	17.98	15.00	75.00

Note. Introduction to AFNR was aligned with intentions to teach science in a General Agriculture course.

AFNR educators lacking CASE certification intended to teach the most science within the Plant Systems pathway, reporting nearly 60% of Plant Systems curriculum (*M* = 58.18, *SD* = 19.60*)* would include science content and/or practices (see Table 5). Teachers certified in *CASE Principles of Agricultural Science – Plant* intended to teach the least science (*M* = 54.33, *SD* = 21.20). However, all AFNR educators indicated intentions to teach science in over half of the Plant Systems pathway curriculum.

Table 5

Science Teaching Intentions by CASE Certification: Principles of Agricultural Science - Plant

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	111	58.18	19.60	15.00	100.00
CASE Certified, Non-CASE Course	33	56.21	21.87	15.00	100.00
CASE Certified, CASE Course	30	54.33	21.20	0.00	90.00

Note. Principles of Agricultural Science – Plant was aligned with intentions to teach science in the Plant Systems pathway.

Similar to AFNR educators in the Plant Science pathway, those teaching within the Animal Systems pathway intended to teach science in over half of their curriculum (see Table 6). Additionally, non-CASE certified AFNR educators intended to teach the most science in the pathway (*M* = 56.89, *SD* = 19.30), while educators certified in *CASE Principles of Agricultural Science – Animal* intended to teach the least (*M* = 53.52, *SD* = 17.80).

Table 6

Science Teaching Intentions by CASE Certification: Principles of Agricultural Science - Animal

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	113	56.89	19.30	10.00	100.00
CASE Certified, Non-CASE Course	39	53.85	19.55	15.00	90.00
CASE Certified, CASE Course	27	53.52	17.80	20.00	80.00

Note. Principles of Agricultural Science – Animal was aligned with intentions to teach science in the Animal Systems pathway.

Within the Power, Structure, and Technical Systems pathway, AFNR educators had similar intentions to teach science, with educators certified in *CASE Agricultural Power and Technology* (M = 30.53, SD = 18.02) reporting intentions to teach just 0.20% more science than non-CASE certified educators (M = 30.33, SD = 18.43). Whereas, lowest science teaching intentions were reported by educators certified in a CASE area other than *Agricultural Power and Technology* (M = 25.31, SD = 15.75).

Table 7

Science Teaching Intentions by CASE Certification: Agricultural Power and Technology

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	86	30.33	18.43	0.00	100.00
CASE Certified, Non-CASE Course	36	25.31	15.75	0.00	65.00
CASE Certified, CASE Course	19	30.53	18.02	0.00	65.00

Note. Agricultural Power and Technology was aligned with intentions to teach science in the Power, Structure, and Technical Systems pathway.

Within the Environmental Service Systems pathway, AFNR educators certified in *CASE Natural Resources and Ecology* intended to teach the most science (M = 55.00, SD = 18.95) (see Table 8). However, AFNR educators certified in a CASE area other than *Natural Resources and Ecology* reported the lowest intentions to teach science (M = 49.32, SD = 19.54).

Table 8

Science Teaching Intentions by CASE Certification: Natural Resources and Ecology

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	66	52.92	19.66	10.00	100.00
CASE Certified, Non-CASE Course	22	49.32	19.54	15.00	90.00
CASE Certified, CASE Course	12	55.00	18.95	25.00	90.00

Note. Natural Resources and Ecology was aligned with intentions to teach science in the Environmental Service Systems pathway.

In addition to the Environmental Service Systems pathway, *CASE Natural Resources and Ecology* was aligned to the Natural Resource Systems pathway (see Table 9). Within this pathway, science teaching intentions among AFNR educators were similar, with non-CASE certified AFNR educators (*M* = 52.23, *SD* = 21.33) intending to teach just 0.23% more science than teachers with the *CASE Natural Resources and Ecology* certification (*M* = 52.00, *SD* = 21.28).

Table 9

Science Teaching Intentions by CASE Certification: Natural Resources and Ecology

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	91	52.23	21.33	5.00	100.00
CASE Certified, Non-CASE Course	31	50.97	20.63	15.00	90.00
CASE Certified, CASE Course	15	52.00	21.28	20.00	90.00

Note. Natural Resources and Ecology was aligned with intentions to teach science in the Natural Resource Systems pathway.

Within the Biotechnology Systems pathway, science teaching intentions among non-CASE certified AFNR educators was highest (*M* = 58.15, *SD* = 21.26) (see Table 10). Non-CASE teachers intended to teach over 10% more science in their curriculum than peers certified in *CASE Animal and Plant Biotechnology* (*M* = 47.00, *SD* = 20.58), who intended to teach the least science.

Table 10

Science Teaching Intentions by CASE Certification: Animal and Plant Biotechnology

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	54	58.15	21.26	20.00	100.00
CASE Certified, Non-CASE Course	22	51.36	19.47	15.00	80.00
CASE Certified, CASE Course	10	47.00	20.58	20.00	75.00

Note. Animal and Plant Biotechnology was aligned with intentions to teach science in the Biotechnology Systems pathway.

Within the Food Products and Processing pathway, AFNR educators certified in *CASE Food Science and Safety* intended to teach the most science (*M* = 50.56, *SD* = 17.58) (see Table 11). However, educators CASE certified in an area other than *Food Science and Safety* reported the lowest science teaching intentions (*M* = 45.22, *SD* = 17.42).

Table 11

Science Teaching Intentions by CASE Certification: Food Science and Safety

	Frequency	Mean	Standard Deviation	Minimum	Maximum
No CASE Certification	63	49.17	20.09	10.00	100.00
CASE Certified, Non-CASE Course	23	45.22	17.42	15.00	75.00
CASE Certified, CASE Course	9	50.56	17.58	25.00	80.00

Note. Food Science and Safety was aligned with intentions to teach science in the Food Products and Processing pathway.

A comprehensive review of science teaching intentions across AFNR pathways revealed highest science teaching intentions among AFNR educators with no CASE certifications in four of the eight pathways (i.e., Plant Systems, Animal Systems, Natural Resource Systems, and Biotechnology Systems). Alternatively, highest science teaching intentions for the remaining four pathways (i.e., General Agriculture; Power, Structure, and Technical Systems; Environmental Service Systems; and Food Products and Processing), were identified among AFNR educators teaching CASE certified courses aligned to the respective pathway.

Conclusions, Implications, and Recommendations

In conjunction with the research objectives, findings lead to two main conclusions. First, CASE certified AFNR educators generally perceive slightly higher science knowledge than non-CASE certified educators. Second, the science teaching intentions of CASE certified educators were typically lower than their non-CASE certified counterparts. These conclusions are inconsistent with prior research that links higher perceived science knowledge with higher intentions to teach science (Hamilton & Swortzel, 2007; Scales et al., 2009; Wilson et al., 2001).

As a purpose of CASE is to provide AFNR educators with curriculum which illuminates science (CASE, 2017b), findings are counterintuitive and prompt an interesting discussion as to why CASE certified educators generally reported less intention to teach science than their non-CASE certified counterparts. One plausible explanation addresses the ability of CASE certified AFNR educators to perceive, more accurately, all that science is and entails. After completing a substantial professional development focused on inquiry-based education and course content (CASE, 2017b), CASE certified educators may be more cognizant of the various scientific content and skills which inform effective science instruction. With a heightened scope of scientific content and skills, CASE certified educators may have a more accurate determination of their science teaching intentions.

Though there was potential for CASE to influence perceived science knowledge and science teaching intentions, it is important to recognize the current study was not experimental in nature; thus, current data cannot document a causal relationship between CASE certification, perceived science knowledge, and intentions to teach science. The current analysis simply describes the perceptions and intentions of AFNR educators at the time of data collection, potentially documenting perceptions and intentions that were set prior to CASE engagement. Longitudinal research measuring the science teaching intentions of AFNR educators before and after CASE workshops would help unpack these variables. It is recommended future research measure the perceived science knowledge of educators and their intention to teach science pre- and post- CASE trainings to more accurately determine the effect, if any, of CASE professional development on the perceptions of AFNR educators. Additionally, scholarship on the interdisciplinary effects of CASE could be strengthened by an exploration of number of CASE certifications held by an AFNR educator and the length of time he or she has been certified in relation to science perceptions.

An additional limitation of this study is an incomplete evaluation of the beliefs and attitudes of AFNR educators as suggested by the MTC. The current study sought to explore the perceived science knowledge and science teaching intentions of AFNR educators with and without CASE certification, which is directly aligned to the first two steps (i.e., professional development and classroom practices) of teacher change (Guskey, 2002). Future research should measure student learning outcomes derived from changes in perceived science knowledge and science teaching intentions among AFNR educators with and without CASE certification to determine the more holistic effect of CASE certification(s) on the attitudes, beliefs, and actions of AFNR educators regarding interdisciplinary learning opportunities.

The impetus for the current study was to provide a valuable first step in understanding the relationship between CASE certification(s), perceived science knowledge, and science teaching intentions. Building on existing CASE research in AFNR Education (Carraway et al., 2015; Lambert et al., 2014; Ulmer et al., 2013), findings describe the intentions of AFNR educators, both CASE certified and non-CASE certified, to teach science across curricular offerings. Additionally, findings provide a foundation for exploring the effect, if any, of CASE certification(s) on the intentions of AFNR educators to teach science. While more work is needed, the knowledge acquired via the current study provides an opportunity to reflect upon the importance of interdisciplinary learning within AFNR Education and evaluate how approaches, like CASE, can serve to achieve interdisciplinary aims.

References

Berg, J., Hrabowski, F., & Zerhouni, E. (2016). Training the workforce for 21st-century science. *Journal of the American Medical Association, 316*(16), 1675-1676. doi:10.1001/jama.2016.12410

Boix Mansilla, V., Miller, W. C., & Gardner, H. (2000). On disciplinary lenses and interdisciplinary work. In S. Wineburg & P. Grossman (Eds.). *Interdisciplinary curriculum: Challenges of implementation.* New York, NY: Teachers College Press.

Chettiparamb, A. (2007). *Interdisciplinarity: A literature review.* Southampton: The Interdisciplinary Teaching and Learning Group, Subject Centre for Languages, Linguistics and Area Students.

Culhane, J. H., Niewolny, K., Clark, S., McConnell, K., & Friedel, C. (2016). Learning through collaborative and interdisciplinary teaching: A case study of faculty work as learning in sustainable agriculture education. *North American Colleges and Teachers of Agriculture, 60*(2), 219-226.

Carraway, C., Ulmer, J., Burris, S., Irlbeck, E. (2015). A case study of preservice teachers receiving Curriculum for Agricultural Science Education training in a semester course. *Proceedings of the Western AAAE Research Conference, 34,* Corvallis, OR. 84-98.

Curriculum for Agricultural Science Education. (2017a). *Curriculum Standards Alignment.* Retrieved from: www.case4learning.org/index.php/curriculum/curriculum-standards-alignment

Curriculum for Agricultural Science Education. (2017b). *Implementation Guide.* Retrieved from: http://www.case4learning.org/images/documents/2017Documents/Implementation_Guide_9-26-2017final.pdf

Diamond, B. S., Maerten-Rivera, J., & Rohrer, R. (2013). Elementary teachers' science content knowledge: Relationships among multiple measures. *Florida Journal of Educational Research, 51,* 1-20.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method* (2nd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Dyer, J. E., & Osborne, E. W. (1999). The influence of science applications in agriculture courses on attitudes of Illinois guidance counselors at model student-teaching centers. *Journal of Agricultural Education, 40*(4), 57-66. doi: 10.5032/jae.1999.04057

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching, 8*(3), 381-391. doi:10.1080/135406002100000512

Hamilton, R. L., & Swortzel, K. A. (2007). Assessing Mississippi AEST teachers' capacity for teaching science integrated process skills. *Journal of Southern Agricultural Education Research, 57*(1), 1-12.

Kline, R. B. (2005). *Principles and practices of structural equation modeling* (2nd ed.). New York, NY: The Guilford Press.

Lambert, M. D., Velez, J. J., & Elliott, K. M. (2014). What are the teachers' experiences when implementing the Curriculum for Agricultural Science Education? *Journal of Agricultural Education, 55*(4), 100-115. doi:10.5032/jae.2014.04100

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43-53. doi:10.5032/jae.2001.04043

McKim, A. J., Velez, J. J., Lambert, M. D., & Balschweid, M. A. (2017). A philosophical review of science and society within agricultural education. *Journal of Agricultural Education, 58*(2), 98-110. doi:10.5032/jae.2017.02098

McKim, A. J., Velez, J. J., Sorensen, T. J., (2016). Science integration: The role of the agriculture teacher. *Proceedings of the North Central Region Agricultural Education Research Conference, Lafayette, IN,* 1-8.

Miller, L. E., & Smith, K. L. (1983). Handling non-response issues. *Journal of Extension, 21*(5), 45-50.

Newell, W. H. (2007). Decision making in interdisciplinary studies, in G. Morcol (Ed.), *Handbook of decision making* (pp. 245-265). New York, NY: Marcel Dekker.

Nikitina, S. (2006). Three strategies for interdisciplinary teaching: Contextualizing, conceptualizing, and problem-centring. *Journal of Curriculum Studies*, *38*(3), 251-271. doi:10.1080/00220270500422632

Scales, J., Terry, R., & Torres, R. M. (2009). Are teachers ready to integrate science concepts into secondary agriculture programs? *Journal of Agricultural Education, 50*(2), 100-111. doi:10.5032/jae.2009.02100

Stember, M. (1991). Advancing the social sciences through the interdisciplinary enterprise. *The Social Science Journal*, *28*(1), 1-14. doi: 10.1016/0362-3319(91)90040-B

Thompson, G. W., & Warnick, B. K. (2007). Integrating science into agriculture education curriculum: Do science and agriculture teachers agree? *Journal of Agricultural Education*, *48*(3), 1–12. doi: 10.5032/jae.2007.03001

Ulmer, J. D., Velez, J. J., Lambert, M. D., Thompson, G. W., Burris, S., & Witt, P. A. (2013). Exploring science teaching efficacy of CASE curriculum teachers: A post-then-pre assessment. *Journal of Agricultural Education, 54*(4), 121-133. doi:10.5032/jae.2013.04121

Warmbrod, J. R. (2014). Reporting and interpreting scores derived from Likert-type scales. *Journal of Agricultural Education*, *55*(5), 30-47. doi:10.5032/jae.2014.05030

Wilson, E., Kirby, B., & Flowers, J. (2001). Agricultural educator's knowledge and perception of agricultural biotechnology curriculum. *Proceedings of the 28th Annual National Agricultural Education Research Conference*, New Orleans, LA. 409–421.

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Evaluating Interdisciplinary Teaching:
Curriculum for Agricultural Science Education

I appreciate the scholarly effort of all who work to advance impactful agricultural and extension education. Congratulations on navigating the peer review process and sharing your hard work at our profession's national conference. I appreciate your efforts and look forward to seeing the future fruits of your labor. Please feel free to reach out directly to discuss the comments provided further.

Points of Excellence

- I appreciate the clarity in depicting the theoretical foundation and the efficiency in presenting the review of related literature.
- Excellent presentation of findings/data.
- Thoughtful discussion on conclusions drawn regarding intentions to teach science between CASE and non-CASE certified instructors.

Opportunities for Improvement

- I have questions/concerns about viewing interdisciplinary purely view the lens of intention to teach science. Is agriculture not "a science"; thus, do we not all intend to teach science at all times? While methods indicate that his part of a larger project, using the title of interdisciplinary, than only presenting on intent to teach one discipline (i.e. science), seems misleading.
- There might be concerns about the validity of the frame indicated. Is it possible to be a secondary agriculture teacher and not be listed with the National FFA Organization?

Future Questions

- ***What is the intentions of agriculture teachers to teacher other disciplinary knowledge beyond science?*** When we speak to interdisciplinary teaching and integration, when we assess intentions to teach science, perhaps we can also ask intentions to teach English or intentions to teach math? Perhaps even an open-ended question to agriculture teacher to identify other disciplines of knowledge that they believe they are instructing.
- ***Beyond "intent to teach", what about exploring collaboration opportunities with colleagues in different disciplines?*** It would be fascinating to explore the curricular/programmatic engagement occurring between secondary school-based agricultural educators and other secondary teachers. Where is collaboration occurring? Do relationships/collaboration with instructors from other disciplines impact perceptions of intent to teach that content? What are the barriers to more collaborations? What are the impacts on student achievement when teachers from multiple disciplines collaborate to delivery interdisciplinary opportunities?

Literacy-Related Considerations of Secondary Agriculture Teachers

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Abstract

Literacy skills are important for success in life and in the classroom. This study sought to explore the process of literacy integration for agriculture teachers. Six high-literacy implementers were observed and interviewed. Four themes related to literacy considerations emerged. Those themes include 1) the importance of a teacher's professional growth and development 2) recognizing and pushing past profession norms related to literacy 3) how they plan literacy, and finally 4) how they use literacy in FFA and SAE settings. Recommendations for practice include offering professional development to support literacy across the three-circle model, equipping pre –service and beginning teachers with several adaptable literacy strategies and demonstrating how they can be used in several different classes. Research recommendations include exploring how the use of literacy strategies influences the development of pedagogical content knowledge and to study "typical" literacy integrators to determine if they have similar experiences.

Introduction and Literature Review

High quality literacy skills are needed to be successful in and out of the classroom (Castleton, 2002; Heller & Greenleaf, 2007; Moje, Young, Readence, & Moore, 2000; Pearson, 2013; Schmoker, 2011; Shanahan & Shanahan, 2008). Success in the classroom is linked to literacy skills, with reading activities often serving as the cornerstones of academic instruction (Schmoker, 2011). Outside of the classroom, literacy skills are needed to enter the job market. Reading and comprehending a job application is the first step in entering the workforce, while writing skills are needed to complete the application process (Tannock, 2001). Literacy skills lead to a better quality of life, by being somewhat correlational to income levels, associated with better health, avoidance of the criminal justice system, and increased social and civic engagement (Heller & Greenleaf, 2007; Shanahan & Shanahan, 2008). The world is changing and those changes emphasize the need for literacy skills. The information age allows people to access and publish more information than ever before (Gallagher, 2009; Moje et al., 2000; Peery, 2009). Citizens of the information age need literacy skills to fully function in modern society.

Reading, writing, speaking, and listening are the components of literacy (Coleman & Pimentel, 2012; Krajcik & Sutherland, 2010; Moje, 1996; Moje, 2008). While literacy is made up of four components, it serves a broader purpose. Literacy is how we make connections and develop a deeper understanding of the world around us (Heller & Greenleaf, 2007; Moje, 2008;

Moje et al., 2000; Pearson, 2013). At its heart, literacy allows us to communicate with each other and absorb meaning from the larger context.

Agriculture teachers have generally positive attitudes regarding literacy and its place in agricultural education (Hasselquist & Kitchel, 2016b), but it does not lead to higher literacy implementation rates (Hall, 2005; Hasselquist & Kitchel, 2016a; Park & Osborne, 2006b). The lack of adoption by middle and secondary teachers may be one explanation elementary students have improved their reading scores while high school scores have stagnated (Shanahan & Shanahan, 2008). All teachers must find a way to become teachers of literacy (Buehl, 2011; Coleman & Pimentel, 2012; Lesley, 2014; Moje et al., 2000; Pearson, 2013; Schmoker, 2011).

Pre-service agriculture teachers are very resistant to the idea of including literacy in their content area (O'Brien & Stewart, 1990). However, some type of attitudinal change must occur since a majority of agriculture teachers use literacy on a regular basis (Hasselquist & Kitchel, 2016b). Pre-service teachers receive training in pedagogy and technical content knowledge (Darling-Hammond & Bransford, 2005; Roberts & Kitchel, 2010). These courses are designed to develop the skills needed to be successful as classroom teachers. While content knowledge and pedagogical skills are important for teachers, the importance of receiving literacy training may be overlooked.

Specifically, Park and Osborne (2007) found only 39.2% of agriculture teachers had completed college coursework related to content area literacy. While the percentage has increased (Hasselquist & Kitchel, 2016b) it still means there is a portion of in-service agriculture teachers with no formal coursework in literacy skills. Individuals who have completed literacy-related coursework used more strategies when compared to non-completers (Park & Osborne, 2006a). However, it was determined coursework was not influential in how often literacy activities are used (Hasselquist & Kitchel, 2016a). Assessment of student literacy skills has been a concern for content area teachers in the past (Baker et al., 2008; Hand & Prain, 2002; Park & Osborne, 2005; Park & Osborne, 2006a). The lack of confidence is particularly problematic. If agriculture teachers are more confident in their abilities to assess student skills, specifically writing, they are more likely to use literacy assignments (Hasselquist & Kitchel, 2016a). It is not entirely known what causes agriculture teachers to move from literacy resistance to literacy integration.

Teachers grow and learn through a variety of experiences over the course of their careers (Darling-Hammond & Bransford, 2005; Eraut, 1994; Shulman & Shulman, 2004). Formal learning opportunities include professional development experiences and continuing education classes (Greiman, 2010), with most teacher growth occurring through on the job learning (Eraut, 1994). Teachers may not be able to articulate the full depth of their knowledge (Schon, 1983), but they understand what works in their classrooms (Shulman, 1987). When teachers enter the classroom, they rely heavily on the apprenticeship of observation to guide their practice (Eraut, 1994; Hammerness et al., 2005; Shulman, 1990).They reflect on how they were taught as students, and integrate those same teacher behaviors into their lessons. Eventually, they begin to focus on student-centered concerns, which helps them understand the complexities of teaching and leads them to seek out new information (Hammerness et al., 2005). Changing practice is challenging and support is beneficial (Eraut, 1994). Teachers may seek out a community of practice (Schon, 1983) and other supports to help them make the transition to become a teacher of literacy.

Literacy skills are fundamental for a positive academic and life experience (Schmoker, 2011; Shanahan & Shanahan, 2008). All content area teachers are now charged with developing literacy skills needed to be successful within their disciplines (Buehl, 2011; Moje, 2008; Pearson, 2013). Despite its importance, relatively little is known about literacy practices in agricultural classrooms. Furthermore, current literacy studies of agriculture teachers show some significant changes from previous research (Hasselquist & Kitchel, 2016b). One speculation for this divergence is the adoption of Common Core State Standards (CCSS) and its impact on agriculture teachers (Hasselquist & Kitchel, 2016b). Research must be undertaken to better understand the current climate of literacy and literacy integration in agricultural education.

Purpose & Research Question

The purpose of this study was to conceptualize how teacher beliefs and experiences related to literacy translates into classrooms practices. The central question that guided the study was: How do agriculture teachers become teachers of literacy?

This question addresses Research Area Five: Efficient and Effective Agricultural Education Program within the American Association for Agricultural Education’s National Research Agenda (Roberts, Harder, & Brashears, 2016). Effective agriculture programs help build literacy skills and support the broader school initiatives, including the development of student literacy skills.

Methods

The methods and data used for this study are an extension of a larger study exploring the process of literacy integration in agriculture classrooms. Very little is known regarding how agriculture teachers gain the confidence, knowledge, and skills needed to implement literacy in their classrooms. The grounded theory method was selected due to its appropriates in exploring an unidentified process (Corbin & Strauss, 2015; Creswell, 2013). Due to the nature of grounded theory, no theoretical framework was used. A thorough literature review was used to develop background knowledge related to the data and assist in the construction of a substantive theory (Corbin & Strauss, 2015). Due to the scope of the project and submission limitations, the findings are explored as themes and no substantive theory is presented.

The data were approached from a pragmatic lens. Corbin and Strauss (2015) contend the epistemological origins of grounded theory arise from interactionism and pragmatism, making this lens appropriate for the methodology. In qualitative research, the researcher serves as the instrument (Creswell, 2014). Therefore, it is important to disclose the researchers' positionality due to its influence on research (Creswell, 2013; Lincoln & Guba, 2000). The researcher's identity as a former agriculture teacher, participant in literacy-related professional development, and personal literacy experiences influence the way they view agricultural education and literacy.

Participants

This study focused on six high school agriculture teachers who had a minimum of five years teaching experiences. The five-year threshold was selected based on teacher growth and development literature. Between the fifth to eighth year of teaching is when teachers begin to develop expertise in the classroom (Darling-Hammond & Bransford, 2005). Experienced teachers were selected because of the likelihood they would feel comfortable enough with the content to incorporate more literacy skills in the classroom. Recommendations were obtained from agricultural education specialists in Missouri Department of Elementary and Secondary Education for teachers with a reputation of incorporating literacy into their lessons and effective classroom instruction.

An initial list of thirteen potential participants was obtained, with only four males identified. Special recruitment efforts were made targeting male participants. However, all males either declined or failed to respond to emails, calls, and text messages, limiting the study to only female participants. Special efforts should be made in future studies to include male participants. See Figure 1 for a chart that includes specific characteristics about each participant including: pseudonyms, years of experience, and other factors of note. Pseudonyms are used throughout the findings and discussion sections to protect the identity of the participants.

Pseudonym	Years of Experience	Factors of Note
Beth	11	Offered embedded English credit

Jane	13	CASE trained
Sue	7	CASE trained
		Taught core subject area
Lea	5	CASE trained
Amy	16	Offered embedded English credit
		Taught dual credit course
Stevie	9	Literacy Focused PLC member

Figure 1. Chart of Participant Characteristics

Data Sources

This study focused on classroom literacy behaviors, specifically why and how teachers incorporate literacy. To accomplish this, four sources of qualitative data were collected with each one giving new insight into the process. The primary source of data were interviews, with classroom observations, field notes, and artifact analysis informing and driving the interviews. Incorporating literacy skills to content area classrooms can difficult. The use of multiple data sources provided a variety of ways to view this process. Collecting data from a variety of sources in a short amount of time allows researchers to capture as much data as possible, leading to saturation, and helping with substantive theory generation (Creswell, 2013).

Validation Strategies

In qualitative research, the validity of the findings is important; it ensures the study's explanation and findings are credible to the larger community (Janesick, 2000). Throughout this study, the researchers engaged in a variety of general qualitative validations techniques highlighted by Creswell (2013, 2014). The use of four different data sources helped create a detailed picture of the central concept. Rich thick descriptions were used to explain the findings of this study and aided the reader in understanding how the theory was developed and added to the study's transferability (Creswell, 2013, 2014). Triangulation was achieved by using multiple data sources and it helped validate the study (Creswell, 2013, 2014). To confirm credibility of the findings and interpretations, member checks were used (Creswell, 2013, 2014). The researcher was reflexive by examining their own position within the data and how it might influence data collection and analysis (Creswell, 2013).

Additionally, grounded theory methodology has specific validation strategies used in this study (Corbin & Strauss, 2015; Creswell, 2013). Grounded theory studies a process; a research question regarding a process was investigated (Creswell, 2013). Open, axial, and selective coding was used to develop a theory related to the central concept of the study (Corbin & Strauss, 2015). Memoing was used extensively throughout the research process and was instrumental in identifying the central concept, establishing connections between categories, and the development of the theory (Corbin & Strauss, 2015; Creswell, 2013).

Findings

Four main themes emerged based on the information provided by the participants. The themes focused on considerations the participants kept in mind when working to integrate literacy into their high school classrooms. Integration was not instantaneous and the participants had a variety of factors to consider throughout the integration experience. They described a slow process, typically years in the making, where they developed the knowledge and confidence to begin any type of purposeful systemic literacy incorporation.

Teachers' Professional Growth and Career Maturation Concerning Literacy

All participants were reflective of how much they grew as professionals during their first few years of teaching, with several participants having identified time as a key factor in their growth and development. They discussed how each year became more enjoyable and a little easier. Beth said, "I always tell people you got to get to year three . . . year three is way better and year four is a whole new world." During this time, the participants described becoming comfortable with the content and confident in their teaching abilities. These two things were important for participants to begin *purposefully* including literacy for the benefit of students. When asked about adding literacy activities to classroom, Jane said, "just be confident in yourself as a teacher. Confidence comes with time." Beth focused on the importance of you knowing your content. "Once I started getting comfortable with the content is when I started being able to [make changes] . . . I've now been teaching so long, I now really can play with it," she shared. Time and experience in the classroom gave the participants the content knowledge and confidence needed to begin purposefully infusing more literacy into their classrooms.

Time in the classroom allowed teachers to mature in their careers, developing a strong content knowledge base and a library of lesson plans to draw from. This had a positive effect on the literacy integration process. Beth described it as:

> Once I hit a point where . . . I started thriving and enjoying what I was doing every day, and I could start playing around with [how to teach] the content instead of just trying to figure out how to get the content or even learn the content.

Only two participants purposefully used literacy activities in their first few years of teaching, for the sole purpose of compensating for gaps in their technical knowledge. However, as the participants got further into their careers, they were less concerned with developing lessons and more concerned with the process of teaching.

Sue discussed how it took her several years before she "became a real teacher." Meaning she was finally able to focus on more than just content. She described how during the first few years she "just presented material" because she was so focused on the content. Once her content knowledge was developed, she could begin to find ways to enhance the lessons and try new literacy activities to support the students. Amy added:

> After those first two years it's kind of leveled out, you can start thinking about what's important for you to get in. But, you know let's be honest, literacy is probably not going to be on the top priority list of surviving those first couple of years.

The participants described how early in their careers they relied heavily on PowerPoints, but have since moved towards more student-centered teaching styles. This was supported by field observations, none of the participants relied solely on a PowerPoint. Several used PowerPoints and supported their students through a variety of literacy focused activities such as think-pair-share, list making, and information scavenger hunts.

Participants viewed confidence as an important aspect of teacher resiliency needed during literacy integration. Jane said, “It’s a confidence thing. . . So [add literacy]. Fail. And that's great. And then learn how to do it better next time.” When Jane talked about her experiences, it was confidence in her ability as a teacher, which made trying new things easier because there was no pressure to be perfect and “know everything.” The participants were aware not everything they did would be successful on the first try, but it was important to keep trying especially when it benefitted the students. Amy and Lea also described increased confidence was important when trying new things. Lea, the youngest of the participants, noted how she had to have confidence in her abilities before reaching out to other teachers for help with literacy. “I had to gain a little confidence [in myself] before reaching out to people that know what they're doing and asking them for tips and help . . .,” she shared. The participants’ confidence helped give them the resiliency needed to try and integrate new literacy ideas into the classroom.

The participants’ growth as teachers, specifically shifting from teacher-centered to student-centered concerns, was crucial for literacy implementation. Time in the classroom allowed the participants to become aware of student needs. Stevie confessed, “As a beginning teacher, I didn’t pay attention to my students as individuals . . .” she went on to describe how she knew some students were struggling but did not realize she could help them until later in her career. During the early years of their careers, the participants described a growing awareness of students’ struggles with literacy. Amy said, “probably about three to four years into my career you really start to see, ‘gosh this is terrible.’” For Lea, her awareness came out of frustration. “There was a huge gap for me as far as what I expected from kids and what I got,” she said. This awareness was important for them to understand what the students need and how to reach them.

Implementing Curriculum for Agriscience Education (CASE) and other prescribed curriculums, into their agriculture programs and helping students adjust to the new material was also an important learning process for the participants. Using a text-dependent curriculum for the first time in their careers allowed participants to recognize the importance of literacy integration and how some of the student support was built in. Lea and Jane discussed how getting students to read the CASE materials was a challenge. Lea explained, “[the students] have to read their packets which has been probably one of my biggest struggles . . . we’re getting better at it.” Now, both Jane and Lea work to provide them with strategies and supports to help students work through a reading. During field observation, Lea asked her students to highlight any key terms and circle any vocabulary words they might not know, which was similar to a strategy Jane described using.

For Amy, her Agricultural Management course receives dual credit at a local community college. She noted the teachers were allowed some freedom in how the material was covered, there are also some prescribed activities which must be followed by everyone. During field observations, Amy used the technique of Cornell Notes, also called two-column notes. When asked why she selected this activity, she explained this was part of the curriculum and it was designed to help students process and summarize information better.

Pushing Past Profession Norms and Expectations

Of the six participants, only four were enrolled in a high school agriculture program. The participants who were students in high school agriculture programs described their experiences as very traditional in nature and did not remember literacy in the context of their high school agriculture classes. When asked about their student teaching experiences, all the participants felt they taught at very traditional programs concerning content and pedagogy. Stevie said, “it was very old school. Like ‘here’s the textbook copy these terms and definitions’ or ‘learn these 50 breeds of cattle.’” A similar story was shared by others.

Despite student teaching and being enrolled in traditional programs, the participants were all part of innovative and progressive programs. Field observations revealed all participants use a variety of literacy activities, such as student research presentations, creation of plant care brochures, and a case study role play, in their classrooms indicating a marked departure from their previous experiences. An important factor to note is all participants taught at least one traditional hands-on course, such as woodworking or a greenhouse management. Even in traditional hands-on classes, they still valued and engaged in literacy activities.

Within the field of Career and Technical Education (CTE), the participants felt there were lower academic expectations, including literacy incorporation. Sue was critical of the profession, “I know there's some Ag teachers that do not [use literacy], they don't do that kind of stuff, because it’s not traditional.” She described how this attitude hurts students because they were not developing the skills needed to be successful in life and how it negatively impacts the field of agricultural education. Lea, who taught several mechanics based classes, was reflective about the need for all CTE teachers to integrate literacy. She said, “we can't just pass the buck on [literacy] because we are CTE, which so many of us do . . .” They were frustrated because of how they perceived CTE teachers to ignore literacy and other academic concerns, which negatively affects the entire field.

Another concern the participants worked through was the perceived low expectations core academic area teachers have regarding CTE. Both Amy and Beth, who offer classes for embedded English credit, found the embedded credit has been a source of tension among other teachers in their buildings. Amy said, “our English department is pretty old school. They've got a couple of older teachers there that don't really appreciate that the kids could have their fourth English credit here.” Beth collaborates with her English department on a weekly basis, but that does not mean it has been easy. Both participants described having to continually prove to the other teachers their classes were meeting the necessary requirements, even after the curriculums had been approved by the English department, school board, and the Department of Elementary and Secondary Education. They also described differences in teaching philosophies and approaches could be problematic from time to time. Beth described placing a heavy emphasis on the content of students’ writing and would occasionally comment of grammatical issues, while some of her English teachers felt she should place more emphasis on grammar and less on content. This discussion and disagreement emerges several times a school year.

How Teachers Plan Literacy

When adding literacy into lesson plans, the participants consider multiple factors. Technical content was the top priority of all participants. Beth said, “the most important thing is getting the content across and interacting with the students so they get it and so then you have to use whatever you need to make it happen.” Sue explained, “I'm going to start with my objective or my tasks that I want them to know and then I need to come up with strategies that get them to the point.” Focusing on the content gave the teachers structure when considering what types of literacy activities and strategies maximize student learning.

In addition to the content being covered, the participants were purposeful in using a variety of instructional practices. Amy explained, “I have try to do different things. . . No two kids learn the same. So, I try to do a whole bunch of different stuff.” Several participants noted that variety was important for the teacher and the student. Beth pointed out, “using the same [activity] over and over and over again [is] why kids are getting bored. . . There needs to be some variation.” Jane considers her own needs when selecting activities for her students. She said:

> We had lecture for three days and two days of hands on stuff so I was ready to do something a little more [literacy based] with the students. . . You know. It's real easy to

> stand in front of the room and run the same PowerPoint I've had for the 13 years and do the same story and just talk at them.

By considering previous lessons types, the teachers could best identify the type of literacy activity to include for instructional variety.

The participants also stressed how literacy integration could not be obvious to students. They were forced to seek out subtle and pragmatic ways to include literacy. They often described “being sneaky” or “just slipping it in there” as the best way to prevent pushback and gain student buy in for literacy activities. Amy reflected, “[we]'ve got to be creative in the ways that we do it.” The participants noted some students immediately shut down when it comes to obvious literacy activities. Jane was quick to point out subtle literacy activities are important for those students. She said, “you kind of trick them. . . So sometimes you make it a game. It tricks them into reading.” Beth took the time to explain the importance of subtlety with some of her students. “What they don't realize is while they're having fun, they're learning [and using literacy] but if I told them that, they would shut down.” For some of her most challenging classes, she purposefully includes games and other activities that seem random to the students, but are designed to help build literacy skills.

Developing relationships and knowing students were critical parts of planning literacy. “I know what works for my kids because I have a relationship with them, so I understand how they are going to process information,” said Lea. She discussed how that knowledge influences what activities she selects. Jane and Amy discussed the importance of using a wide array of literacy activities with their students. Variety was important for reaching the widest range of students. All the participants discussed how each class of students has a unique set of needs, and adjustments to the literacy activities must be made to best fit the class. Amy described it as, “each class dynamic is different . . . I'll be like, ‘I think I can get away with that in this class, but definitely not this class.’ You just make adjustments.” Other participants who taught a class multiple times discussed how lessons and literacy activities must be changed to best fit the class’ dynamic. Field observations supported this type of reflective teaching. Amy and Jane taught the same lesson twice. Both made small changes to the lesson and literacy activities to better fit class dynamics and different student needs.

Students are a part of the classroom environment. Helping them adjust to literacy expectations was an important part of the process. All the participants encountered some form of student resistance towards literacy, which did not make integration easy. Sue said, “They fuss, they do not like to [read]. I mean there's some that just don't read. They'll wait and get the answers from somebody else.” Student resistance to reading and writing was a common challenge. Beth said, “you have some that really fight you on it . . . you can’t just ‘today we are going to read’ you have make it meaningful for them.” Or as Sue said, “you just trick them into doing it." The participants often discussed finding texts and strategies closely aligned with their content and students' interests. Jane described the importance of finding the right material for her students. "If you find the content they're interested in, they'll go hog wild on it," she said.

While students expressed hesitation and even resistance to literacy in the agriculture classroom, the participants believed it was important to be consistent with students and hold them to high standards especially when using literacy. Lea observed:

> I'd say embrace it. I think that you need to come in understanding that it's going to be a battle because kids don't like to write because writing is work. It takes some creativity and they have to exercise some muscles that they don't really care to use in their brain, but I think you gotta (sic) embrace the challenge.

Beth said, "you just gotta (sic) stick to your guns and make them do it. They stop fighting eventually." While Stevie said, "by the time they are juniors, they're trained pretty good. They just do [the literacy activity] without much complaint." The consistency piece was important for helping the students understand literacy activities are a part of the agriculture classroom.

Participants reported reflective thinking before and after using literacy activities. Besides considering what content they need to address and who their students are, the participants considered the previous time they used the activity and if any adjustments should be made. They also described the importance of reflecting on a recently completed lesson to determine if more literacy was needed. As Stevie pointed out, "sometimes you just miss a good opportunity." When Lea was asked about how she might make adjustments with a literacy activity, she shared, "[the adjustments will] probably be explaining a few things [students] had questions about up front. If they were really confused about a couple of different things and going through that with them." Clarity was a common adjustment made by participants, their ultimate goal was improving the learning experience for the students.

Sue described the importance of resiliency regarding literacy integration. "If it's something new that doesn't work, you just gotta (sic) rework it and try again," she said. If the participants felt the activity had the potential to make a difference for students, they were willing to invest the time and energy needed rework the activity. Or as Amy said, "sometimes it's trial and error." When literacy activities failed, it provided participants with an opportunity for quality reflection and growth. Stevie said, "no one likes to fail, but you learn so much when it happens." Beth thought it was important to view a failed activity from the student's perspective. She described the evolution of a literacy assignment from a formal essay to a comprehensive project made up of multiple components. It took several attempts to finally find the right balance, but "it was worth it."

Leveraging Literacy in FFA and SAE for Student Success

There were several ways the participants described using literacy to help enhance FFA activities and traditions. In the past, Sue's FFA chapter had participated in Food for America, an FFA program where high school students bring farm animals to a local elementary school to educate the students about food production. She recently changed from a petting zoo to a book based event. Sue shared, "we used to do Food for America . . . but the lessons weren't age appropriate. . . So now we pick a book to read [to the students] and then develop activities to go with it." She recognized how literacy activities can help enhance an FFA chapter's outreach.

Literacy skills are needed to complete FFA award applications and update SAE record books. All participants required students to keep SAE record books in the classroom and devoted time to their upkeep on a regular basis. Amy reflected on how it was so important to help younger students understand the terminology and how to fill one out correctly. "You have to be able to write to tell your story. You could have the best project in the world but that is not going anywhere if you can't write about it," she remarked. Amy discussed taking several days in class to help students understand how to read a record book prompt or application question and respond appropriately. Participants recognized the importance of helping students develop the literacy skills needed to complete FFA award applications and update SAE record books. Literacy knowledge and skills are needed to help students maximize the experience.

Discussion

Integrating literacy did not happen automatically for the participants, it took time and classroom experience. The first few years of teaching are challenging for many people, and the participants were no different. It is impossible to expect college preparation program to cover everything new teachers need (Darling-Hammond & Bransford, 2005), which caused some of the participants use literacy to compensate for personal knowledge gaps. Further investigation is warranted to help determine how often literacy activities are used to help compensate for a teacher's lack of content knowledge. It was should also be explored if the use of literacy activities helps to develop pedagogical content knowledge (PCK) for beginning teachers, or if the activities are used as a stop-gap with no long-term influence over practice.

The first few years of teaching are overwhelming, with the primary focus on surviving the classroom (Hammerness et al., 2005). As the participants moved from the "surviving to thriving" stage, they could consider making curriculum and content adjustments to best serve students' needs. As they moved out of the early career stage and into the experienced teacher stage, they had a better understanding of student learning, content, and pedagogy, which allowed them to reexamine their lessons (Hammerness et al., 2005). The familiarity with content is important to develop PCK, identify the best way to teach the material (which could potentially include literacy activities), and move away from the apprenticeship of observation (Eraut, 1994; Hammerness et al., 2005).

Time in the classroom provided participants with confidence in their own abilities and a deeper understanding of technical content (Darling-Hammond & Bransford, 2005). The teachers also described a growing awareness of students, student learning, and more student related concerns. The directional shift from teacher-centered to student-centered concerns (Hammerness et al., 2005) was important for literacy integration. Participants became aware of student struggles, which motivated them to find solutions. Increasing teacher confidence allowed participants to feel comfortable making changes and including more literacy. Growth in content knowledge was important because it freed up additional time, normally spent learning content, to construct new lessons and activities to support students. As they became comfortable and confident in their classrooms, it was much easier to integrate literacy (Hammerness et al., 2005). They were not worried about having a perfect lesson or activity, they just wanted to start exposing their students to literacy in a variety of ways. After the lesson, they would reflect and modify the activity for next time (Chambers Cantrell, David Burns, & Callaway, 2008; Santamaria et al., 2010). Future research should focus on how student-centered teaching approaches influence literacy integration. Is being prepared and comfortable with a student-driven learning environment part of the literacy integration process or does it have to precede it?

Time in the classroom enabled the participants to develop a comfort level with the content and pedagogy used (Shulman, 1987), which allows teachers to instinctively add activities to their lessons, some of which is literacy based. According to Schon (1983), viewing literacy as part of good teaching is a “knowing-in-action” behavior for the participants. Their experience in the classroom helped them create maxims surrounding literacy (Shulman, 1986). Since they consider it part of good teaching, does this mean literacy has some relationship to PCK or do they consider it a generally pedagogical strategy? In future PCK research, special attention should be paid to determine if and how literacy is part of pedagogical content knowledge. Additionally, a review of PCK literature would beneficial in determining if there is a connection between PCK and the use of literacy in the content area classroom.

Content was always a priority for teachers (Darling-Hammond & Bransford, 2005). Once they have decided what to teach, the decision to include literacy was based on the best way to teach the technical information. This is similar to associative mode of knowledge (Eraut, 1994), where they possess a practical knowledge of what their students need and sometimes seek creative solutions to fill it. Since pedagogical content knowledge (PCK) is identified as the best way to teach technical content (Darling-Hammond & Bransford, 2005; Roberts & Kitchel, 2010), it could be argued having a wide knowledge of literacy activities and strategies is an important component of developing PCK. The participants easily used content area literacy and disciplinary literacy strategies without recognizing it. It is important to note sometimes literacy activities were used as a vehicle to communicate the content, not to improve student literacy skills. A singular focus on content means missed opportunities to explain how literacy activities and skills are transferrable to life outside of the classroom. Without this generalization, students may struggle with technical texts after high school, since students often fail to generalize literacy skills and activities outside a specific classroom (Moje, 1996). Helping the teachers become aware of the different activities they use and how they can better help prepare students for life after school is important. Efforts should be made to make in-service teachers aware of the importance of helping students generalize and transfer literacy skills to experiences outside the agriculture classroom.

Several student factors informed participants' use of literacy activities. Knowledge of individual students and class dynamics played a role in the selection process. As teachers shifted from a teacher-centered to student-centered concerns (Hammerness et al., 2005), they used their knowledge of individual students and classroom dynamics to inform literacy integration. Adaptive expertise and reflection were important for teachers who taught multiple sections of the same class (Hammerness et al., 2005; Schon, 1983). Their adaptive expertise allowed them to maximize the lesson for each section (Hammerness et al., 2005). When making lesson adjustments, they considered multiple factors, similar to associative mode of knowledge (Eraut, 1994). They possess practical knowledge of what their students need and seek creative solutions to maximize student learning. Additionally, the participants' reflective thinking allowed them to modify activities and identify potential problem spots. Future consideration should be given to hosting professional development workshops on helping teachers become adaptive experts in their classrooms with specific literacy activities. One recommendation for practice is to equip pre-service and beginning teachers with several easily adaptable strategies and demonstrating how those activities can be used in a variety of settings. For example, being able to modify a graphic organized based on lesson content, knowledge of the organizer (intended purpose, etc.), and intended student learning outcomes.

Agricultural education is represented as a three-circle model, with the circles of classroom, FFA, and SAE intersecting and overlapping to maximize student learning (Phipps, Osborne, Dyer, & Ball, 2008). This was the first time teachers articulated how literacy appears in other areas of the model. FFA awards and SAE record books require unique writing skills and styles, making them a part of agricultural education's disciplinary literacy. Participants only discussed a few ways FFA and SAE are supported by literacy. Many agriculture teachers use a wide variety of embedded literacy activities across the three-circle model, but they fail to notice them. Professional development should be offered to help support literacy across the three-circle model

Finally, it important to note the participants in this study where considered to be high literacy implementers by their peers. It is possible their attitudes, beliefs, and practices are not representative of a "typical" agriculture teacher. Future research should be conducted with a larger participant pool to determine if this process is followed by other agriculture teachers. Despite targeted recruitment, the participants for this study were entirely female. In future studies, special attention should be paid to male teachers who integrate literacy to determine if their process is any different.

References

Baker, W. P., Barstack, R., Clark, D., Hull, E., Goodman, B., Kook, J., Shaw, J. (2008). Writing-to-learn in the inquiry-science classroom: Effective strategies from middle school science and writing teachers. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 81*(3), 105-108.

Buehl, D. (2011). *Developing readers in the academic disciplines*. Newark, DE: International Reading Association.

Castleton, G. (2002). Workplace literacy as a contested site of educational activity. *Journal of Adolescent & Adult Literacy, 45*(7), 556-566.

Chambers Cantrell, S., David Burns, L., & Callaway, P. (2008). Middle-and high-school content area teachers' perceptions about literacy teaching and learning. *Literacy Research and Instruction, 48*(1), 76-94. doi:10.1080/19388070802434899

Coleman, D., & Pimentel, S. (2012). Revised publishers' criteria for the Common Core State Standards in English language arts and literacy, grades 3–12. *Retrieved from the Common Core Standards Initiative at www. corestandards. org/assets/Publishers_Criteria_for_3-12. pdf.*

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (Fourth ed.). Los Angeles: Sage.

Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (Third ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2014). *Research design: qualitative, quantitative, and mixed methods approaches* (Fourth ed.). Thousand Oaks, CA: Sage.

Darling-Hammond, L., & Bransford, J. (2005). *Preparing teachers for a changing world*. San Francisco, CA: Jossey-Bass.

Eraut, M. (1994). *Developing professional knowledge and competence*. London: Falmer Press.

Gallagher, K. (2009). *Readicide: How schools are killing reading and what you can do about it* Portland, ME: Stenhouse Publishers.

Greiman, B. C. (2010). Continuing professional development. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.), *Preparing and Advancing tecahers in agricultural education* (pp. 181-200). Columbus, OH: Curriculum Materials Service The Ohio State University.

Hall, L. A. (2005). Teachers and content area reading: Attitudes, beliefs and change. *Teaching and Teacher Education, 21*(4), 403-414. doi:10.1016/j.tate.2005.01.009

Hammerness, K., Darling-Hammond, L., Bransford, J., Berliner, D., Cochran-Smith, M., McDonald, M., & Zeichner, K. (2005). How teachers learn and develop. In L. Darling-Hammond & J. Bransford (Eds.), *Preparing Teachers for a Changing World* (pp. 358-389). San Franciso, CA: Jossey-Bass.

Hand, B., & Prain, V. (2002). Teachers implementing writing-to-learn strategies in junior secondary science: A case study. *Science education*, *86*(6), 737-755.

Hasselquist, L., & Kitchel, T. (2016a). *Classroom literacy practices and factors of influence*. Paper presented at the North Central Region AAAE Research Conference, West Lafayette, IN.

Hasselquist, L., & Kitchel, T. (2016b). *Relationships among professional training factors, personal literacy preferences, professional literacy attitudes and current classroom practices of agriculture teachers*. Paper presented at the The National Research Conference of the American Association for Agricultural Education, Kansas City, MO.

Heller, R., & Greenleaf, C. L. (2007). Literacy instruction in the content areas: Getting to the core of middle and high school improvement. *Alliance for Excellent Education*.

Janesick, V. J. (2000). The choreography of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2 ed., pp. 379-400). Thousand Oaks, CA: Sage.

Krajcik, J. S., & Sutherland, L. M. (2010). Supporting students in developing literacy in science. *Science, 328*(5977), 456-459. doi:10.1126/science.1182593

Lesley, M. K. (2014). Policy, pedagogy, and research: Three issues affecting content area literacy courses for secondary-level teacher candidates. *Literacy Research and Instruction, 53*(1), 50-71. doi:10.1080/19388071.2013.826761

Lincoln, Y. S., & Guba, E. G. (2000). Paradimatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (Second ed., pp. 163-189). Thousand Oaks, CA: Sage.

Moje, E. B. (1996). “I teach students, not subjects”: Teacher-student relationships as contexts for secondary literacy. *Reading Research Quarterly, 31*(2), 172-195.

Moje, E. B. (2008). Foregrounding the disciplines in secondary literacy teaching and learning: A call for change. *Journal of Adolescent & Adult Literacy, 52*(2), 96-107.

Moje, E. B., Young, J. P., Readence, J. E., & Moore, D. W. (2000). Commentary: reinventing adolescent literacy for new times: perennial and millennial issues. *Journal of Adolescent & Adult Literacy, 43*(5), 400-410.

O'Brien, D. G., & Stewart, R. A. (1990). Preservice teachers' perspectives on why every teacher is not a teacher of reading: A qualitative analysis. *Journal of Literacy Research, 22*(2), 101-129.

O'Brien, D. G., Stewart, R. A., & Moje, E. B. (1995). Why content literacy is difficult to infuse into the secondary school: Complexities of curriculum, pedagogy, and school culture. *Reading Research Quarterly*, 442-463.

Park, T., & Osborne, E. (2007). Agricultural science teachers' attitudes about and use of reading in secondary agricultural science instruction. *Career and Technical Education Research, 32*(3), 161-186.

Park, T., & Osborne, E. (2005). Process and product variables for the study of reading in secondary agriscience. *Journal of Agricultural Education, 46*(3), 12. doi:10.5032/jae.2005.03012

Park, T., & Osborne, E. (2006a). Agriscience teahcers' attitudes toward implementation of content area reading strategies. *Journal of Agricultural Education, 47*(4), 39.

Park, T., & Osborne, E. (2006b). Content area reading strategies and textbook use in agricultural education. *Journal of Agricultural Education, 47*(4), 1. doi:10.5032/jae.2006.04001

Pearson, P. D. (2013). Research foundations for the Common Core State Standards in English language arts. *Quality Reading Instruction In the Age of Common Core State Standards*, 237-262.

Peery, A. (2009). *Writing matters in every classroom*. Englewood, CO: The Leadership and Learning Center.

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. L. (2008). *Handbook on agricultural education in publics schools* (6th Edition ed.). Clifton Park, NY: Delmar Cengage Learning.

Roberts, T.G., Harder, A., & Brashears. M.T. (Eds). (2016) *American Association for Agricultural Education national research agenda:2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication.

Roberts, T. G., & Kitchel, T. (2010). Designing professional knowledge curriculum and instruction. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.), *Preparing and advancing* *teachers in Agricultural Education* (pp. 101-111). Columbus, OH: Curriculum Materials Service The Ohio State University.

Santamaria, L. A., Park, T. D., Keene, B. L., van der Mandele, E. S., Taylor, M. K., & Richards, A. (2010). *Teacher feedback on reading strategy use in career and technical education*. Paper presented at the Proceedings of the Annual Meeting of the Association for Career and Technical Education Research, Las Vegas, NV.

Schmoker, M. (2011). *Focus: Elevating the essentials to radicially improve student learning*. Alexandria, VA: ASCD.

Schon, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books, Inc.

Shanahan, T., & Shanahan, C. (2008). Teaching disciplinary literacy to adolescents: Rethinking content-area literacy. *Harvard Educational Review, 78*(1), 40-59.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*(1), 1-23.

Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Shulman, L. (1987). The wisdom of practice: Managing complexity in medicine and teaching. In D. Berliner & B. Rosenshine (Eds.), *Talks to Teachers: A Festschrift* (pp. 369-387). New York: Random House.

Shulman, L. (1990). *Aristotle had it right: On knowledge and pedagogy*: Holmes Group.

Shulman, L., & Shulman, J. (2004). How and what teachers learn: A shifting perspective. *Journal of curriculum studies, 36*(2), 257-271.

Tannock, S. (2001). The literacies of youth workers and youth workplaces. *Journal of Adolescent & Adult Literacy, 45*(2), 140.

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Literacy-Related Considerations of Secondary Agriculture Teachers

I appreciate the scholarly effort of all who work to advance impactful agricultural and extension education. Congratulations on navigating the peer review process and sharing your hard work at our profession's national conference. I appreciate your efforts and look forward to seeing the future fruits of your labor. Please feel free to reach out directly to discuss the comments provided further.

Points of Excellence

- The review of literature was comprehensive and well organized.
- I appreciate the connection of literacy development to the total school-based agricultural education model.
- Excellent presentation of methods. I appreciate the transparency, specifically, regarding male participants.

Opportunities for Improvement

- While I understand the utilization of grounded theory, thus, no presentation of a theoretical framework, as a reader who is a visual learner, a visual presentation of a conceptual framework of what was being explored, variables, and possible relationships might have been helpful.

Future Questions

- ***What are perceptions of other stakeholders on the capacity of agriculture teachers to improve literacy?*** It would be fascinating to ask other area teachers, administrators, parents, students and even fellow agriscience teacher on their perceptions of the capacity of a school-based agricultural education to improve a student's literacy.
- ***What do we know about literacy in agricultural teacher education?*** It would be helpful to know who among of our small profession (less than 200) is delivering or engaging in literacy professional development. What level does it occur? How is it integrated? Are there best practices we can share and replicate?
- ***Is there a set of specific skills/competencies regarding literacy instruction?*** I am curious of how we can drill down to competency statements that as a profession we believe agriculture teacher need to possess. At that point, we could identify which should be obtained/evidenced at the pre-service level versus the in-service level.
- ***Could we identify specific "best practices" for literacy integration in our non-*traditional program spaces of youth organizations and work-based learning?** It would be fascinating to develop a list of interventions that could be replicated through FFA chapters and SAE programs across the nation.

Discussant – John Ricketts; Timekeeper – Chris Eck

Experiential Learning
The influence of agriscience research SAE on high school students' perceived self-efficacy of 21st century skill attainment *Brooke Thiel*
PCK and Experiential Learning: The Context for teaching and learning *Josh Stewart, Misty D. Lambert, Kellie Claflin*
Reflecting on Experience: The Impact of Reflection Following FFA Civic Engagement Activities *Dr. Will Bird, Dr. Amanda Bowling, Dr. Anna Ball*
A Phenomenology of Supervised Agricultural Experiences: The Shared Experiences of Prospective School-Based Agricultural Education Teachers *Dr. Ashley Whiddon, Dr. Jon W. Ramsey, Dr. Marshall A. Baker, Dr. Mary Jo Self*

The Influence of Agriscience Research SAEs on High School Students' Perceived Self-Efficacy of 21st Century Skill Attainment

Brooke L. Thiel, North Dakota State University
Adam A. Marx, North Dakota State University

Abstract

The purpose of this descriptive, exploratory study was to determine if there was an association between involvement in agriscience research SAEs and perceptions of 21st century skill attainment. Students enrolled at three purposely selected high schools were surveyed to assess their current level of perceived 21st century skills attainment. According to the findings of this study, students who were engaged in agriscience research SAEs expressed higher levels of perceived self-efficacy of 21st century skills attainment in the following 21st century skill constructs: (a) critical thinking and problem solving, (b) communication and collaboration, (c) information literacy, (d) flexibility and adaptability, (e) initiative and self-direction, (f) productivity and accountability, and (g) leadership and responsibility. Thus, it is recommended that involvement in agriscience research SAEs be expanded in school-based agricultural education programs.

Introduction

Supervised Agricultural Experience (SAE) is an integral part of a comprehensive, school-based agricultural education program (Camp, Clarke, & Fallon, 2000; Croom, & Lee, 2007; Dyer & Williams, 1997; Phipps, Osborne, Dyer, & Ball, 2008; Talbert, Vaughn, Cheek, Arrington, Carter, & Randell, 1994). Through the process of experiential learning, SAE allows for the transfer of planned skills to real-world, agriculturally related work experiences (Baker, Robinson, & Kolb, 2012; Camp et al., 2000; Cheek et al., 1994; Phipps et al., 2008; Talbert et al., 2007). Those real-world experiences can be in the form of ownership/entrepreneurship, placement/internship, agriscience research, school-based enterprise, and service-learning (National Council for Agricultural Education, 2017).

Alarmingly, SAE involvement within school-based agricultural education is declining nationwide (Dyer & Osborne, 1995; Retallick & Martin, 2008; Steele, 1997). In the early 1990's, over 85% of agricultural education students in Iowa conducted SAEs, while in 2005, that number dropped to only 56% (Retallick & Martin, 2008). More recently, only an average of 46% of students surveyed in Florida, Indiana, Missouri, and Utah reported conducting SAEs (Lewis, Rayfield, and Moore, 2012). Although participation is declining, agricultural educators across the country agree that SAE should remain an integral component of school-based agricultural education (Camp et al., 2000; Wilson & Moore, 2007). SAE involvement is positively related to student achievement in agriscience classes (Cheek et al., 1994) and it prepares students for jobs in agriculture, develops agricultural knowledge, and instills positive work ethics (Dyer & Williams, 1997). Without SAE as a part of a comprehensive, school-based agricultural education program, students may be limited in the skills they could potentially attain at the secondary level, especially career-related skills.

Review of Literature

When the Smith-Hughes Act of 1917 passed, it allowed for school-based agricultural education for people currently working or preparing to work on farms (Phipps et al., 2008). Included in the Smith-Hughes Act of 1917 was a requirement that all students participate in supervised practice on a farm for at least six months per year (Phipps et al., 2008). Initially, those experiences could be either entrepreneurship/ownership or placement (Phipps et al., 2008). Over the years, the term used to describe those work experiences changed numerous times until the contemporary term of Supervised Agricultural Experience was settled upon. With this history in mind, placement and entrepreneurship/ownership SAEs are referred to as “traditional” types of SAEs. Today, additional SAE areas include: (a) agriscience research, (b) school-based enterprise, and (c) service-learning (National Council for Agricultural Education, 2017).

In 1920, 48.6% of Americans lived in rural areas (Department of Commerce, 1922). Over the years, the number of American’s living on farms has decreased (US Department of Commerce, 2016). Phipps et al. (2008), previously stated that 73% of students enrolled in agricultural education did not live on farms which may decrease opportunities for production agriculture SAEs and on-farm placements due to a lack of agriculturally-related resources. Retallick (2010) identified two factors that limit SAE involvement: (a) changing demographics and (b) a lack of resources available to teachers and students. Traditional SAE implementation is limited by students’ diverse academic backgrounds and personal experiences and the lack of physical and financial resources of previous generations (Retallick, 2010). Addressing these challenges require creativity from both the teacher and students as they view SAE through the lens of the 21st century (Retallick, 2010).

Perhaps one way to overcome the challenge of limited opportunities for SAE involvement can be through greater utilization of nontraditional SAE areas such as agriscience research (Retallick, 2010). Agriscience research is one of the nontraditional SAEs well-suited for integration into programs which may lack the agriculturally-based community resources necessary for traditional entrepreneurship and placement SAEs. Furthermore, the utilization of agriscience research SAEs may be one way the SAE program can continue to find relevance and value with current agricultural education students.

Foundationally, SAEs expose students to careers, allow them to develop specific industry-related skills, and provide students with a simulated work environment in which they can apply their academic and occupational skills (National Council for Agricultural Education, 2015). After agribusiness and management, agricultural careers in science, technology, engineering, and mathematics (STEM) are the second most in-demand career areas (Goecker, Smith, Fernandez, Ali, & Theller, 2015). Agricultural careers in STEM account for 27% of annual job openings in agriculture (Goecker et al., 2015). Presumably, the skills students develop through involvement in agriscience research SAEs would be transferable to the skills necessary for success in those careers.

Specifically, there is a need for researchers to identify what skills are required of students who wish to pursue STEM careers in agriculture. Many educators, administrators, and policy makers believe that American education needs to make a shift towards utilizing 21st century skills as educational outcomes (Trilling & Fadel, 2009). The Partnership for 21st Century Skills (2015) summarized the following skills as 21st century skills: creativity and innovation, critical thinking and problem solving, communication and collaboration, information literacy, media literacy, information and communications technology literacy, flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility.

The need for 21st century skill development is supported by empirical research which suggest that those skills better prepare students for 21st century careers (Casner-Lotto, Barrington, & Wright, 2006; Rateau, Kaufman, & Cletzer, 2015). It is possible that 21st century skills can be developed in a number of different ways including through inquiry-based teaching, experiential learning activities, and involvement in FFA. Research indicates that inquiry-based teaching leads to the development of 21st century skills including critical thinking (Haury, 1993; Mabie & Baker, 1996; Thoron & Myers, 2012; Wells, Matthews, Caudle, Lunceford, Clement, & Anderson, 2015), communication (Haury, 1993), and improved scientific literacy (Haury, 1993). Inquiry-based instructional methods closely align with the methods used in experimental agriscience research SAEs (Wells et al., 2015). Mabie and Baker (1996) identified that experiential learning activities, which would include agriscience research SAEs, improved students' ability to observe, communicate, compare, relate, order, and infer; all of which are essential components of inquiry. Many of the skills students develop through Career and Technical Student Organizations (CTSOs) align with 21st century skills. The Carl D. Perkins Act of 2006 outlines eight purposes of CTSOs, such as FFA, that are supported by research in agricultural education, including (a) develop leadership skills (Rosch, Simonsen, & Velez, 2015; Townsend & Carter, 1983); (b) cultivate personal growth; (c) explore careers (Lundry, Ramsey, Edwards, & Robinson, 2015); (d) improve home and family; (e) develop citizenship and patriotism (Townsend & Carter, 1983); (f) improve scholarship and vocational preparation (Sapp & Thoron, 2014); (g) improve school and community; (h) develop respect for dignity and work (Lundry et al., 2015); (i) develop high ethical and moral standards; (j) participate in cooperative efforts (Lundry et al., 2015; Townsend & Carter, 1983); (k) develop creativity (Lundry et al., 2015); and (l) develop social skills (Carl D. Perkins Act, 2006). Thus, if 21st century skills are developed through involvement in FFA, inquiry-based teaching, and experiential learning activities, perhaps those same skills could also be attained through another component of a comprehensive, school-based agricultural education program: agriscience research SAE.

The purpose of school-based agricultural education is to prepare students for careers in agriculture (National Council for Agricultural Education, 2012). In order to prepare students for 21st century careers, focus needs to also be directed at promoting the development of 21st century skills. Thus, there is a need to conduct research which identifies specific activities within a comprehensive, school-based agricultural education program that may enhance the development of 21st century skills.

Framework

This study was grounded in Kolb's Experiential Learning Theory, a four-stage continuous cycle that includes (a) concrete experience, (b) reflective observation, (c) abstract conceptualization, and (d) active experimentation (Kolb, 1984).

Experiential learning is a primary theoretical foundation of agricultural education (Cheek et al., 1994; Knobloch, 2003; Roberts, 2006; Stewart & Birkenholz, 1991). Because experiential learning is conceptually based on experiences, it is most commonly associated with SAEs in agricultural education (Cheek et al., 1994; Knobloch, 2003; Roberts, 2006). Experiential learning involves a direct learning event or experience, which requires active engagement in that learning event by the student (Clark, Threeton, & Ewing, 2010). However, Clark et al. (2010) believes that experiential learning, as it is currently being used within agricultural education, is not truly experiential learning. While utilizing experiential learning experiences, agricultural educators rarely provide opportunities for active experimentation or internal reflection (Osborne, 1994). In a study by Shoulders and Myers (2013), the most commonly omitted stage of experiential learning was active experimentation. The statement "learning by doing" is commonly utilized within agricultural education (Phipps et al., 2008), however, that practice only uses part of the experiential learning theory as it places the entire focus on concrete experiences, rather than on the holistic process of experiential learning, which should also include reflection and active experimentation (Clark et al., 2010). Experiential learning needs to be more than just involvement in the experience (Roberts, 2006). As applied to this study, this theory holds that if a secondary student were to participate in an agriscience research SAE, which requires a student to go through the four cycles of Kolb's Experiential Learning Theory, then they may develop 21st century skills. This is plausible, because prior research establishes that students create knowledge via experiential learning through Kolb's Experiential Learning Theory (Baker et al., 2012).

Within the model of Kolb's Experiential Learning Theory, the basis of this study is built on the assumption that students participating in agriscience research would attain 21st century skills through their SAE, a form of supervised experiential learning. Within the context of a student's agriscience research SAE, first, a student would identify a problem and develop a hypothesis. As they test their hypothesis, the actual experiment manifests as the concrete experience. Because students are typically working on their own when conducting agriscience research SAEs, the 21st century skills of accountability, productivity, initiative, and self-direction are expressed through active experimentation. Within active experimentation, students build on prior knowledge and connect their learning to their personal interests, which requires creativity, innovation, and critical thinking. Next, the student would evaluate their results, which involves them in the reflective observation stage. While reflecting, they will confirm or deny their hypothesis, evaluate sources of error, and identify discrepancies and patterns in their data. Within reflective observation, a student must use critical thinking and problem-solving skills to reflect upon their experiment and experience. Movement into the abstract conceptualization stage would be evident as the student makes conclusions based upon their data. As students go through abstract conceptualization and they revise their ideas, they may practice technology literacy as they seek information related to their research. Revision of their idea or the creation of new ideas from their results allows them to practice creative thinking and innovation. Changing one's ideas may require the student to be adaptable and flexible. Finally, as they apply their results and conclusions to real-world applications, the student would move into the active experimentation stage. Communication skills are developed as they share their findings and applications. They may also express leadership and responsibly as they apply what they have discovered to the world around them. In the case that the student starts to reinterpret their experience and develop their thoughts into new research ideas, they would move back into the concrete experience stage and begin the cycle again. Movement back into the concrete experience stage also leads to adaptability skills as students work to re-test their hypothesis and act on new ideas. This cycle could continue throughout a student's high school SAE program.

Though the development of 21st century skills was a key component of this study, it was necessary to measure whether that skill development was recognized by the students. Thus, self-efficacy theory was used to develop the instrument that measured perceived development of 21st century skills. Self-efficacy theory relates to one's belief in their ability to do something: complete a task, perform an action, etc. (Bandura, 1986). Students that experience success completing a task, tend to have higher self-efficacy (Schunk, 2012). Thus, if a student successfully performs 21st century skills through the process of an agriscience research project, then they should have higher self-efficacy related to those skills.

Purpose and Objectives

The purpose of this descriptive, exploratory study was to determine if differences in perceived levels of 21st century skill development could be linked to student participation in agriscience research. The selected 21st century skills included critical thinking and problem solving, creativity and innovation, communication and collaboration, information literacy, media literacy, ICT (information, communications, and technology) literacy, flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility.

1. Describe student's perceptions of their current level of identified 21st century skills.
2. Describe the differences in perceptions of 21st century skills between students involved in agriscience research SAEs, those with any other SAE, and all other students.

Methods

This descriptive, exploratory study included 599 10th-12th grade students enrolled at three purposely selected high schools whose school-based agricultural education programs included SAE instruction and utilized agriscience research SAEs. Survey design was utilized where students completed a paper questionnaire to acquire demographic information and their perceptions of their current level of attainment of 21st century skills. Data were collected during the second semester of the school year from three high schools that offered comprehensive school-based agricultural education programs in North Dakota and Minnesota. A total of 328 surveys were returned (N = 328). Questionnaires were evaluated for completeness, response set, and other completion errors. In total 41(n) were removed, leading to a final usable sample of 287(N). Students unaccounted for at each school were either absent or declined to complete the instrument. Because generalizability was not the intent of this study, those potential subjects were not followed up with to supply responses. Additionally, non-response error was not calculated or considered in accordance with the design of the study. Therefore, the results of this study are not generalizable beyond the sample discussed herein.

Instrument

The 21st Century Skills Perceived Self-Efficacy Survey was created for this study using the guiding principles of Bandura (2006) and the P21 Framework Definitions for 21st Century Skills (Partnership for 21st Century Learning, 2015). The instrument was created using all eleven 21st century skill categories, as defined by the Partnership for 21st Century Learning (2015). The questions on the instrument were developed directly from the benchmarks and standards of each specific 21st century skill category as listed in the P21 Framework Definitions. The standards and benchmarks were reworded to fit Bandura's recommended language for constructing self-efficacy scales, which required the questions to be worded in a "can do" statement to measure perceived capability versus self-worth (Bandura, 2006). Pajares, Hartley, & Valiante recommend that a response scale of 0-100 be utilized in self-efficacy instruments because the larger scale is a stronger predictor of performance than five-point interval scales (as cited in Bandura, 2006, p. 312). Smaller scales are less sensitive and reliable because people tend to avoid the extreme ends of the scale, which make it difficult to identify any differences among subjects (Bandura, 2006).

The 21st Century Skills Perceived Self-Efficacy Survey consisted of 87 questions aimed at measuring the strength of students' self-efficacy beliefs related to specific 21st century skills on a 100-point scale. The 100-point scale used descriptors at 0 (cannot do at all), 50 (moderately certain can do), and 100 (highly certain can do). Respondents were asked to indicate their current, perceived ability by writing a number between 0-100 in a column next to the statement. Eleven 21st century skill categories were included in the instrument including critical thinking and problem solving (8 questions in construct), communication and collaboration (12 questions in construct), creativity and innovation (10 questions in construct), information literacy (7 questions in construct), media literacy (7 questions in construct), ICT (information, communications, and technology) literacy (3 questions in construct), flexibility and adaptability (9 questions in construct), initiative and self-direction (8 questions in construct), social and cross-cultural skills (6 questions in construct), productivity and accountability (12 questions in construct), and leadership and responsibility (5 questions in construct).

The instrument was evaluated for face and content validity to ensure the questions appeared effective and would accurately measure what they intended to measure. A panel of experts within teacher education and school-based agricultural education evaluated the instrument for wording and readability (n = 3). Adjustments to the instrument were made, including eliminating and rewording of some of the questions, based on their recommendations. To ensure reliability, the instrument was piloted with a group of 34 students similar to the identified population for this study. Reliability for each construct generated the following Cronbach's alpha scores estimating the internal reliability for each construct: critical thinking and problem solving (.87), communication and collaboration (.88), creativity and innovation (.89), information literacy (.79), media literacy (.82), ICT literacy (.80), flexibility and adaptability (.83), initiative and self-direction (.85), social and cross-cultural skills (.79), productivity and accountability (.88), and leadership and responsibility (.83). The original drafted instrument included 107 items. Following reliability analysis, 87(n) were retained.

The final section of the instrument included 18 demographic questions and statements. Items specific to the student included: current grade, gender, enrollment in agricultural education or not, SAE involvement or not, and agriscience research involvement or not. Participants were also asked to answer questions regarding their type of SAE, years of experience in agriscience research and the number of completed projects, and involvement in FFA awards related to agriscience research, such as the agriscience fair, proficiency awards, and Star in Agriscience awards. The inclusion of contextual and demographic variables was supported by previous research on SAE within agricultural education.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 21. The responses to all the questions within each construct were averaged and thus, a students' total perceived self-efficacy was reported by construct, not by each individual question. A mean of 70-100 confidence indicated a high level of perceived self-efficacy. A mean of 40-69.99 indicated a moderate level of self-efficacy, whereas a mean of 0-39.99 indicated low self-efficacy related to 21st century skills.

Descriptive statistics were run to analyze independent and dependent variables, including means and standard deviations. Group means for objective two were analyzed using a one-factor between subjects ANOVA where students self-identified themselves into different groups: students who participated in agriscience research SAEs, those who participated in other SAEs, and those who did not participate in SAEs. Eight students reported having agriscience research SAEs in addition to at least one other type of SAE. Those eight students were combined with the 16 students that only maintained agriscience research SAEs to create the agriscience research SAE group (n = 24). All other students that indicated having an SAE made up the second group (n = 89). The third group was made up of students that had taken agricultural education courses and did not have SAEs, as well as students that had never been enrolled in any agricultural education courses. Based on the theoretical framework of this study, it is justified to combine students without SAEs with those that have never been enrolled in agricultural education because comprehensive agricultural education cannot exist without SAEs. Thus, students that have been enrolled in agricultural education courses but do not maintain SAEs will theoretically not have the opportunity to develop the same skills as those that do maintain SAEs, and thus they were combined with the non-Ag Ed students.

Description of Respondents

Descriptive statistics were used to analyze demographic information of the respondents. Characteristics of the sample are found in Table 1. The greatest number of respondents were sophomores (36.9%, n = 106) whereas the fewest represented were juniors (27.5%, n = 79). The distribution of the sexes for the sample included more females (50.5%, n = 145) than males (47.7%, n = 137). A majority of respondents had enrolled in agricultural education at some point during high school (56.4%, n = 162) compared to respondents who had not enrolled in agricultural education before (42.2%, n = 121). Of the students that indicated they had a Supervised Agricultural Experience (SAE), the majority of respondents had entrepreneurship SAEs (23.9%, n = 27). Other SAE areas that had high participation were placement SAEs (23%, n = 26) and agriscience research SAEs (14.2%, n = 16).

Table 1
Demographic Characteristics of Participating Students (N = 287)

Variable	***n***	**%**
Student Class Rank		
Sophomore	106	36.9
Junior	79	27.5
Senior	95	33.1
Missing	7	2.4
Sex		
Female	145	50.5
Male	137	47.7
Other	2	0.7
Missing	3	1.0
Enrolled in Ag Ed		
Yes	162	56.4
No	121	42.2
Missing	3	1.0
SAE Type		
Entrepreneurship	27	9.4
Placement	26	9.1
Research	16	5.6
Exploratory	4	1.4
Other	24	8.4
N/A	171	59.6
Missing	3	1.0
Combined SAE	16	5.4

Findings

Objective One

Objective one was to describe student’s perceptions of their current level of identified 21st century skills. For all of the respondents, the sample means for each 21st century skill construct indicates, on average, a high confidence in their abilities within each skill area. The means for each 21st century skill construct fell within a high level of perceived self-efficacy, with the lowest mean being the communication and collaboration construct (M = 72.19, SD = 15.54) to the highest mean being ICT literacy (M = 80.11, SD = 14.09) for the entire present sample (N = 287).

The respondents were broken into groups specific to their involvement in SAEs. The three additional groups were (a) No SAE (n = 171), (b) Other SAE (n = 89), and (c) Agriscience SAE (n = 24). Respondents that indicated they were not enrolled in agricultural education or were enrolled in agricultural education but did not maintain an SAE were placed in the “No SAE” group. Students that indicated they participated in any other SAE area other than agriscience research were placed in the “Other SAE” group. Any respondent that participated in agriscience research SAEs, whether combined with another SAE area or not, were placed in the “Agriscience SAE” group.

Table 2
Current Level of Identified 21st Century Skills by Group

	All (n=287)		No SAE (n=171)		Other SAE (n=89)		Agriscience SAE (n=24)	
21st Century Skill Construct	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Critical Thinking and Problem Solving	75.76	14.93	75.37	15.89	74.42	13.66	85.36	10.59
Communication and Collaboration	72.19	15.54	70.97	16.60	72.44	13.25	80.05	14.13
Creativity and Innovation	74.02	14.81	73.08	16.17	74.54	12.50	79.00	11.52
Information Literacy	73.31	15.51	71.69	16.96	74.50	12.86	80.80	11.06
Media Literacy	73.42	15.85	72.60	16.60	73.48	15.01	79.38	12.63
ICT Literacy	80.11	17.07	79.80	18.03	80.32	15.61	81.60	15.97
Flexibility and Adaptability	73.65	14.72	72.68	15.41	73.17	13.72	81.97	11.00
Initiative and Self-direction	77.04	15.27	76.28	15.96	76.47	14.00	84.40	13.94
Productivity and Accountability	78.72	14.76	77.73	16.17	78.83	11.98	85.40	12.81
Leadership and Responsibility	73.20	17.34	71.83	18.38	73.31	16.11	81.96	12.22
Social and Cross-cultural Skills	78.17	14.09	77.74	15.29	77.61	12.49	83.78	10.42

Note. Perceived self-efficacy used a 100-point scale using descriptors at 0 (cannot do at all), 50 (moderately certain can do), and 100 (highly certain can do). Range based off averaged construct means.

Objective Two

Objective two was to describe the differences in perceptions of 21st century skills between students in agriscience research SAEs, those with any other SAE, and all other students. The students were broken into three groups based on their involvement in agriscience research SAEs (n = 24), involvement in other SAEs (n = 89), and no involvement in SAEs or agricultural education (n = 171). A one-way ANOVA was conducted to determine if the means of perceived self-efficacy of 21st century skills differed between students depending on their involvement in agriscience research SAEs, SAEs, or none of the above. Assumptions for a one-way ANOVA were tested according to recommendations by Field (2013) and were met. Table 3 contains the results of the ANOVA tests. The results indicated that the difference between means of perceived self-efficacy were significantly different for all of the 21st century skills constructs except creativity, media literacy, ICT literacy, productivity/accountability, and social/cross-cultural skills between the three groups (agriscience research SAEs, SAEs, and no SAE/no Ag Ed). In terms of practical significance (Table 3), the magnitude of omega-squared for all values suggests a small association between the involvement in agrsicience research SAEs and perceived self-efficacy of 21st century skills. The magnitude of omega-squared was interpreted using Cohen's reference values (1988). The computed value indicates that between 1% and 2% of variability in perceived self-efficacy of 21st century skills can be attributed to involvement in agriscience research SAEs.

Table 3
Association Between 21st Century Skills Constructs and Involvement in Agriscience Research SAEs (N = 287)

21st Century Skill Construct	***df***	***F***	ω^2	***p***
Critical Thinking/Problem Solving	2, 284	3.56***	.02	.03
Communication/Collaboration	2, 284	3.67**	.02	.03
Creativity/Innovation	2, 284	1.75	.01	.18
Information Literacy	2, 284	4.03**	.02	.02
Media Literacy	2, 284	1.93	.01	.15
ICT Literacy	2, 284	0.13	-.01	.88
Flexibility/Adaptability	2, 284	4.33***	.02	.01
Initiative/Self Direction	2, 284	3.10**	.01	.05
Productivity/Accountability	2, 284	2.88**	.01	.06
Leadership/Responsibility	2, 284	3.67**	.02	.03
Social and Cross-cultural Skills	2, 284	2.10	.02	.12

Note. * indicates a significant pairwise comparison of means of perceived 21st century skills constructs between students with agriscience research SAEs and other SAEs. ** indicates a significant pairwise comparison of means of perceived 21st century skills constructs between students with agriscience research SAEs and no SAE. *** indicates a significant pairwise comparison for both comparisons.

Given that the omnibus F test was significant, a post-hoc analysis was needed to determine which groups in particular show significant differences between their means. All possible pairwise comparisons were made using the Tukey procedure with a familywise significance level of .05. The post-hoc procedure revealed that nine significant contrasts existed ($p < .05$). The significant contrasts are indicated in Table 3.

Conclusion/Recommendations/Implications

We conclude agriscience research SAEs can have an influence on perceived self-efficacy of 21st century skills attainment. However, a limitation of this study is that the results are not generalizable across the entire population of agricultural education students in the country due to the exploratory nature of this study and the selected methods with which it was conducted. Nonetheless, the results of this study do indicate that there may be a small association between involvement in agriscience research SAEs and the development of 21st century skills. Further, it is recognized that self-efficacy does not equal ability, and thus does not give a clear indication of skill development. However, the purpose of using perceived self-efficacy in this study was to explore the connection between 21st century skills and agriscience research SAEs. Future studies should be conducted to explore skill development as it relates to involvement in agriscience research SAEs.

When students who had participated in agriscience research SAEs were compared to those students that maintained other SAEs and those that either did not have an SAE or had not enrolled in any agricultural education courses, the data indicated that there was a significant difference between those groups in regard to perceived self-efficacy of six of the 21st century skill constructs. Though the effect size was small, a difference does exist in the perceived self-efficacy of 21st century skills of students that participated in agriscience research SAEs and those that did not. Plausibly, students do attain 21st century skills by moving through the four-stage cycle of Kolb's Experiential Learning Theory. As it relates to the theoretical framework for this study, it is likely that students expressed various 21st century skills while participating in their agriscience research SAEs, which moved them through the four stages of experiential learning. As students successfully expressed those 21st century skills, they gained confidence in their abilities, and thus increased their perceived self-efficacy related to those skills. While it is proposed that students develop 21st century skills throughout their involvement in agriscience research SAEs, it is possible that a lack of deliberate reflection and identification of what was learned could impede the development of those skills within the phases of the Experiential Learning model. Further research is recommended related to the deliberate instructional intent of skill development to better test the development of skills within the framework of Kolb's Experiential Learning Theory.

Retallick (2010) purports that creativity from both the teacher and students is a way to overcome the challenges related to SAE involvement in the 21st century. One creative solution to the decline in SAE involvement due to changing demographics and a lack of resources available to teachers and students (Retallick, 2010) may be to utilize agriscience research SAEs, which not only lead to the development of essential 21st century skills, but also provide students with the skills necessary for STEM careers in today's agricultural industry (Goecker et al., 2015). Due to the flexible nature of agriscience research SAEs, paired with the fact that many agriscience research projects can be conducted with limited inputs and resources, it is logical that implementation of these SAEs should be expanded to more schools so that more students can benefit from involvement in SAE.

Due to the small effect size, the results of this study are certainly not definitive. Prior research indicates that many different factors and experiences contribute to the development of 21st century skills in high school students. Some of those factors include involvement in FFA experiences (Carl D. Perkins Act, 2006; Lundry et al., 2015; Rosch et al., 2015; Townsend & Carter, 1983), engagement in experiential learning activities (Mabie & Baker, 1996), and participation in inquiry based learning experiences (Haury, 1993; Mabie & Baker, 1996; Thoron & Myers, 2012; Wells et al., 2015). In the broad scope of preparing students for future careers in agriculture, the likelihood of finding a one-size fits all solution related to the development of 21st century skills is unlikely. However, the significantly different means between some of the 21st century skill areas does indicate that a possible connection exists between the development of 21st century skills and involvement in experiential learning activities, such as agriscience research SAEs. Therefore, the utilization of agriscience research SAEs in school-based agricultural education programs may lead to the development of 21st century skills and more career-ready students.

We recommend that further research be conducted regarding agriscience research SAEs and their application within school-based agricultural education. Though perceived self-efficacy suited the exploratory purpose of this study, other methods are necessary for future studies. We determined it was not feasible to create an instrument that quantitively measured all 21st century skill constructs together. Further, that instrument would have been unnecessary for a descriptive, exploratory study. Consequently, perceived self-efficacy was chosen because it could be used to measure the eleven different 21st century skill constructs at one time. However, we recognize that students' perceptions of their abilities do not necessarily measure their actual attainment of specific skills accurately. That point does highlight the need for further research, specifically regarding the actual attainment of identified skills, not just student perceptions of skills.

Certainly, other dependent variables could have been chosen for this study. However, 21st century skills were selected because of their communicative value in today's educational climate. It is important for agricultural educators to be able to communicate the value of agricultural education to stakeholders in terms that are transferable across disciplines. The term "21st century skills" is readily understood across academic disciplines and thus was selected for this study. Nonetheless, future studies are encouraged and needed to measure the effect of agriscience research SAE involvement on other educational outcomes.

References

Baker, M. A., Robinson, J. S, & Kolb, D. A. (2012). Aligning Kolb's experiential learning theory with a comprehensive agricultural education model. *Journal of Agricultural Education, 53*(4), 1-16. doi: 10.5032/jae.2012.04001

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In T. Urdan & F. Pajares (Eds), *Self-efficacy beliefs of adolescents* (307-337). Greenwhich, Connecticut: Information Age Publishing.

Camp, W. G., Clarke, A., Fallon, M. (2000). Revisiting supervised agricultural experience. *Journal of Agricultural Education, 41*(3), 13-22. doi: 10.5032/jae.2000.03013

Carl D. Perkins Career and Technical Education Improvement Act. (2006) 20, U.S.C. § 2301.

Casner-Lotto, J., & Barrington, L. (2006) *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce.* Retrieved from http://www.p21.org/storage/documents/ FINAL_REPORT_PDF09-29-06.pdf

Cheek, J. G., Arrington, L. R., Carter, S., & Randell, R. S. (1994). Relationship of supervised agricultural experience program participation and student achievement in agricultural education. *Journal of Agricultural Education, 35*(2), 1-5. doi: 10.5032/jae.1994.02001

Clark, R. W., Threeton, M. D., & Ewing, J. C. (2010). The potential of experiential learning models and practices in career and technical education & career and technical teacher education. *Journal of Career and Technical Education, 25*(2), 46-62. Retrieved from https://ejournals.lib.vt.edu/index.php/JCTE/article/view/501/476

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Department of Commerce. (1922). *Fourteenth Census of the United States of America: Agriculture*. (Volume V.). Washington, DC: U.S. Government Printing Office.

Dyer, J. E., & Osborne, E.W. (1995). Participation in supervised agricultural experience programs: A synthesis of research. *Journal of Agricultural Education, 36*(1), 6-14. doi: 10.5032/jae.1995.01006

Dyer, J. E., & Williams, D. L. (1997). Benefits of supervised agricultural experience programs: A synthesis of research. *Journal of Agricultural Education, 38*(4), 50-58. doi: 10.5032/jae.1997.04050

Goecker, A. D., Smith, E., Fernandez, J. M., Ali, R., & Theller, R. (2015). *Employment opportunities for college graduates in food, agriculture, renewable natural resources,* *and the environment: United States 2015-2020.* Retrieved from https://www.purdue.edu/usda/employment/wp-content/uploads/2015/04/2-Page-USDA-Employ.pdf

Haury, D. L. (1993). Teaching science through inquiry. *ERIC/CSMEE Digest*. Retrieved from http://www.ericdigests.org/1993/inquiry.htm

Knobloch, N. A. (2003). Is experiential learning authentic? *Journal of Agricultural Education, 44*(4), 22-34. doi: 10.5032/jae.2003.04022

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice Hall.

Lewis, L. J., Rayfield, J., & Moore, L. L. (2012) Supervised agricultural experience: An examination of student knowledge and participation. *Journal of Agricultural Education, 53*(4), 70-84. doi: 10.5032/jae.2012.04070

Lundry, J., Ramsey, J. W., Edwards, M. C., & Robinson, J. S. (2015). Benefits of career development events as perceived by school-based agricultural education teachers. *Journal of Agricultural Education, 56*(1), 43-57. doi: 10.5032/jae.2015.01043

Mabie, R., & Baker, M. (1996). A comparison of experiential instructional strategies upon the science process skills of urban elementary students. *Journal of Agricultural Education, 37*(2), 1-7. doi: 10.5032/jae.1996.02001

National Council for Agricultural Education. (2012). *About agricultural education.* Retrieved from https://www.ffa.org/thecouncil/ageducation

National Council for Agricultural Education. (2015). *Philosophy and guiding principles for execution of the supervised agricultural experience component of the total school based agricultural education program.* Retrieved from https://www.ffa.org/SiteCollectionDocuments/sae_guiding_principles.pdf

National Council for Agricultural Education. (2017). *SAE for all teacher guide.* Retrieved from https://www.ffa.org/SiteCollectionDocuments/NCAE_SAEforAll_Teacher_Guide.pdf

Osborne, E. W. (1994). Completing the cycle. *The Agricultural Education Magazine, 67*(3), 3, 11.

Partnership for 21st Century Skills. (2015). *P21 framework definitions.* Retrieved from http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf

Phipps, L.J., Osborne, E.W., Dyer, J.E., & Ball, A. (2008). *Handbook on agricultural education in public schools.* Clifton Park, NY: Delmar, Cengage Learning.

Rateau, R. J., Kaufman, E. K., & Cletzer, D. A. (2015). Innovative classroom strategies that prepare college graduates for workplace success. *Journal of Agricultural Education, 56*(3), 52-68. doi: 10.5032/jae.2015.03052

Retallick, M. S., & Martin, R. (2008). Fifteen-year enrollment trends related to the three components of comprehensive agricultural education programs. *Journal of Agricultural Education, 49*(1), 28-38. doi: 10.5032/jae.2008.01028

Retallick, M. S. (2010). Implementation of supervised agricultural experience programs: The agriculture teachers’ perspective. *Journal of Agricultural Education, 51*(4), 59-70. doi: 10.5032/jae.2010.04059

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1), 17-29. doi: 10.5032/jae.2006.01017

Rosch, D., Simonsen, J. C., & Valez, J. J. (2015). Examining year-long leadership gains in FFA members by prior FFA involvement, class year, and gender. *Journal of Agricultural Education, 56*(3), 227-241. doi: 10.5032/jae.2015.03227

Sapp, S. B., & Thoron, A. C. (2014). Effects of agricultural sales CDE modules on content knowledge and argumentation skill. *Journal of Agricultural Education, 55*(5), 93-110. doi: 10.5032/jae.2014.05093

Shoulders, C. W., & Myers, B. E. (2013). Teachers’ use of experiential learning stages in agricultural laboratories. *Journal of Agricultural Education, 54*(3), 100-115. doi: 10.5032/jae.2013.0310

Schunk, D. H. (2012). *Learning theories: An educational perspective.* Boston, MA: Pearson Education, Inc.

Steele, R. (1997) Analysis of the continuing decline in use of supervised agricultural experience (SAE) in New York State. *Journal of Agricultural Education, 38*(2), 49-58. doi: 10.5032/jae.1997.02049

Stewart, B. R., & Birkenholz, R. J. (1991). Outcomes of changing supervised agricultural experience programs. *Journal of Agricultural Education, 32*(3), 35-41. doi: 10.5032/jae.1991.03035

Talbert, B. A., Vaughn, R., Croom, D. B., & Lee, J. S. (2007). *Foundations on agricultural education.* Danville, IL: Professional Educators Publications, Inc.

Thoron, A. C., & Myers, B. E. (2012). Effects of inquiry–based agriscience instruction on student scientific reasoning. *Journal of Agricultural Education, 53*(4), 156-170. doi: 10.5032/jae.2012.04156

Townsend, C. D., & Carter, R. I. (1983). The relationship of participation in FFA activities and leadership, citizenship, and cooperation. *Journal of the American Association of Teacher Educators in Agriculture*, *24*(1), 20-25. doi: 10.5032/jaatea.1983.01020

Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times.* San Francisco, CA: Jossey-Bass.

US Department of Commerce. (2016). *New census data show differences between urban and rural populations.* Retrieved from https://www.census.gov/newsroom/press-releases/2016/cb16-210.html

Wells, T., Matthews, J., Caudle, L., Lunceford, C., Clement, B., and Anderson, R. (2015). The infusion of inquiry-based learning into school-based agricultural education: A review of literature. *Journal of Agricultural Education*, *56*(4), 169-181. doi: 10.5032/jae.2015.04170

Wilson, E. B., & Moore, G. E. (2007). Exploring the paradox of supervised agricultural experience programs in agricultural education. *Journal of Agricultural Education, 48*(4), 82-92. doi: 10.5032/jae.2007.04082

The Influence of Agriscience Research SAEs on High School Students' Perceived Self-Efficacy of 21st Century Skill Attainment

Discussant remarks: J. C. Ricketts, Professor
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If you are a believer in Supervised Agricultural Education (SAE) as an essential component of agricultural education, this article is your missing link. In short, the authors sought to determine the impact of research SAEs in agricultural education. After a nice review of SAE, it's origins, and purposes the authors detail it's evolution, which includes research or agriscience SAEs. The authors provide an overview of the existing literature related to the dependent variable in the study as well, 21st century skills. The authors present a well-written theoretical framework including Kolb's Experiential Learning and Bandura's self-efficacy theories.

I was particularly interested in the instrument that was developed for the project. A tool to get at all the 21st century skills, even through self-efficacy, would be valuable for documenting the impact of various aspects of agricultural education. I'd like to hear more about the development of the instrument. Did the authors write a certain number of items per benchmark and standard or was there one item per standard? Was the reported reliability arrived at after one administration or were some items removed through psychometric item analyses? I was also interested the choice of a 100 point scale and the categories for high, moderate, and low efficacy. Why and how were these decisions made?

Regarding conclusions, there's a lot to discuss. The first point for discussion I'm scared might get overlooked in this paper is the finding that the largest group was the "No SAE" group. What does that mean for the profession? The conclusion that agriscience research SAEs have an influence in 21st century skills is an important one. The authors make recommendations about future studies looking at skill development, rather than self-efficacy. What are some approaches the authors are considering for measuring actual skills development? Lastly, the authors indicated that other dependent variables were considered besides 21st century skills and that future studies might look at some of these. What would be some other dependent variables to examine to identify the impact of the agriscience research SAE?

These authors are to be commended for an important and impressive study that will gain even more significance with improvements and replication. Congratulations.

Pedagogical Content Knowledge and Experiential Learning: The Context for Teaching and Learning

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This study sought to explore the connections between experiential learning and pedagogical content knowledge (PCK) in preservice agriculture teachers. Guided by Kolb's Experiential Learning Cycle and the most recent PCK model, we utilized a phenomenological approach to examine how preservice agriculture teachers construct their own knowledge, then amplify and/or filter personal knowledge to support students' understanding. The purposefully selected population for this study included all preservice agriculture teachers at Oregon State University during the 2016-2017 school year (N = 10). Three sources of qualitative data were collected and analyzed: field notes, lesson plans, and interviews. Context emerged as an important theme for describing the lived experiences of these participants. The context in which they learned content and the context in which they planned for, and taught, content for student understanding were both evident, and quite different. The felt need to learn emerged as an important component of context for learning. Context for teaching was shaped by the subject area, applying amplifiers and filters, and the classroom environment. We recommend preservice programs foster thinking about how personal and educational experiences can be used for developing PCK, and continue to identify learning experiences to help preservice teachers develop PCK.

Introduction and Conceptual Framework

"What we know about how students learn ought to influence teaching practices, and what we know about effective teaching practices, as well as teacher learning, should influence teacher education" (Bransford, Darling-Hammond, & LePage, 2005, p. 23). Teacher educators are faced with the task of preparing preservice teachers in the knowledge bases needed for teaching, through experiences that initiate the development of expertise in teaching agriculture (Terry, Jr., & Briers, 2010). In order for teachers to be effective they need to be both competent in the subject matter they teach, and understand how students might struggle to learn the content (Grossman, Schoenfeld, & Lee, 2005). The diversity of secondary agricultural curriculum is unique, and requires a wide array of content knowledge (Terry, Jr. & Briers, 2010), although, in any teaching field, content and pedagogical expertise will only be developed through a "progressive and continuous cycle of professional development, growth, reflection, and refinement" (Edwards & Thompson, 2010, p. 118). According to Dewey (1938/1997), the most important attitude we can possess is that of a lifelong learner. Teachers continually construct new knowledge and skills through the recurring cycle of practice, therefore, teacher preparation programs should provide foundational ideas and understandings of teaching and learning to foster lifelong learning through teaching (Bransford et al., 2005; Hammerness et al., 2005). This study sought to explore the development of the knowledge bases needed for teaching through experiential learning opportunities, and examine how preservice teachers apply personal amplifiers and filters to develop PCK for teaching agricultural content.

Pedagogical Content Knowledge

Shulman (1986) introduced pedagogical content knowledge (PCK) as the missing paradigm in educational research. Some 30 years later, educational researchers are still trying to conceptualize how teachers understand the knowledge bases related to particular content they teach to particular groups of students. The PCK construct provides a useful way to explore the connections between content and pedagogical knowledge, and student learning. Specifically, the model of teacher professional knowledge and skill (TPK&S) (Gess-Newsome, 2015) (see Figure 1) is an advancement in the understanding of the PCK construct, and helps re-establish and define the knowledge bases involved in the planning for and teaching of particular content for a particular purpose, to particular students (Gess-Newsome, 2015). A distinguishing component of the TPK&S framework is the recognition of teachers' ability to apply amplifiers and filters to current knowledge bases, likely motivated by teacher beliefs, orientations, contextual variables, and depth of content knowledge (Gess-Newsome, 2015). Essentially, these amplifiers and filters are used to break down content knowledge for student understanding.

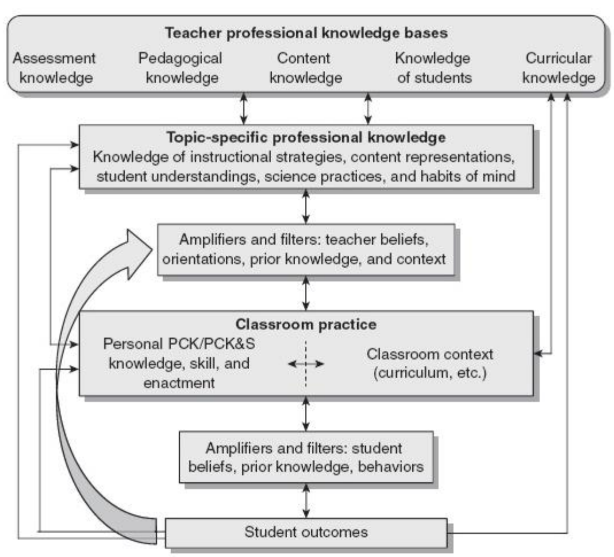

Figure 1. Model of teacher professional knowledge and skill. From *Re-examining Pedagogical Content Knowledge in Science Education.*

Experiential Learning

While it takes many years of experience to develop expertise, teachers need to be able "to reflect on, evaluate, and learn from their teaching so that it continually improves" (Bransford et al., 2005, p. 3). Kolb (2015) posited all learning is essentially relearning, developed through a continuous process of testing and refining personal beliefs and theories, and grounded in experience. The Experiential Learning Cycle (Kolb, 1984) (see Figure 2) provides a valuable tool for teachers to think about and make sense of their own teaching and experience, as time spent practicing teaching does not necessarily lead to expertise in teaching (Darling-Hammond & Sykes, 1999; Kolb, 2015). In fact, teachers could not do the work they need to do "unless they knew how to learn in the contexts of their work…the ability to stand back from and analyze their own teaching, to ask such questions as: What is working? What is not working?" (Darling-Hammond and Sykes, 1999, p. 10). Kolb (2015) explained experiential learning theory as a dynamic process whose foundation is a learning cycle, which is driven by the constant interplay between action and reflection, and experience and abstraction. According to Kolb (2015), *"Learning is the process whereby knowledge is created through the transformation of experience"* (p. 49).

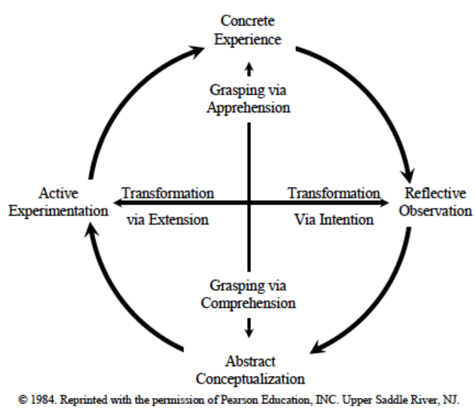

Figure 2. Experiential Learning Cycle. Reprinted from "Experiential learning: Experience as the source of learning and Development," by D. A. Kolb, 1984, Englewood Cliffs, NJ: Prentice-Hall. Copyright 1984.

Educators should know how to employ prior experiences and current surroundings to develop new learning experiences that are beneficial for students' construction of knowledge (Dewey, 1938/1997), an idea which also applies to teacher preparation programs. Teacher educators should encourage and facilitate preservice teachers' reflection on and development of conceptualizations from prior learning experiences so they may situate their new beliefs and theories in the context of student understanding (Nilsson, 2008).

Conceptual Framework

Preservice teachers do not arrive to teacher preparation programs as blank slates, on the contrary, they arrive with an abundance of prior knowledge and skills, developed through experience (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010; Bransford, Brown, & Cocking, 2000). However, Dewey (1938/1997) indicated some experiences are mis-educative, and often preservice teachers arrive to their preparation programs with preconceptions about teaching, learning, and the profession of teaching (Hammerness et al., 2005). With such little time to prepare preservice teachers, teacher educators are forced to make decisions about what components of the program most effectively help teachers learn to reflect on and evaluate their own experiences and practice, in order to foster lifelong learning (Hammerness et al., 2005).

While PCK has been investigated across several educational disciplines, there is a very small body of literature dedicated to exploring PCK in agriculture teachers (Ball, Thames, & Phelps, 2008; Rice & Kitchel, 2016). Furthermore, the specific connections between experiential learning and pedagogical content knowledge development have not yet been explored in agricultural education. We created the conceptual model for teacher development (see Figure 3) which represents the connections between PCK and experiential learning, specific to teacher preparation and professional development, and combines the most recent model of PCK (Gess-Newsome, 2015) and Kolb's (1984) Experiential Learning Cycle. This conceptual model can be used as a framework to further investigate teaching and learning, teacher preparation, and teacher professional development.

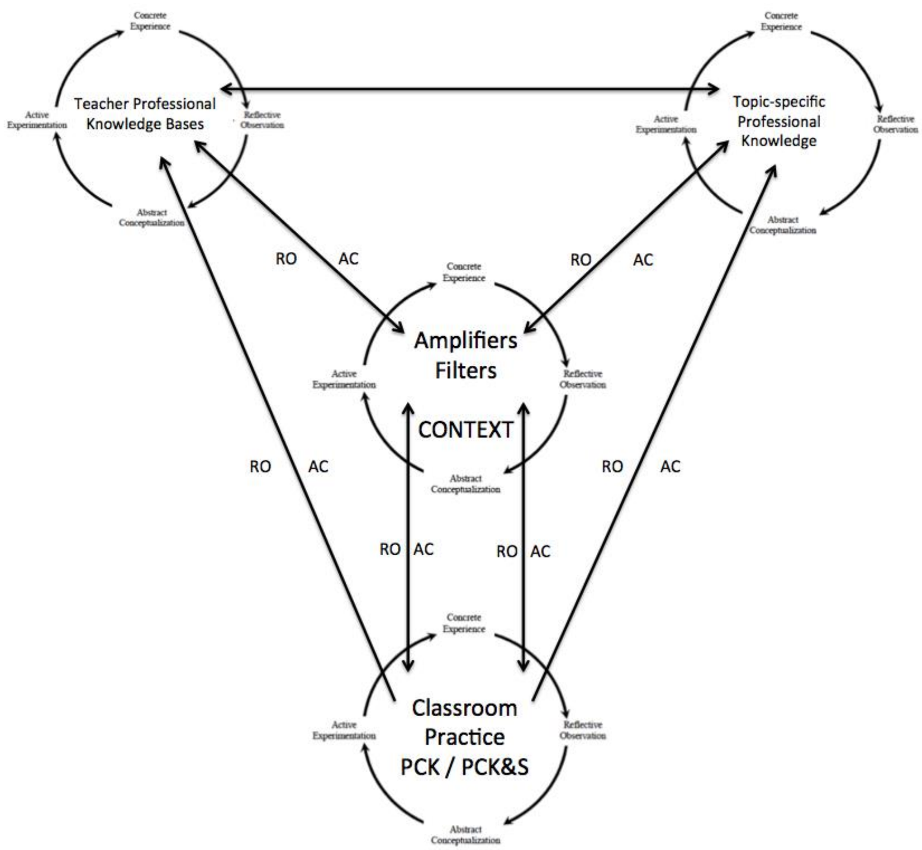

Figure 3. Conceptual Model for Teacher Development

Based on the model of teacher professional knowledge and skill (Gess-Newsome, 2015), we contend teachers develop expertise in teaching through the utilization of teacher professional knowledge bases (TPKB) and topic-specific professional knowledge (TSPK), which inform one another. Within this conceptual model, TPKB refers to generalized professional knowledge about teaching that is not content or topic specific and may include various categories (e.g. assessment knowledge, pedagogical knowledge, content knowledge, knowledge of students) (Gess-Newsome, 2015). TSPK is content-specific, as well as specific to the developmental level of students, and combines subject matter, pedagogy, and contextual knowledge (Gess-Newsome, 2015). Essentially, TSPK is knowledge about a specific topic which is held by the profession (Gess-Newsome, 2015). Shulman's (1987) early work on PCK emphasized the transformation of knowledge for instruction, as well as evaluation and reflection to develop new comprehensions of knowledge. This point of view directly parallels the main tenet of experiential learning, the construction of knowledge by grasping and transforming information through experiences in a cyclical model (Kolb, 1984).

Dewey (1938/1997) believed all learning happens as the result of experience and Kolb (2015) and Shulman (1987) posited expertise and knowledge are constructed through the transformation of experience. Because knowledge is constructed through the transformation of experience, we contend the development of TPKB and TSPK happens as a result of the experiential learning cycle. The repetitive nature of experiential learning affords constant construction and re-construction of knowledge needed for teaching, assisting in the progression from novice to expert (Darling-Hammond & Bransford, 2005). The bi-directional arrow between the two knowledge bases indicates how they inform one another throughout preservice and inservice teacher development.

Kolb (2015) expressed the need for the development of topic-specific knowledge, as well as a conceptual framework to retrieve knowledge and transfer it to other contexts, arguing iterations of the experiential learning cycle foster the deliberate practice needed to develop expertise in teaching. Within the model for teacher development, the bi-directional arrows between TSPK and TPKB, and amplifiers, filters, and context, represent how teachers utilize amplifiers, filters, and context to adapt knowledge bases for teaching, which is then realized in classroom practice. The experiential learning cycle surrounding each section of the model represents the recursive and deliberate practice needed to develop these items.

During the experiential learning cycle reflections are consolidated into abstract conceptualizations, or generalizations (Roberts, 2006). Constructed knowledge is then grasped through comprehension (Kolb, 2015) and filtered or amplified based on teacher beliefs, orientations, prior knowledge, and context (Gess-Newsome, 2015). Amplifiers and filters afford teachers the ability to accept, reject, or change new knowledge during teacher education, inservice training, or classroom practice. Any effect new knowledge, policy, administration, teaching method, or content, may have on students' learning "will be filtered through teachers, mediated by what teachers believe and know and are able to do" (Thompson & Zeuli, 1999, p. 349). Reflection and conceptualization also contribute to the construction of new knowledge through the development of mental representations (or schema) by which amplifiers and filters are then applied in order to break down content knowledge for student understanding based on the context of the learning environment (Derry, 1996; Gess-Newsome, 2015; Kolb, 2015).

Purpose and Research Questions

The purpose of this study was to explore the connections between experiential learning and pedagogical content knowledge (PCK) in preservice agriculture teachers. The following research questions were developed to guide the study: How do preservice agriculture teachers use past experiences to inform the knowledge bases needed for teaching agriculture? How do preservice agriculture teachers understand and break down content for student understanding? How do preservice agriculture teachers utilize reflection and abstract conceptualization in their thinking about pedagogical content knowledge? This research aligns with the National Research

Agenda Priority 4: Meaningful, engaged learning in all environments (Roberts, Harder, & Brashears, 2016).

Methods

This study was a phenomenological inquiry into preservice agriculture teachers' lived experiences (van Manen, 1990) in order to explore the connections between experiential learning and PCK. Phenomenology is a practical approach to describe how individuals orient themselves to lived experiences, and fosters a focused description on what all participants have in common (Creswell, 2013; van Manen, 1990). Participants included 10 preservice teachers enrolled in a teacher education program at Oregon State University. Semi-structured one-on-one interviews were used as the primary data source for this study. However, the fact that teachers can exhibit PCK in different settings (Rice & Kitchel, 2016) created the need to consider other data sources as well. Each source of data has strengths and weaknesses, making triangulation important in qualitative research (Patton, 2002). Classroom observations and field notes, in addition to lesson plans for the observed lessons, were triangulated with the interview data.

The interview protocol was derived primarily from the CoRe (Content Representation) developed by Cooper, Loughran, and Berry (2015) for PCK research on science teachers. We reduced the data from 10 participants, to six, based on descriptions of the participants formulated from questions asked during the interview about agricultural production and education background, and 4-H/FFA participation. The six purposefully selected participants exhibited a diversity of agricultural and educational experiences that were representative of the whole group. Transcripts were read through by one researcher, who applied initial codes that were developed based on the conceptual framework. These initial codes were useful as a way to begin understanding the participants lived experiences of teaching, as well as their reflection on how they learned the content or learned to teach the content. Throughout the coding process, meaningful text was marked, synthesized, and compiled into memos (Creswell, 2013). Field notes were coded using the same codebook, and compared to highlighted text in the transcripts.

The remaining four transcripts were distributed to the other two researchers, who individually began reading through and marking relevant text without the use of the codebook (Moustakas, 1994). The three of us then met to determine what about the structures of experiences were similar among the participants (van Manen, 1990). Lesson plans were also analyzed for evidence of PCK, providing a glimpse at another aspect of teaching: the forethought and planning that went into teaching the lesson.

In an effort to provide transparency and ensure trustworthiness, member checking was employed on three different occasions during the study (Creswell, 2013). Two participants were provided with a synthesis of their interview, to confirm accurate interpretation of the data (Maxwell, 2013). On two other instances, feedback was solicited from a number of individual participants about emerging conclusions (Maxwell, 2013). Additionally, as researchers and agriculture teacher educators, we attempted to acknowledge our own positions within the study and maintain reflexivity throughout data collection and analysis by recognizing and bracketing our own biases (Creswell, 2013).

Findings

In the study of how to promote excellence through education, an on-going debate is whether or not "excellence is something fostered in individuals – by enhancing their inherent mental abilities, their knowledge, or their personal efforts to excel – or whether excellence is a product of particular institutional practices" (Ferrari, 2002, p. vii). This study began with a question about the courses of action an agriculture teacher education program might take to help preservice teachers develop pedagogical content knowledge (PCK) through experiential learning opportunities, in order to develop their expertise in teaching. To reach this seemingly lofty goal, it seemed appropriate to begin with an exploration of the connections between experiential learning and PCK in preservice agriculture teachers.

Context emerged as an important theme for describing the lived experiences of these preservice agriculture teachers. However, it became apparent an important delineation was needed to describe context as a theme. In this study, the context in which participants learned content and the context in which they planned for and taught content for student understanding were both evident, and quite different. The felt need to learn emerged as an important component within the context for learning. Context for teaching is shaped by the use of context as a filter or amplifier, and the learning environment.

Context for Learning

In general, the experience learning content was equally as important as the content itself. Participants who had learning experiences that were interactive, commented on remembering and valuing those the most. Beth stated:

> …our labs were always pretty neat and interactive…the classes that I felt like I got the most from, you know, like our reproductive physiology class with [professor] I really

> liked because we had some really neat hands on lab activities to do…microbiology was another really cool one because we did a lot of things…

Beth also said, "I guess my memories of those classes that had those interactive components probably helped prepare me for what we're doing now, because I know those were the classes I enjoyed most."

Rebekah, who purposely took a welding course at a community college before student teaching acknowledged the influence her learning experience had on her own teaching:

> I took the welding class at [community college] fall term and that was super helpful and I think it was particularly helpful, not only for my own understanding of skill development, but I think it was also helpful that the welding teacher at [community college] was a former high school welding teacher…so he was kind of able to help develop the content a little differently for me, so that I could apply it in the classroom.

In some instances, participants compared various learning experiences related to content they were teaching. Morgan commented on her animal science knowledge which she developed through personal experiences and courses at a community college. She stated, "…it was easier to, it seems, looking back, it seemed like [community college] was easier to connect the curriculum that I was learning in class to the previous experience. Was that called 'schema'?" She continued comparing her experiences learning animal and plant science content:

> …it seemed easier to be able to do that because I had a deeper experience of
>
> raising animals…at [university] when I took all my plant classes…because of the caliber, and the rigor of academic, choice of academics is, is higher... is more extreme…a lot of it was retained to pass an exam and I couldn't tell you where it went…

Cole remarked about the fact he had a variety of experiences related to plant science and hydroponics that made him confident to teach the lesson:

> I kind of knew just the basics of plant growth and what they need as far as
>
> nutrients, just from my experiences on the farm and my experiences growing plants and some of my classes at [university], I took a couple of classes where we talked about electrical conductivity and basically growing plants in a greenhouse system. So, I guess it was a combination of areas that I got that background knowledge from.

It was also evident when there had not been a prior learning experience in the specific content area, or when learning experiences in the content area had not made an impression that might have affected participants' teaching. Faith taught an agricultural leadership lesson on commitment. When asked about prior leadership experience, Faith responded:

> No, I haven't taken any leadership classes. I think the closest thing is I was really

> involved with leadership in 4-H. Well, I guess I have taken a couple of leadership classes. I don't remember what class it was, though.

Rachel taught an agricultural science lesson on mitosis and meiosis. When asked about learning the content she answered,

> I think I was taught it in high school, but my clearest memory is college…So, it was, I think, my junior year when I finally took those biology series. So only two years ago, but, I didn't remember a lot.

The context in which previous learning experiences occurred contributed to how the participants thought about and planned for teaching. In some instances, it was evident the context for learning content was the only point of reference in their thinking about the content or planning to teach. In other cases, the immediacy in which the content needed to be learned in order to teach became altogether a different learning experience.

Felt Need to Learn.

The felt need to learn changed the dynamic of the learning experience. Depending on the particular content area, the preservice teacher often relied on direct instruction from the cooperating teacher, learned the content through planning to teach, or some combination of rapidly gathering content knowledge to be able to teach. Faith stated:

> Well, there was a teaching, like a teacher book for that curriculum…I read that and then I read the student's version also. And, [cooperating teacher] kind of walked me through what she does with that or what she planned to do with it. I don't know if she has ever used it. I think they're brand new books.

Rachel felt she possessed limited, surface-level content knowledge due to inadequate previous learning experiences, and indicated her felt need to learn as well. She commented, "It did come back to me and I feel like I learned it better having taught it now than when I was trying to learn it in college because it was… just for the test…in college." The felt need to learn also emerged when talking about teaching shop-related agricultural mechanics courses with Rebekah, an area of content preparation in which the preservice teachers in this particular program often lack experience. She said:

> I think that when I found out that I was teaching four shop classes, I kind of went into a panic mode and started talking to everyone I know about how I was going to be teaching

> four shop classes and that I was going to be lucky if none of my students blew anything up or lost any body parts.

Additionally, Beth reflected on her preparation for the reproductive systems animal science unit she was teaching and said, “When I started the repro unit for animal science, I mean, I spent a lot of hours just refreshing my memory on the content,” another indication of the felt need to learn, or re-learn, content for teaching.

Context for Teaching

Whether or not participants were able to reflect on prior learning experiences to plan for teaching made a difference as to how they thought about the content. Several of the participants were able to break down content for student understanding, based on their own learning experiences. Rachel said, “I had to review it and then I also had to read… I had to simplify it and modify it for my students.” For Rebekah, learning how to weld helped develop the context for how she thought about teaching, “…because it was something that I was super invested in being good at and learning more about because it’s not my skill set and I wanted to be confident.” When talking about how she plans for teaching, Beth stated:

> But, for me, I know, learning these kinds of things, I always struggled with not being able to see it and I know a lot of kids struggle with that, so incorporating some kind of activity where they can see it always helps.

Cole utilized his personal experiences to break down the important concepts in the lesson for student understanding:

> …most people, especially if they don’t have any experience in hydroponics, they don’t realize that you can grow plants without soil…so I think that was the most important thing: just for them to realize that there’s another way to do it and, I guess some of the important things were realizing why you would want to grow it in water, just plain water, as opposed to having dirt medium.

He went on to say, “I think I spent a lot of time on those concepts just so the kids could understand why you would even want to grow something in a hydroponic system”.

Evidence of the participants’ thinking about the content was also found in their lesson plans. For instance, Rebekah’s lesson plan was nothing more than a few jotted notes about the class opener and closer, indicating she was comfortable facilitating students working in the shop and managing the time and activities. Rachel’s lesson plan was also concise, although 50 minutes of the scheduled 75 minutes was to be used for watching a video, followed by a PowerPoint lecture with guided notes. The remainder of the time was allotted for an interest approach and review activity, likely an indication of her admitted surface-level understanding of the content.

Cole placed components of a hydroponics system on the tables in the classroom, before students arrived. As an interest approach, he asked the students to work together and attempt to identify the individual components, then speculate about their purpose in a hydroponics system. This was an unscripted discussion, but highlighted Cole's personal knowledge of the components and willingness to use the context of the learning environment to guide students' thinking.

Context as a filter or amplifier.

At times, participants were able to filter or amplify their own knowledge bases, based on the context for teaching. Rachel, Beth, and Cole each identified the age, maturity, and abilities of their students, which contributed to how they thought about the planning for the lesson. In discussing her animal nutrition lesson, Amber said, "…[nutrition] was a hard concept for me to understand in high school until I got into college…I think by being in those classes it helped me understand how to kind of tailor that more to high school students...". Rachel said, "I had to simplify it and modify it for my students, so having to rewrite everything, um, that also helped me." She continued:

> I didn't use the PowerPoint that I found…the bullet points were really long sentences…they used pretty big words. Some of them I even had to look up. And, it's a very, as we discussed earlier, a very content heavy subject. So, I didn't want them to sit there and stare at the screen…

Participants also selectively filtered content based on their own limited understanding, which likely influenced the delivery of the lesson. Morgan admitted not feeling confident with any content beyond what she taught in her animal science lesson, and Cole said:

> There's times where I won't include something…because I don't feel super comfortable about all the material in it and so…if I tell them that and they ask me a question, a clarifying question, I might not be able to answer it real [sic] well.

Morgan was the only participant who had the opportunity to teach the same course at different times during the day, and used the time between the two class periods to filter or amplify her knowledge bases depending on her perception of the effectiveness of the first lesson, in order to prepare for the next class period:

> I would test things in first period and I would make adjustments…if I needed to add any more detailed instructions; or if I needed…built in more time; if I could incorporate groups differently; I would adjust throughout the day.

While it was an unrelated content area, Rebekah also provided an example of a learning experience that directly informed that way she thinks about teaching. She said:

> I was feeling really challenged in feed rations and so, [my high school agriculture teacher] had me sit down and plan out my feeding schedule from that day to fair and rate of gain and different fat contents and all that kind of stuff to figure out feed ratios… and so that was the way that she, kind of, adapted lessons to my needs.

Context was distinctly described in two ways, and it was evident that the context for learning and the context for teaching informed one another. Context proved to be an interesting point of reference as an observer. Participants discussed the differences between teacher centered instruction and learner centered instruction and mostly indicated wanting to provide learner centered instruction; however, many of the observed lessons were quite teacher centered. When prompted about how the lesson could have been more learner centered or what could be done differently, participants began reflecting on and conceptualizing how they would prepare differently, amplify or filter the content for student understanding differently, or facilitate student learning differently.

Conclusions/Recommendations/Implications

According to Kolb (2015), the learner is responsible for his or her own learning, and while learning involves repeated practice, time spent practicing does not always equate to improved performance. Kruger and Dunning (1999) argued those who are incompetent often reach incorrect conclusions and make poor choices, then fail to notice they have done so. We are fascinated with the manner in which preservice teachers manage to develop and transform their thinking about teaching and learning in such a short amount of time. This study began attempting to understand whether or not preservice agriculture teachers learn all they need to know about teaching through experience; whether life experience, educational experience, or experiences in their teacher education program. But what if they lacked experiences related to the content area they were expected to teach? What then, exactly, do preservice agriculture teachers need to know to be successful agriculture teachers; we believed from both personal experiences and anecdotally, an understanding of agricultural content was simply not enough.

Conceptual Framework

The proposed conceptual framework encourages constant re-evaluation of the knowledge bases necessary for teaching agriculture. While there may have been evidence these participants were developing PCK, it is unlikely they understood what that actually meant. Without an understanding of the conceptual framework or the PCK model, participants were unable to explain how they were merging content knowledge and pedagogical practices. Additionally, it is reasonable to assume the participants were only engaging in reflective practice because they were prompted to do so through the interview protocol.

In order for the conceptual framework to be useful, it would need to be included as a framework for student teacher development. They would need to be educated on the framework and given the tools to move beyond simply reflecting, but to conceptualizing how experiences can be used for teaching. Given the broad range of lesson topics that were observed, using the framework as a way to make sense of preservice teachers' preparedness, as well as future preparation to understand their own reflection-on-action and reflection-in-action, seems more effective than attempting to measure PCK for every subject area, which is consistent with previous work on reflective practice.

The Importance of Context

Anecdotally, we might expect that preservice or new teachers often struggle to provide student centered lessons. In relation to the conceptual framework, these participants exhibited underdeveloped knowledge bases for teaching. In addition, the amplifiers and filters they might apply to these knowledge bases were limited by their lack of experience. While a teacher education program is limited by time spent with preservice teachers, perhaps utilizing the conceptual framework to foster the ability for preservice teachers to not only reflect on prior learning experiences, but also move beyond reflection to conceptualizing practical applications of the learning experience is an important step in developing PCK in preservice teachers.

This study began with a constructivist orientation, however, the importance of context throughout the study also closely resembles how Lave and Wenger (1991) explain situated learning theory. Participants may very well have been constructing their own knowledge in attempting to learn content for teaching agriculture, although the contexts in which they were constructing this new knowledge was critical to their learning in order to teach. In addition, the contexts in which participants were teaching the content shaped their thinking about PCK, whether they identified their classroom practice as PCK or not. "Abstract representations are meaningless unless they can be made specific to the situation at hand" (Lave & Wenger, 1991, p.

33). This is the case with Kolb's (1984) learning cycle where abstract conceptualizations are contextualized through active experimentation.

Participants in this study provided evidence of the context-specific nature in which they had learned content for teaching. This context-specific, situated learning provides confirmation for the model for teacher development (see Figure 3), in which teacher professional knowledge bases and topic-specific professional knowledge are developed through the reflection on and application of specific experiences (i.e., the experiential learning cycle). For these participants, the learning of these knowledge bases needed for teaching was situated in practice, presumably the reason they felt they had learned more from preparing to teach the content than learning the content in the context of a college classroom.

PCK is the merging of knowledge bases needed for teaching (Shulman, 1986), and because the knowledge bases inform each other (Gess-Newsome, 2015), a deficiency in one knowledge base often results in a change in the other. Because the context in which participants learned the content varied from the context in which they were preparing to teach the content, the result was often to fall back on a teacher centered lesson design and delivery. The felt need to learn offers an interesting perspective on how teachers develop the knowledge bases needed for teaching, and for these participants, lessened their effectiveness at teaching the content. This deficit in content knowledge was even more exposed when the participant had not had any prior learning experiences related to the content. This is presumably the case among many preservice and early career teachers. Are there opportunities in teacher preparation programs to have all candidates work with lessons for which they have no background experiences?

When prompted, the participants began to reflect on their own teaching, and perhaps prior learning experiences, to conceptualize how or what they would change about the lesson given the opportunity to teach it again. Arguably, if preservice teachers are to be expected to reflect and conceptualize, perhaps this re-teaching opportunity should be an important component of teacher preparation programs as this engagement with the same content across multiple levels and in multiple opportunities may be key to reaching another level in their understanding of how students learn content.

References

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: Seven research-based principles for smart teaching*. John Wiley & Sons.

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching what makes it special? *Journal of Teacher Education*, *59*(5), 389-407. doi:10.1177/0022487108324554

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, D. C.: National Academy Press.

Bransford, J., Darling-Hammond, L., & LePage, P. (2005). Introduction. In L. Darling-Hammond & J. Bransford (Eds.) *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 1-39). San Francisco, CA: Jossey-Bass.

Cooper, R., Loughran, J., & Berry, A, (2015). Science teacher's PCK: Understanding sophisticated practice. In A. Berry, P. Friedrichsen, & J. Loughran (Eds.), *Re-examining Pedagogical Content Knowledge in Science Education*, (pp. 60-74). New York, NY: Routledge.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches.* Los Angeles, CA: Sage.

Darling-Hammond, L. & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco, CA: Jossey-Bass.

Darling-Hammond, L., & Sykes, G. (Eds.). (1999). *Teaching as the Learning Profession: Handbook of Policy and Practice*. San Francisco, CA: Josey-Bass.

Derry, S. J. (1996). Cognitive schema theory in the constructivist debate. *Educational Psychologist, 31*(3-4), 163-174. doi:10.1080/00461520.1996.9653264

Dewey, J. (1938/1997). *Experience and education.* New York: Simon and Schuster.

Edwards, M. C., & Thompson, G. (2010). Designing technical agriculture curriculum. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.). *Advancing and preparing teachers in agricultural education*, (pp. 112-129). Columbus, OH: Curriculum Materials Services.

Ferrari, M. (Ed.). (2002). *The pursuit of excellence through education*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Gess-Newsome, J. (2015). A model of teacher professional knowledge and skill including PCK. In A. Berry, P. Friedrichsen, & J. Loughran (Eds.), *Re-examining Pedagogical Content Knowledge in Science Education*, (pp. 28-42). New York, NY: Routledge.

Grossman, P., Schoenfeld, A., & Lee, C. (2005). Teaching subject matter. In L. Darling-Hammond & J. Bransford (Eds.) *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 201-231). San Francisco, CA: Jossey-Bass.

Hammerness, K., Darling-Hammond, L., Bransford, J., Berliner, D., Cochran-Smith, M., McDonald, M., & Zeichner, K. (2005). How teachers learn and develop. In L. Darling-Hammond & J. Bransford (Eds.) *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 358-389). San Francisco, CA: Jossey-Bass.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and* *development* (2nd ed.). Upper Saddle River, NJ: Pearson.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77*(6), 1121-1134. doi:10.1037/0022-3514.77.6.1121

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* New York, NY: Cambridge University Press.

Maxwell, J. A. (2013). *Qualitative research design: An interactive approach*. Thousand Oaks, CA: Sage.

Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.

Nilsson, P. (2008). Teaching for understanding: The complex nature of pedagogical content knowledge in pre-service education. *International Journal of Science Education*, *30*(10), 1281-1299.

Patton, M. Q. (2002). *Qualitative research and evaluation methods.* Thousand Oaks, CA: Sage.

Rice, A. H., & Kitchel, T. (2016). Deconstructing content knowledge: Coping strategies and their underlying influencers for beginning agriculture teachers. *Journal of Agricultural Education*, *57*(3), 208-222. doi:10.5032/jae.2016.03208

Roberts, T. G. (2006). A philosophical examination of experiential learning for agricultural educators. *Journal of Agricultural Education*, *47*(1), 17. doi:10.5032/jae.2006.0101

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds.) (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainsville, FL: Department of Agricultural Education and Communication.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4-14. Retrieved from https://www.jstor.org/stable/1175860?seq=1#page_scan_tab_contents

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, *57*(1), 1-23. doi:10.17763/haer.57.1.j463w79r56455411

Terry, Jr., R., & Briers, G. E. (2010). Roles of the secondary agriculture teacher. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.). *Advancing and preparing teachers in agricultural education*, (pp.86-98). Columbus, OH: Curriculum Materials Services.

Thompson, C. L., & Zeuli, J. S. (1999). The frame and tapestry: Standards-based reform and professional development. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 341-375). San Francisco, CA: Josey-Bass.

van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. New York, NY: State University of New York Press.

Pedagogical Content Knowledge and Experiential Learning: The Context for Teaching and Learning

Discussant remarks: J. C. Ricketts, Professor
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This article should be used as a model of what it means to build a study with theory as the base. The authors do a tremendous job making sure the reader understands experiential learning and pedagogical content knowledge prior to their investigation of the integration of the two.

The authors do not go into as much detail on the methods sections as some qualitative researchers. They noted that interview data was triangulated with classroom observations and field notes, but what does that mean? What was the interview protocol? How were the codes to be used identified? How did the themes emerge? How do you decide which excerpts from the interviews to share in the article?

The importance of experiences, not just content knowledge is reiterated in the conclusions section. How can teacher educators provide the right experience recipe for our students? Reflection is surely part of the recipe, but how do we get our students to reflect on the pedagogy and/or content knowledge needed for different lessons? What did the necessary prompts written about look like? Are these prompts integrated anywhere else in our evaluation systems?

Although this article is well written, it left me with the following questions that I think are worthy of discussion.

1. Are you aware of any successful models of PCK (i.e. whole programs, early experiences, courses, etc.) in agricultural education teacher preparation programs?

2. If you could re-do a curriculum of preserve teacher preparation with PCK in mind, what would it look like?

3. What is the best way to help students understand that they have the capacity and the experiences needed to be successful as an educator?

Let's Talk About It: Enhancing Civic Responsibility with Civic Engagement and Reflection

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Amanda Bowling, The Ohio State University
Anna Ball, University of Missouri

Civic engagement activities are utilized to enhance youth's citizenship skills and content knowledge, and to strengthen the community's status. Postactivity reflections can be utilized to strengthen the benefits of civic engagement activities but are often underutilized. This quasi-experimental study sought to determine the influence of guided reflection following FFA civic engagement activities on students' self-perceived civic responsibility. Through the use of a nonequivalent control group pretest-posttest design, four schools and students who participated in FFA civic engagement activities (n = 138) were randomly assigned to either a group discussion after reflection or a no-reflection group. It was found that throughout all time periods, students felt slightly connected to their community, community needs awareness, and civic efficacy. It was also found that the reflection treatment group exhibited statistically significantly higher community needs awareness and civic efficacy construct mean scores than the no-reflection group. It is recommended for FFA chapters to provide a wide variety of short-term civic engagement activities with reflection components.

Introduction and Conceptual Framework

Civic engagement activities unite human efforts and resources toward identifying and correcting existing community problems (Adler & Goggin, 2005; Camino & Zeldin, 2002; Diller, 2001; Jans, 2004). As a result of civic engagement, individuals form stronger bonds with other community members, enhance their sense of community pride, and increase their concern for improving the status of the community (Flanagan & Faison, 2001; Furco, Jones-White, Huesman, & Gorny, 2016). During adolescence, civic values are more likely to take shape as these individuals are far more open to learning civic concepts than in any other period of life; it may be adolescents' last opportunity to develop behaviors as positive contributors to society (Finlay, Wray-Lake, & Flanagan, 2010). Civic engagement allows youth to explore their identity beyond the familial home, acquire the societal norms of the adult world, and provide youth a positive connection to societal improvement (McIntosh, Metz, & Youniss, 2005; Seider, Soutter, & Clark, 2016). To initiate the steps of becoming engaged contributors to society, however, adolescent youth must first be presented the opportunity to become involved in civic engagement activities (Hart & Atkins, 2002; Langston, 1987). If adolescent youth miss the opportunity to become civically involved, their civic capacities in adulthood could be diminished (Finlay, Wray-Lake, Warren, & Maggs, 2014).

Civic engagement activities are often provided in schools and youth programs to enhance youths' citizenship skill development. Educators throughout the United States routinely utilize civic engagement activities to enhance students' content knowledge, develop citizenship skills, and simultaneously strengthen the community's status (Sherrod, 2005; Yates & Youniss, 1999; Youniss & Yates, 1997). FFA chapters can provide numerous civic engagement involvement outlets for youth, commonly offered as community-based service learning or curriculum-based service learning projects (National FFA Organization, 2016; 2017; Ricketts & Ricketts, 2011;

Woodward & Rudd, 2016). FFA sponsored civic engagement activities can occur in a variety of ways, including activities such as providing food to those unable to feed themselves, repairing or constructing community structures, or developing a community garden to educate the community on food production (National FFA Organization, 2017). Research indicates that short-term intensive community-based service learning projects support the competence, autonomy, and relatedness of the youth participants and also increases the likelihood of future participation in service projects (Kackar-Cam & Schmidt, 2014). FFA specific civic engagement activities potentially enhance agriculture students' sense of civic responsibility (Brandell & Hinck, 2005; Furco et al., 2016; Skinner & Chapman, 1999).

Civic engagement activities can enhance youths' capabilities as productive community members while simultaneously improving the status of local communities (Lin, 2015; Waterman, 1997). If schools and youth programs intend to develop responsible civic attitudes, it is crucial for these groups to utilize effective methods for facilitating meaningful civic engagement experiences. Civic engagement activities are a widely utilized component at all levels of FFA programming (National FFA Organization, 2016). However, the civic engagement component of FFA programming remains largely unexamined. As a result, current FFA civic engagement practices may not fully maximize students' civic learning and development.

A conceptual model (see Figure 1) was developed using existing youth development and civic engagement literature to guide the current investigation. The conceptual model focuses on the development of civic responsibility through participating in civic engagement activities and postengagement reflections. Civic responsibility encompasses three dimensions: an individual's connection to the community, awareness of existing community needs, and civic efficacy (Balsano, 2005; Evans & Prilleltensky, 2005; Furco, Muller, & Ammons, 1998; Lin, 2015; McGuire & Brown, 2015). Connection to the community represents that an individual perceives interconnectedness to other community members and can relate to other community members (Balsano, 2005; Mondak & Gearing, 1998). Community needs awareness signifies an individual's ability to identify and resolve existing communal issues (Evans & Prilleltensky, 2005). Civic efficacy is the mindset that an individual can and should solve existing community problems (Giles & Eyler, 1994; McGuire & Brown, 2015). Theoretically, youths' sense of civic responsibility increases as a result of civic engagement involvement.

However, the simple act of participating in civic engagement activities does not necessarily maximize civic responsibility development (Bringle & Hatcher, 1999; Finlay et al., 2014). A critical component to successful, meaningful, and developmentally constructive civic engagement involves time for youth to critically process the civic engagement experience using structured postactivity reflection (Billig, 2000; Mitchell et al., 2015). Civic engagement reflection has been defined as an activity that "connects the experience with content, skills, and values" of youth to the larger community through meaningful reflective dialogue (Billig, 2000, p. 662). The form of civic engagement reflections varies greatly, including reflective papers, journals, group projects, presentations, group discussions, peer debriefing, and one-on-one discussions (Blyth, Saito, & Berkas, 1997). Regardless of form, structured reflection requires youth to consciously examine, collaborate, and contemplate what occurred during the civic engagement activity as well as how the experience will impact them in the future (Bringle & Hatcher, 1999; Mitchell et al., 2015). The civic engagement experience, and ultimate learning, becomes more meaningful when youth critically assess the experience to create new ideals, beliefs, or viewpoints (Eyler & Giles, 1997).

Meaningful and effective civic engagement reflection includes three components (Bradley, 1997). The first component of structured guided reflection is conceptualization. Reflection links an individual's understanding of concrete events to more abstract conceptualizations beyond themselves (Camino & Zeldin, 2000; Conway, Amel, & Gerwein, 2009; Terry & Bohnenberger, 2004). Formally implemented structured reflection offers a more consistent level of cognitive processing for all involved youth (Eyler & Giles, 1997). Structured reflection also provides a more equal opportunity for all youth to process the experience and ultimately reach higher levels of understanding. The second component of structured guided reflection is the realization of ability and impact. Most event reflection by youth increases their personal investment for improving community problems and allows them to have a more powerful intellectual experience when consistently utilized (Eyler, Giles, & Braxton, 1995; Greene & Diehm, 1995). The final component of structured guided reflection is transfer to future situations. Reflection must objectively direct youth to think about the implications of their civic engagement experiences. Adults should guide youths' thinking so as to transfer what is learned from the civic engagement experience to other situations (Hofer, 1999; Mitchell et al., 2015). Youth will derive little meaning from ambiguous reflection and will fail to consider the experience in more global ways (Bringle & Hatcher, 2004).

Civic engagement activities should include a meaningful and thoughtfully structured postactivity reflection component (Waterman, 1997). Post-civic engagement reflection enhances youths' conceptualization of the civic engagement experience, realization of civic impact, and transfer of knowledge to future civic situations (Bringle & Hatcher, 1999). If civic engagement experiences lack reflection, students may not reach their full developmental potential (Blyth et al., 1997; Hatcher & Bringle, 1997). The utilization and effect of reflection within FFA civic engagement programming holds great potential but remains largely unexplored.

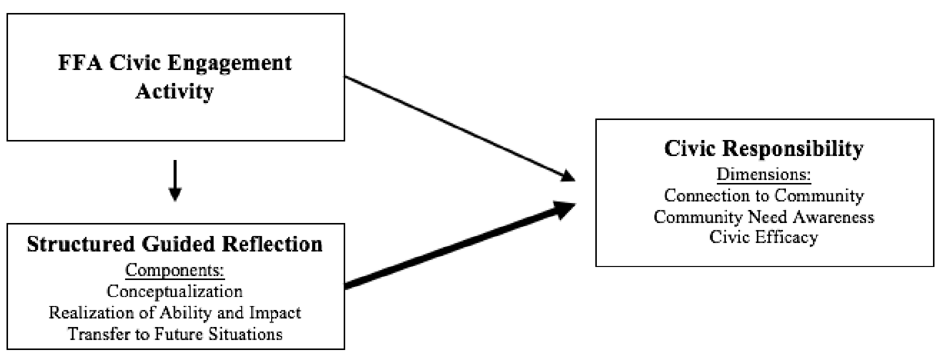

Figure 1. Conceptual model of critical components during FFA civic engagement activities.

Purpose and Objectives

The purpose of this study was to determine the influence of guided reflection following FFA civic engagement activities on students' self-perceived civic responsibility. The research specifically addressed the National Research Agenda Research Priority Area 6: Vibrant, Resilient Communities (Roberts, Harder, & Brashears, 2016). The following research objectives and null hypothesis were generated to guide the study:

1. Describe students' self-perceived levels of civic responsibility.
2. Compare the effect of post-civic engagement reflection on students' levels of civic responsibility.

   H_0: μ Reflection = μ No reflection

   In the population, no statistical difference exists within the students' level of civic responsibility based upon the level of post-civic engagement reflection.

Methods

This study utilized a quasi-experimental, nonequivalent control group pretest-posttest design (see Table 1; Ary, Jacobs, & Sorensen, 2010; Shadish, Cook, & Campbell, 2002). The nonequivalent control group pretest-posttest design is appropriate because subjects within intact existing groups, such as FFA chapters, cannot be randomly assigned to groups to establish equality (Shadish et al., 2002). Students' self-perceived levels of civic responsibility were measured utilizing a paper and pencil format of the Civic Reasonability Scale consisting of three constructs: (a) connection to the community- students felt they had a relationship with their community; (b) community needs awareness- students felt they could identify existing societal issues; and (c) civic efficacy- students felt they had the skills and ability to influence community issues in a positive way (Furco, Muller, & Ammons, 1998). Responses were based on a six-point Likert-type scale with anchors of 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Slightly Disagree*, 4 = *Slightly Agree*, 5 = *Agree*, and 6 = *Strongly Agree*. Furco et al. (1998) established content validity and reliability estimates yielding a Cronbach's alpha range of .76 to .93 for all constructs. We determined the instrument as a valid and reliable measure of self-perceived civic responsibility (Nunnally, 1978).

We gathered data on the same unit of student subjects, making it a dependent samples design. Four schools were selected for participation because they consistently provided FFA sponsored civic engagement activities lacking a reflection component. The design utilized four data collection periods: November, Year 1; May, Year 2; November, Year 2; and March, Year 3. Upon conclusion of the third data collection point, schools were randomly assigned to the control or experimental groups. Two schools were randomly assigned to provide a teacher-facilitated reflection treatment protocol to deliver in a group discussion format. The reflection protocol was adapted from the Six Step Civic Reflection Process (Bradley, 1997) and provided a consistent treatment among treatment group subjects. The other two FFA chapters provided civic engagement activities without reflection (see Table 1).

Table 1
Graphic Representation of the Research Design

	Pretest					Posttest
Group	Period 1	Period 2	Period 3	Assignment	Treatment	Period 4
School 1	O_1	O_2	O_3	Random	Control	O_4
School 2	O_1	O_2	O_3	Random	Control	O_4

School 3	O_1	O_2	O_3	Random	$X_{\text{Reflection}}$	O_4
School 4	O_1	O_2	O_3	Random	$X_{\text{Reflection}}$	O_4

FFA advisors of the programs selected for the reflection treatment group were provided training on reflection protocol expectations as well as scripted reflection questions to ask students immediately following civic engagement activities. The participating schools provided the researcher a sample of 372 students. Students who participated in FFA civic engagement activities before and after the treatment assignment (n = 138) were the final usable sample from which data was gathered during all four periods. The final usable sample (n = 138) were students who participated in at least one FFA civic engagement activity during each time period. We viewed these students as a time and place sample and deemed the results inferable to past and future individuals within the four FFA chapters (Oliver & Hinkle, 1982). Respondents self-reported themselves as mostly 15 years old, male, in 9th grade, white, lived on a rural farm, and had grades of mostly A's and B's.

We used descriptive statistics to analyze the findings for Research Objective 1. For Research Objective 2, We used analyses of covariance (ANCOVA) to compare groups' mean scores in order to test the null hypothesis. First, We used a Levene's test of equality of variance to test the homogeneity of variance assumption. They tested the null hypothesis stating that no differences existed in the error variance between treatment groups for the connection to community construct ($F_{1,136}$ = 0.15, p = .70), community needs awareness construct ($F_{1,136}$ = 0.01, p = .93), and civic efficacy ($F_{1,136}$ = 0.04, p = .84). The differences of error variances were not statistically significant for any construct; the assumption of homogeneity of variance was tenable. For all statistical analyses, alpha levels were set a priori at $\alpha = 0.05$.

Findings

Research Objective 1 sought to describe students' levels of self-perceived civic responsibility. Civic responsibility was operationally defined as (a) connection to the community; (b) community needs awareness; and (c) civic efficacy. Table 2 displays the means and standard deviations for civic responsibility constructs by school for each time period as well as the summated civic responsibility construct scores. In regard to the connection to the community construct, students from School 1 (M = 4.58; SD = 0.77) and School 4 (M = 4.73; SD = 1.00) reported an overall response of agree. Respondents indicated they slightly agreed with the connection to the community at School 3 (M = 4.48; SD = 0.84) and School 2 (M = 4.22; SD = 0.86). Students from all four schools slightly agreed with the community needs awareness construct. The community needs awareness construct means scores ranged from 3.59 (SD = 0.89) to 4.29 (SD = 1.00) across all schools. Students from School 4 reported the highest overall level of community needs awareness (M = 4.29; SD = 1.00) among all schools, followed by students from School 1 (M = 4.58; SD = 0.77), students from School 3 (M = 3.99; SD = 0.88), and students from School 2 (M = 3.59; SD = 0.89). Students from School 1 (M = 4.16; SD = 0.92), School 3 (M = 3.84; SD = 0.97), and School 4 (M = 4.28; SD = 1.02) responded overall with slightly agree when presented with the civic efficacy construct. Students from School 2 reported the lowest levels of agreement with the continued participation construct, responding that overall they slightly disagree (M = 3.40; SD = 0.96).

Table 2

Students' Self-Perceived Levels of Civic Responsibility (*n* = 282)

Civic responsibility construct	Period 1			Period 2			Period 3			Period 4			Total		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
School 1															
Connection to the community	58	4.78	0.80	41	4.70	0.76	55	4.45	0.99	58	4.53	0.89	58	4.58	0.77
Community needs awareness	58	4.42	0.81	41	4.30	0.96	55	4.12	1.08	58	4.18	0.89	58	4.20	0.84
Civic efficacy	58	4.27	1.02	41	4.26	1.03	55	4.08	1.11	58	4.24	0.92	58	4.16	0.92
School 2															
Connection to the community	59	4.49	0.93	58	4.15	1.08	59	4.10	1.02	59	4.15	1.11	59	4.22	0.86
Community needs awareness	59	3.79	1.06	58	3.53	1.12	59	3.46	1.02	59	3.62	1.17	59	3.59	0.89
Civic efficacy	59	3.66	1.07	58	3.20	1.24	59	3.34	1.17	59	3.43	1.24	59	3.40	0.96
School 3															
Connection to the community	137	4.61	0.85	121	4.51	0.92	127	4.39	1.01	137	4.46	1.07	137	4.48	0.84
Community needs awareness	137	4.02	0.86	121	3.99	0.99	127	3.96	1.04	137	4.06	1.13	137	3.99	0.88
Civic efficacy	137	3.89	1.01	121	3.85	1.02	127	3.76	1.17	137	3.92	1.21	137	3.84	0.97
School 4															
Connection to the community	27	4.97	0.63	27	4.83	0.91	28	4.83	0.74	28	4.68	1.21	28	4.73	1.00
Community needs awareness	27	4.38	0.65	27	4.49	0.85	28	4.29	0.93	28	4.35	1.26	28	4.29	1.00
Civic efficacy	27	4.20	0.98	27	4.41	1.02	28	4.27	1.26	28	4.44	1.19	28	4.28	1.02

Civic responsibility construct scores for each school were collapsed within each time period to form summated construct scores (see Table 3). The summated levels of students' self-perceived civic responsibility among all schools revealed that students slightly agreed they had feelings of connection to the community (*M* = 4.47; *SD* = 0.85), community needs awareness (*M* = 3.98; *SD* = 0.91), and civic efficacy (*M* = 3.86; *SD* = 1.00).

Table 3
Summated Levels of Students' Self-Perceived Civic Responsibility Among All Schools (*n* = 282)

Civic responsibility construct	Period 1 (*n* = 282)		Period 2 (*n* = 247)		Period 3 (*n* = 269)		Period 4 (*n* = 282)		Total (*n* = 282)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Connection to the community	4.66	0.84	4.49	0.95	4.38	1.00	4.43	1.07	4.47	0.85
Community needs awareness	4.09	0.91	3.99	1.04	3.92	1.06	4.02	1.13	3.98	0.91
Civic efficacy	3.96	1.04	3.83	1.14	3.79	1.19	3.93	1.20	3.86	1.00

Note. Coded: 1–1.50 = *Strongly Disagree*, 1.51–2.50 = *Disagree*, 2.51–3.50 = *Slightly Disagree*, 3.51–4.50 = *Slightly Agree*, 4.51–5.50 = *Agree*, and 5.51–6 = *Strongly Agree*.

Objective 2 sought to compare the effect of a post-civic engagement reflection on students' civic responsibility. The researcher used ANCOVA to compare group mean scores and test the null hypothesis. Civic responsibility scores for time Periods 1 through 3 were collapsed into a single pretreatment civic responsibility score for comparison to the single posttreatment civic responsibility score. Summary statistics for treatment groups were calculated for comparison of all subjects (*n* = 138).

Connection to Community

As shown in Table 4, students in the no reflection group had an overall pretreatment connection to community construct mean score of 4.66 (*SD* = 0.78) and an overall posttreatment connection to community construct mean score of 4.50 (*SD* = 0.98). Students in the reflection group had an overall pretreatment connection to community construct mean score of 4.68 (*SD* = 0.75) and an overall posttreatment connection to community construct mean score of 4.71 (*SD* = 0.94).

Table 4
Comparison of Pretreatment and Posttreatment Connection to Community Construct Mean Scores between No Reflection and Reflection Groups (*n* = 138)

		Pretreatment				Posttreatment			
				Range				Range	
Group	*n*	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
No Reflection	53	4.66	0.78	1.00	6.00	4.50	0.98	1.00	6.00
Reflection	85	4.68	0.73	1.00	6.00	4.71	0.94	1.00	6.00

Total	138	4.67	0.75	1.00	6.00	4.63	0.96	1.00	6.00

Note. Coded: 1–1.50 = *Strongly Disagree*, 1.51–2.50 = *Disagree*, 2.51–3.50 = *Slightly Disagree,* 3.51–4.50 = *Slightly Agree*, 4.51–5.50 = *Agree*, and 5.51–6 = *Strongly Agree*.

We tested the null hypothesis for the connection to community construct using ANCOVA and used students' pretreatment connection to community construct scores as the covariate (see Table 5). The *F*-value ($F_{2,135} = 2.52$, $p = .12$) was not statistically significant, indicating there was no difference among students' connection to community construct scores between treatment groups when controlling for pretreatment connection to community construct scores.

Table 5
Analysis of Covariance (ANCOVA) in Connection to Community Construct Scores by Treatment Group ($n = 138$)

Source	Sum of Squares	*df*	Mean Square	*F*	*p*
Treatment Group	1.19	1	1.19	2.52	.12
Covariate	60.23	1	60.23	127.38	.01*
Error	63.83	135			

Note. Adjusted $R^2 = 0.48$; $*p \leq .05$.

Community Needs Awareness

As shown in Table 6, students in the no reflection group had an overall pretreatment community needs awareness construct mean score of 4.20 (*SD* = 0.85) and an overall posttreatment community needs awareness construct mean score of 4.10 (*SD* = 1.07). Students in the reflection group had an overall pretreatment community needs awareness construct mean score of 4.23 (*SD* = 0.74) and an overall posttreatment community needs awareness construct mean score of 4.41 (*SD* = 1.03).

Table 6
Comparison of Pretreatment and Posttreatment Community Needs Awareness Construct Mean Scores between No Reflection and Reflection Groups ($n = 138$)

		Pretreatment				Posttreatment			
				Range				Range	
Group	*n*	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
No reflection	53	4.20	0.85	1.00	6.00	4.10	1.07	1.00	6.00
Reflection	85	4.23	0.74	1.00	6.00	4.41	1.03	1.00	6.00
Total	138	4.22	0.78	1.00	6.00	4.30	1.05	1.00	6.00

Note. Coded: 1–1.50 = *Strongly Disagree*, 1.51–2.50 = *Disagree*, 2.51–3.50 = *Slightly Disagree,* 3.51–4.50 = *Slightly Agree*, 4.51–5.50 = *Agree*, and 5.51–6 = *Strongly Agree*.

We tested the null hypothesis for the community needs awareness construct using ANCOVA and used students' pretreatment community needs awareness construct scores as the covariate (see

Table 7). The F-value ($F_{2,135} = 4.44$, $p = .04$, $\eta^2 = 0.02$) was statistically significant, indicating a significant difference existed among students' community needs awareness construct scores between treatment groups when controlling for pretreatment community needs awareness construct scores.

Table 7
Analysis of Covariance (ANCOVA) in Community Needs Awareness Construct Scores by Treatment Group (n = 138)

Source	Sum of Squares	*df*	Mean Square	*F*	*p*
Treatment group	2.53	1	2.53	4.44	.04*
Covariate	72.29	1	72.29	126.98	.01*
Error	76.8863	135			

Note. Adjusted $R^2 = 0.49$; $^*p \leq .05$.

Civic Efficacy

As shown in Table 8, students in the no reflection group had an overall pretreatment civic efficacy construct mean score of 4.15 (*SD* = 0.89) and an overall posttreatment civic efficacy construct mean score of 4.11 (*SD* = 1.05). Students in the reflection group had an overall pretreatment civic efficacy construct mean score of 4.10 (*SD* = 0.93) and an overall posttreatment civic efficacy construct mean score of 4.35 (*SD* = 1.12).

Table 8
Comparison of Pretreatment and Posttreatment Civic Efficacy Construct Mean Scores between No Reflection and Reflection Groups (n = 138)

		Pretreatment				Posttreatment			
				Range				Range	
Group	*n*	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
No reflection	53	4.15	0.89	1.00	6.00	4.11	1.05	1.00	6.00
Reflection	85	4.10	0.93	1.00	6.00	4.35	1.12	1.00	6.00
Total	138	4.12	0.91	1.00	6.00	4.26	1.09	1.00	6.00

Note. Coded: 1–1.50 = *Strongly Disagree*, 1.51–2.50 = *Disagree*, 2.51–3.50 = *Slightly Disagree*, 3.51–4.50 = *Slightly Agree*, 4.51–5.50 = *Agree*, and 5.51–6 = *Strongly Agree*.

The null hypothesis for the civic efficacy construct was tested using ANCOVA and used students' pretreatment civic efficacy construct scores as the covariate (see Table 9). The F-value ($F_{2,135}$ = 5.02, $p = .03$, $\eta^2 = 0.02$) was statistically significant, indicating a significant difference existed among students' civic efficacy construct scores between treatment groups when controlling for pretreatment civic efficacy construct scores.

Table 9

Analysis of Covariance (ANCOVA) in Civic Efficacy Construct Scores by Treatment Group (*n* = 138)

Source	Sum of Squares	*df*	Mean Square	*F*	*p*
Treatment group	2.78	1	2.78	5.02	.03*
Covariate	87.39	1	87.39	157.81	.01*
Error	74.76	135			

Note. Adjusted $R^2 = 0.54$; $*p \leq .05$.

We rejected the null hypothesis stating that no difference existed between the groups' levels of civic responsibility in favor of the research hypothesis. Summary statistics for treatment group comparisons indicated students who participated in FFA civic engagement activities and also experienced post-civic engagement reflection had significantly higher levels of civic responsibility.

Conclusions, Implications, and Recommendations

Regarding Research Objective 1, throughout all time periods, students slightly agreed with feeling connected to their community, possessed slight community needs awareness, and slight civic efficacy. We concluded that, overall, students viewed themselves as somewhat responsible for the well-being of their immediate communities. All students' levels of self-perceived civic responsibility decreased throughout the first three time periods; students' levels of self-perceived civic responsibility increased from Period 3 to Period 4. We also concluded that students' self-perceived levels of civic responsibility had a tendency to decrease over time.

The results regarding students' levels of self-perceived civic responsibility suggest that students possess positive civic attitudes related to civic responsibility; however, youth don't necessarily feel strongly about their role as a responsible community member. It can be implied that there is room for improvement in civic attitudes with this group of students. These students' civic attitudes are positive, but not necessarily strong.

Students reported decreasing trends in self-perceived civic responsibility over time. Several implications can be made from this conclusion. First, adolescence is a developmental time period when youth experiment and come to know the adult world beyond their immediate home (Dwyer & Hunt-Jackson, 2002; Lerner, 2009). Adolescent youth may naturally develop a more critical perception of their own civic attitudes based upon civic engagement experiences (Levine & Higgins-D'Alessandro, 2010). Second, none of these FFA chapters provided a post-civic engagement reflection component prior to Period 4. A final explanation of students' decreasing levels of civic responsibility could be that a lack of reflection following civic engagement reduces students' civic attitudes. Civic engagement without reflection can be harmful to youths' civic attitudes (Blyth et al., 1997). In other words, FFA civic engagement activities without reflection could potentially do more harm than good to students' civic attitudes. Finally, the decrease in civic responsibility scores could be attributed simply to test wiseness of the subjects in the study.

Regarding Research Objective 2, students in both treatment groups displayed similar pretreatment scores for each civic responsibility construct. The differences between the treatment groups' mean pretreatment civic responsibility construct scores ranged from 0.02 to 0.05. We concluded that students had similar levels of self-perceived civic responsibility construct scores prior to the experimental treatment. It should be noted that although this study sought to control variance differences between groups by utilizing a quasi-experimental design, it is not possible to entirely account for all prior experiences and reflection levels of subjects. This limitation should be considered when interpreting these results. We operated under the assumption that prior experiences were generally homogenous among all subjects.

Differences existed between posttreatment civic responsibility construct scores when controlling for pretreatment civic responsibility construct scores. Students in the reflection treatment group displayed higher average scores than the no reflection group for all three civic responsibility construct scores. The reflection groups' posttreatment connection to community construct score was 0.21 higher than the no reflection group, but the difference between means was not statistically significant. The reflection treatment group exhibited significantly higher community needs awareness and civic efficacy construct mean scores than the no reflection group. We concluded that students who experienced a structured reflection following FFA civic engagement activities gained higher levels of self-perceived civic responsibility. The positive influence of structured reflection aligns with the works of numerous scholars supporting the benefits of post-civic engagement reflection (Bringle & Hatcher, 1999; Camino & Zeldin, 2000; Conway et al., 2009; Stafford, Boyd, & Lindner, 2003; Terry & Bohnenberger, 2004; Youniss & Yates, 1997). However, this finding provides the first empirical support of structured student reflection within FFA civic engagement programming.

Finally, students in the reflection group displayed an increase in mean scores among all three constructs of civic responsibility from pretreatment to posttreatment measures. Conversely, students in the no reflection group showed a decrease in all three constructs from the pretreatment to posttreatment measures. We concluded that youth decline in their level of self-perceived civic responsibility when not provided a structured reflection following FFA civic engagement activities. This conclusion supports existing literature stating that youth can develop less responsible attitudes from civic engagement lacking a reflection component (Blyth et al., 1997). This finding is also a unique contribution to youth development programming within FFA programming.

The conclusions implied that reflection components of civic engagement can potentially serve as a valuable pedagogical tool within FFA programming. Through reflection, youth can enhance their connection with their community, their awareness of community needs, and their efficacy toward improving community issues. While benefits of civic engagement reflection exist, civic engagement opportunities provided at the local, state, or national levels rarely promote or provide reflection components (National FFA Organization, 2016). Additionally, the participating FFA chapters did not routinely utilize structured reflection prior to treatment group assignments. It could be implied that while adult FFA leaders recognize the importance of civic engagement, they are unaware of the value of reflection for student development. It could be further implied that adult FFA leaders lack the resources or skills necessary to conduct civic engagement based reflection sessions with youth.

Secondly, the differences between treatment groups were all positive, and two of the three were statistically significant. Some scholars and practitioners may argue that these differences are impractical. However, the treatment length lasted less than four months, a relatively short period of time compared to long-term civic engagement and reflection models (Bringle & Hatcher, 1999; Waterman, 1997). Thus, FFA civic engagement activities that utilize reflection for periods of time longer than four months could deliver more significant impact on students' self-perceived level of civic responsibility (Bringle & Hatcher, 2004).

Finally, the conclusions suggest that FFA civic engagement activities without reflection actually reduce the students' level of civic responsibility. It can be implied from this that students may actually lose citizenship skills purported to be gained during FFA civic engagement activities if they are not allowed to reflect on their civic engagement experiences. No reflection following FFA civic engagement activities could lead to youth becoming less effective community members (Blyth et al., 1997).

From the conclusions and implications, is it recommended for FFA chapters to provide a wide range of short-term civic engagement activities that incorporate long-term reflection components. Post-civic engagement reflections will allow youth to thoughtfully examine their experiences and will be more likely to gain positive citizenship attitudes. Adult FFA leaders should develop a comprehensive plan to connect each civic engagement activity and allow the reflections to scaffold the youths' civic responsibility. The National FFA Organization, state staff, and teacher educators should provide professional development for in-service teachers to engage them in impactful civic engagement activities that incorporate post-activity reflections. Teacher educators should also focus on incorporating lessons that emphasize the importance of immersing youth in civic engagement and strengthen civic responsibility through developed reflections. The preservice lessons and in-service professional development workshops should focus on developing the teachers' ability to develop nonformal student reflections, which connect the various civic engagement experiences students have outside of the agriculture classroom.

It is also recommended that this study be replicated on a larger sample and should utilize more rigorous sampling methods. Researchers should also further define the various types of civic engagement activities. Such an investigation could examine whether certain civic engagement activities are more impactful on youths' civic responsibility development than others. Researchers should also investigate the effectiveness of different post-civic engagement reflection approaches. The type of reflection utilized in the current study consisted of a teacher-led group discussion with students following FFA civic engagement activities. Other types of reflection may be more effective to enhancing students' civic attitudes.

References

Adler, R. P., & Goggin, J. (2005). What do we mean by "civic engagement"? *Journal of Transformative Education*, *3*(3), 236–253. doi:10.1177/1541344605276792

Ary, D., Jacobs, L. C., & Sorensen, C. (2010). *Introduction to research in education*. Belmont, CA: Wadsworth Cengage Learning.

Balsano, A. D. (2005). Youth civic engagement in the United States: Understanding and addressing the impact of social impediments on positive youth and community development. *Applied Developmental Science*, *9*(4), 188–201. doi:10.1207/s1532480xads0904_2

Billig, S. H. (2000). Research on K-12 school-based service-learning: The evidence builds. *Phi Delta Kappan*, *81*(9), 658–664.

Blyth, D. A., Saito, R., & Berkas, T. (1997). A quantitative study of the impact of service-learning programs. In A. S. Waterman (Ed.), *Service-learning: Applications from the research* (pp. 39–56). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Bradley, L. R. (1997). Evaluating service-learning: Toward a new paradigm. In A. S. Waterman (Ed.), *Service-learning: Applications from the research* (pp. 151–172). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Brandell, M. E., & Hinck, S. (2005). Service learning: Connecting citizenship with the classroom. *Journal of Service Learning*, *81*(591), 49–56. doi:10.1177/019263659708159109

Bringle, R. G., & Hatcher, J. A. (1999). Reflection in service learning: Making meaning of experience. *Educational Horizons*, *77*, 179–185.

Bringle, R. G., & Hatcher, J. A. (2004). Designing effective reflection: What matters to service learning?. *Michigan Journal of Community Service Learning 11*(1), 38 -46.

Camino, L., & Zeldin, S. (2002). From periphery to center: Pathways for youth civic engagement in the day-to-day life of communities. *Applied Developmental Science*, *6*(4), 212–219. doi:10.1207/S1532480XADS0604_8

Conway, J. M., Amel, E. L., & Gerwein, D. P. (2009). Teaching and learning in the social context: A meta-analysis of service learning effects on academic, personal, social, and citizenship outcomes. *Teaching of Psychology*, *36*(4), 233–245. doi:10.1080/00986280903172969

Diller, E. C. (2001). *Citizens in service: The challenge of delivering civic engagement training to national service programs.* Washington, DC: Corporation for National and Community Service.

Dwyer, D., & Hunt-Jackson, J. (2002). The life span perspective. In J. S. Wodarski & S. F. Dziegielewski (Eds.), *Human behavior and the social environment: Integrating theory and evidence-based practice* (pp. 84–109). New York, NY: Springer Publishing Company, Inc.

Evans, S., & Prilleltensky, I. (2005). Youth civic engagement. In M. Ungar (Ed.), *Handbook of working with children and youth: Pathways to resilience across cultures and contexts* (pp. 405–415). Thousand Oaks, CA: Sage Publications.

Eyler, J., & Giles, D. E. (1997). The importance of program quality in service-learning. In A. S. Waterman (Ed.), *Service-learning: Applications from the research* (pp. 57–76). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Eyler, J., Giles, D. E., & Braxton, J. (1995). The impact of alternative models of service-learning on student outcomes. Paper presented at the meeting of the National Society for Experiential Education, New Orleans, LA.

Finlay, A., Wray-Lake, L., & Flanagan, C. A. (2010). Civic engagement during the transition to adulthood: Developmental opportunities and social policies at a critical juncture. In L. R. Sherrod, J. Torney-Purta, & C. A. Flanagan (Eds.), *Handbook of research on civic engagement in youth* (pp. 277–306). Hoboken, NJ: John Wiley & Sons, Inc.

Finlay, A., Wray-Lake, L., Warren, M., & Maggs, J. (2014). Anticipating their future: Adolescent values for the future prediction of adult behaviors. *International Journal of Behavioral Development*, *39*(1), 359–367. doi: 10.1177/0165025414544231

Flanagan, C., & Faison, N. (2001). Youth civic development: Implications of research for social policy and programs. *Social Policy Report*, *15*(1), 3–15.

Furco A., Jones-White D., Huesman R., Gorny L. (2016) Modeling the influence of service-learning on academic and sociocultural gains: Findings from a multi-institutional study. In K. Soria & T. Mitchell (Eds.) *Civic engagement and community service at research universities*. Palgrave Studies in Global Citizenship Education and Democracy (pp. 143–163). Palgrave Macmillan, London. doi: https://doi.org/10.1057/978-1-137-55312-6_8

Furco, A., Muller, P., & Ammons, M. (1998). *Pre-post civic responsibility survey.* Berkeley, California: Service Learning Research and Development Center.

Giles, D. E., & Eyler, J. (1994). The impact of a college community service laboratory on students' personal, social, and cognitive outcomes. *Journal of Adolescence, 17*(4), 327-339. doi:10.1006/jado.1994.1030

Greene, D., & Diehm, G. (1995). Educational and service outcomes of a service integration effort. *Michigan Journal of Community Service Learning, 2*, 54–62.

Hart, D., & Atkins, R. (2002). Civic competence in urban youth. *Applied Developmental Science, 6*(4), 227–236. doi:10.1207/S1532480XADS0604_10

Hatcher, J. A., & Bringle, R. G. (1997). Reflection: Bridging the gap between service and learning. *College Teaching, 45*(4), 153–158. doi:10.1080/87567559709596221

Hofer, M. (1999). Community service and social cognitive development in German adolescents. In J. Yates & M. Youniss (Eds.), *Roots of civic identity* (pp. 114–134). New York, NY: Cambridge University Press.

Jans, M. (2004). Children as citizens: Towards a contemporary notion of child participation. *Childhood, 11*(1), 27–44. doi:10.1177/0907568204040182

Kackar-Cam, H., & Schmidt, J. A. (2014). Community-based service-learning as a context for youth autonomy, competence, and relatedness. *The High School Journal, 98*(1), 83–108.

Langston, S. (1987). Strengthening citizen participation. *National Civic Review, 76*(1). 225–226. doi: http://dx.doi.org/10.1017/S1537592708080584

Lerner, R. (2009). *The positive youth development perspective: Theoretical and empirical bases of strengths-based approach to adolescent development*. In S. Lopez & C. Snyder (Eds.), *Oxford handbook of positive psychology* (pp. 149–163). New York, NY: Oxford University Press.

Levine, P., & Higgins-D'Alessandro, A. (2010). Youth civic engagement: Normative issues. In L. R. Sherrod, J. Torney-Purta, & C. A. Flanagan (Eds.), *Handbook of research on civic engagement in youth* (pp. 115–138). Hoboken, NJ: John Wiley & Sons, Inc.

Lin, A. (2015). *Citizenship education in American schools and its role in developing civic engagement: A review of the research. Educational Review, 67*(1), 35–63. doi: http://dx.doi.org/10.1080/00131911.2013.813440

McGuire, J. K., & Brown, M. (2015). Types and conditions of service learning. In J. Field, B. Schmidt-Hertah, & A. Waxenegger (Eds.), *Universities and engagement: International perspectives on higher education and lifelong learning* (pp. 117–129). New York, NY: Routledge, Taylor, & Francis Group.

McIntosh, H., Metz, E., & Youniss, J. (2005). Community service and identity formation in adolescents. In J. Mahoney, R. Larson, & J. Eccles (Eds.), *Organized activities as contexts of development: Extracurricular activities, after-school, and community programs* (pp. 331–351). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Mitchell, T. D., Richard, F. D., Battistoni, R. M., Rost-Banik, C., Netz, R., & Zakoske, C. (2015). Reflective practice that persists: Connections between reflection in service-learning programs and in current life. *Michigan Journal of Community Service Learning, 21*(2), 49–63. doi:

Mondak, J. J., & Gearing, A. F. (1998). Civic engagement in a post-communist state. *Political Psychology, 19*(3), 615-637. doi:10.1111/0162-895X.00121

National FFA Organization. (2016). *Official FFA manual*. Indianapolis, IN: National FFA Organization.

National FFA Organization. (2017). Retrieved from www.ffa.org.

Nunnally, J. C. (1978). *Psychometric theory*. New York, NY: McGraw-Hill.

Oliver, J. D., & Hinkle, D. E. (1982). Occupational education research: Selecting statistical procedures. *Journal of Studies in Technical Careers*, *4*(3), 199–207.

Ricketts, C., & Ricketts, J. C. (2011). *Leadership: Personal growth and career success*. Clifton Park, NY: Delmar.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Seider, S., Soutter, M., & Clark, S. (2016). The role of character and character education in fostering student success at school. In K. R. Wentsel & G. B. Ramani (Eds.), *Handbook of social influences in school contexts: Social-emotional, motivation, and cognitive outcomes* (pp. 293–311). New York, NY: Routledge, Taylor, & Francis Group.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin Company.

Sherrod, L. (2005). Ensuring liberty by promoting youth development. *Human Development, 48*(6), 376–381. doi:10.1159/000088256

Skinner, R., & Chapman, C. (1999). *National student service-learning and community service survey.* Washington, DC: U.S. Department of Education.

Stafford, J. R., Boyd, B. L., & Lindner, J. R. (2003). The effects of service learning on leadership life skills of 4-H members. *Journal of Agricultural Education, 44*(1), 10–21. doi:10.5032/jae.2003.01010

Terry, A. W., & Bohnenberger, J. E. (2004). Blueprint for incorporating service learning: A basic, developmental, K-12 service learning typology. *Journal of Experiential Education, 27*(1), 15–31.

Waterman, A. S. (1997). An overview of service-learning and the role of research and evaluation in service-learning programs. In A. S. Waterman (Ed.), *Service-learning: Applications from the research* (pp. 39–56). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Woodward, L., & Rudd, R. (2016). Service learning impacts and application in agricultural education. *The Agricultural Education Magazine, 89*(1), 9.

Yates, M., & Youniss, J. (1999). Promoting identity development: Ten ideas for school-based service programs. In J. Claus & C. Ogden (Eds.), *Service learning for youth empowerment and social change* (pp. 43–68). New York, NY: Peter Lang Publishing, Inc.

Youniss, J. & Yates, M. (1997). *Community service and social responsibility in youth: Theory and policy*. Chicago, IL: University of Chicago Press.

Let's Talk About It: Enhancing Civic Responsibility with Civic Engagement and Reflection

Discussant remarks: J. C. Ricketts, Professor
Tennessee State University

I commend the authors on a very well designed study, complete with a hypothesis, which is not used much in our profession. The authors provide an overview of the existing literature and appropriately build a case for the need of the study. The authors present a well-written conceptual framework that helps the reader understand and interpret the study, but the theory base seemed limited. The paper stated that "theoretically, youths' sense of civic responsibility increases as a result of civic engagement involvement,' but it was not clear to me why. I assumed it was related to Bandura and his theory related to behavior prediction, but I wasn't sure. Providing examples of civic engagement activities could strengthen the manuscript. Recommendations were made regarding future studies that examined the impact of different types of activities, but I found myself wondering about what civic engagement activities might look like throughout my time reading the manuscript. The authors methods were as sound and appropriate, but I have two questions for discussion.

4. What was the purpose behind three pre-test observations and only one post-test observation?
5. An effect size was reported for the difference between groups, measured by ANCOVA. However, the effect size was not interpreted. How would you interpret the effect size and does this interpretation have any impact on the discussion?

Lastly, the Conclusions, Implications, and Recommendations section of this paper is vry well written. Below I've provided a few questions/thoughts for you to consider related to this section.

1. How does your team propose to strengthen youth's self-perceived responsibility?

2. Why do you think FFA civic engagement activities without reflection could potentially do more harm than good to students' civic attitudes?

3. Can you give us some examples of civic engagement activities used by the chapters in this study?

4. Finally, do you think the importance of reflection would apply to other forms of student experience in agricultural education?

A Phenomenology of Supervised Agricultural Experiences: The Shared Experiences of Prospective School-Based Agricultural Education Teachers

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Abstract

The purpose of this qualitative, phenomenological study was to better understand supervised agricultural experience (SAE) programs through the lived experiences of self-identified future school-based agricultural education (SBAE) teachers in Oklahoma. Phenomenological methods were used to explore eight Future Agricultural Education Teacher Academy participants representing the five agricultural education districts in the state. The research questions investigated the learning outcomes and experiences regarding SAE programs. Subjects in this study reported learning employability and technical agriculture skills as a result of their SAEs. In addition, external influences that facilitate skill acquisition were identified. Four themes were revealed from the reported data to include: (a) subjects attain skills through SAE programs; (b) teachers have a great influence on subjects SAE programs; (c) subjects have limited and narrow perceptions of SAEs; and (d) subjects believe SAE programs diversify their experiences in agriculture. Qualitative research cannot be generalized, but the essence experienced by the subjects might be transferable among similar populations and situations (Creswell, 2012). The essence was revealed that teachers determine learning through SAE programs, which provided opportunity for the acquisition of employability skills in the SBAE program. Recommendations were developed to address the findings and conclusions for each theme.

Introduction/Theoretical Framework

Research focused on identifying best practices for school based agricultural education (SBAE) has concluded supervised agricultural experience (SAE) programs are a fundamental component of the agricultural education model and should be implemented in agricultural education programs (Croom, 2008, Dyer & Osborne, 1995; Retallick, 2010). Supervised agricultural experience programs provide an opportunity to apply technical skills and information learned in a school-based agricultural education classroom (Ewing, 2010) to occupational, non-occupational, and exploratory experiences outside of the classroom (Cheek & Arrington, 1990). It is "believed to be a foundational piece of a [SBAE] student's experience" (Lewis, Rayfield, & Moore, 2012, p. 78).

SAE programs function as an authentic experiential and independent learning opportunity for students (Barrick, Arrington, Heffernan, Hughes, Moody, Ogline, & Whaley, 1992; Ewing, 2010; Hughes & Barrick, 1993; Phipps, Osborne, Ball, & Dyer, 2008; Ramsey & Edwards, 2004; Retallick, 2003; Retallick, 2011) as they plan and implement an SAE program hinged upon their interests in the agricultural industry.

A primary focus of SBAE programs is to provide opportunities to prepare students for entry-level careers in the agricultural industry (Phipps et al., 2008). SAE programs have been noted to provide skills desirable for the agricultural industry (Ramsey, 2009) and have been the focus of numerous studies (Dyer & Williams, 1997; Lewis et al., 2012; Ramsey & Edwards, 2012). School based agricultural education has transformed considerably throughout the past three decades to meet the needs of students (Phipps, et al., 2008; Talbert et al., 2007). Students participate in individual SAEs to develop knowledge and skills from a SAE program (Croom, 2008; Jenkins III & Kitchel, 2009; Phipps et al., 2008; Ramsey & Edwards, 2012; Roberts & Ball, 2009; Talbert et al., 2007). However, despite the potential for skill acquisition and related employment opportunities, the SAE component has diminished in SBAE (Phipps et al., 2008; Retallick & Martin, 2008; Talbert, Vaughn, Croom, & Lee, 2007; Wilson & Moore, 2007). Researchers suggested the declination of SAE programs could be attributed to factors such as teacher attitudes, student attitudes, and implementation barriers (Retallick, 2010; Retallick & Martin, 2008; Robinson & Haynes, 2011; Wilson & Moore, 2007).

In response to the incongruence between theory and practice regarding SAE programs, the National Council for Agricultural Education (2009) established National Quality Standards for SAE programs including: maintaining accurate records, management and support strategies, and students with SAEs [should] send to appropriate entities for recognition. SAE proponents have touted its value to provide learning opportunities to students that participate. Those learning opportunities include: (a) acceptance of responsibility, (b) development of self-confidence, (c) independent learning opportunities, (d) development of independence, and (e) learning to work with others (Pals, 1988). Further, competency has been the focal point of several research endeavors, concentrating on the general understanding of SAE or competencies needed in entry-level careers in the agricultural industry that could be gained as a result of the SAE component (Dyer & Williams, 1997; Lewis et al., 2012; Ramsey & Edwards, 2012; Stewart & Birkenholz, 1991). However, information about specific competencies or skills learned as a result of the SAE experience is lacking in the literature. Moreover, factors that influence learning as a result of the SAE program have not been studied. Therefore, two issues exist: What are the specific learning outcomes as a result of a SAE program and what factors contribute to student learning as a result of an SAE program?

The National Council for Agricultural Education (NCAE) established the SAE Renewal Committee to address the renewal of SAE to meet this constant change. The committee provided clarity and understanding regarding implementation, resources, and philosophy of SAE programs (NCAE, 2014). Additionally, the committee focused on developing guiding principles for SAE execution, receiving teacher feedback on innovative practices to make SAEs relevant in classrooms, and discussing approaches used in local programs that could serve as a model (NCAE, 2014). Further, upon meeting, the NCAE SAE Renewal Committee drafted the *Philosophy and Guiding Principles for Execution of the Supervised Agricultural Experience Component of the Total School Based Agricultural Education Program* (NCAE, 2014). This draft explained the need, types, and descriptors of high quality SAE programs (NCAE, 2014). The committee provided several belief statements regarding high quality SAE programs. Specifically, "SAE can and should be considered as a source of data for evidence of student growth," and "may be utilized to conduct performance assessment of skills for technical skill attainment for Perkins data reporting" (NCAE, 2014, p. 5).

Experiential learning has long been the backbone of agricultural education since the commencement of the Smith-Hughes Act in 1917 (Graham & Birkenholz, 1999). As such, it served as the conceptual framework for this study. Kolb (1984) stressed all learning is experiential. Additionally, Roberts (2006) reported experiences occur in unique contextual settings to foster more understanding and vocabulary regarding experiential learning. Further, Roberts (2006) asserted each experience should be defined through four dimensions: level, duration, intended outcome, and setting. Each component of the agricultural education model promotes experiences in different contexts (Roberts, 2006). As such, experiential learning is a central element in all facets of the comprehensive agricultural education program. Baker, Robinson, and Kolb (2012) developed the Comprehensive Model for Secondary Agricultural Education to operationalize experiential learning within agricultural education. The central theme of the model features the experiential learning cycle embedded in all three facets of agricultural education, making the total program experiential in nature, thus not emphasizing one component over another with respect to being referred to as the one experiential component (Figure 1).

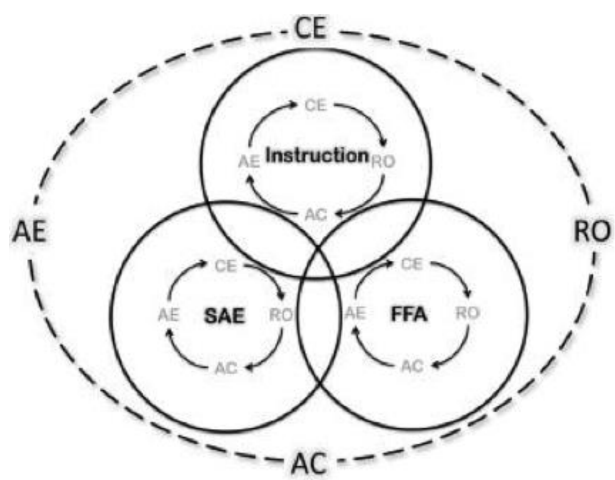

Figure 1. Enriched Agricultural Education Model. Reprinted from "Aligning Kolb's Experiential Learning Theory with a Comprehensive Agricultural Education Model". M. A. Baker, J. S.

Robinson, & D. A. Kolb, 2012, *Journal of Agricultural Education, 53*(4), p. 1 – 16. Reprinted with permission.

While analyzing data, a theory emerged that helped bring forth the essence of self-identified future agricultural education teachers' SAE programs. The theory that emerged is social judgment theory (SJT) (Hammond, Hamm, Grassia, & Pearson, 1987; Hammond & Stewart, 2001) from the framework of the Lens Model theory (Brunswik, 1956). "Judgments of historical […] material will seldom be justified with *correspondence* with empirical fact […] but more often by *coherence* with the supporting, current ideology, which will be expanded to […] a central vision of life" (Hammond, 2010, p. 327). Additionally, judgment cannot be justified, not by any cognitive activity (Hammond, 2010). The intuition, or hunch, is the polar opposite of analysis and doesn't require any cognitive ability. Students revealed they all espoused successful SAE programs. However, through SJT, and employing quality assessors, students were specifically unaware of what was meant by those aforementioned trademarks. Students look through a variety of lens to determine if their SAE was high quality and successful, including FFA Proficiency applications, FFA degree applications, achievement in other award areas, or simply by their own reported intuition. However, most of the students revealed that they did not determine the quality of their SAE based on its original intended purpose, which most of them were to contribute to production agriculture.

Purpose/Objectives

The purpose of this study was to describe shared experiences of future SBAE teachers regarding SAE programs. The researcher sought to gain a deeper understanding of future SBAE teachers' SAE programs, learning outcomes attributed to their SAE programs, and factors that contributed to those learning outcomes. Three questions guided this study:

1. What are the learning outcomes attributed to their respective SAE experiences?
2. What are the external factors that the subjects attribute to learning outcomes as a result of their SAE program?
3. What are the subjects' experiences regarding their SAE programs?

Methods/Procedures

Moustakas (1994) described the transcendental phenomenology step-by-step process as a reduction process, reducing data to one central essence. Polkinghorne (1989) recommended researchers interview 5 to 25 subjects who have experienced the phenomenon, while Creswell (2012) recommended interviewing subjects until data saturation was reached. Ten self-identified future agricultural education teachers from the Oklahoma State University, Future Agricultural Education Teachers Academy (FAETA) were utilized for this study. These students were self-identified as future school-based agricultural education teachers and were selected to participate in the FAETA at Oklahoma State University. The ten criteria of trustworthiness were embedded in the entire process (Tracy, 2010).

Because the researchers employed the phenomenological approach, “the process of collecting information involves primarily in-depth interviews”, coupled with document analysis was employed for this study (Creswell, 2007, p. 131). Semi-structured interviews, lasting approximately 30 minutes were recorded on a digital recording application on an iPhone. Data were then transcribed verbatim using *Microsoft Word* and proceeded until data saturation was reached.

Analysis of the data was guided using the Stevick-Colaizzi-Keen method modified by Moustakas (1994). Transcriptions were downloaded and coded for the purpose of horizonalization using the computer software *Nvivo*. Horizonalization can be described as “the process of laying out all the data for examination and treating the data as having equal weight; that is, all pieces of data have equal value at the initial data analysis stage” (Merriam, 2009, p. 26). This would allow the researchers to look at each statement, or horizon, of the transcription equally and then identify significant statements. Bounded horizons were then clustered under codes.

Once the horizons were coded, “…nonrepetitive, nonoverlapping constituents were clustered into themes” (Moustakas, 1994, p.180). As a result, the data from eight subjects yielded 364 significant statements under 21 codes and four themes emerged. Themes were then used to develop textural descriptions, describing *what* was experienced and structural descriptions describing *how* it was experienced. The textural and structural descriptions were then synthesized into the essence of the experience (Moustakas, 1994). The essence, which focuses on the common experiences of the subjects (Creswell, 2012), for this study focused on the experiences of the self-identified future agricultural education teachers regarding their respective SAE programs. Qualitative research cannot be generalized, but the essence experienced by the subjects might be transferrable among similar populations and situations (Creswell, 2012)

Self-reflexivity is one of the most celebrated practices of qualitative research and it “encourages writers to be frank about their strengths and shortcomings” (Tracey, 2010, p. 7). Reflexivity was used to bracket out personal ideals and focus on the participant’s experiences. It requires a sense of “honesty and authenticity with one’s self, one’s research, and one’s audience” (Tracy, 2010, p. 7).

To achieve reflexivity, researchers are encouraged to keep a reflexivity journal while in the field to bracket out information before any observations or interactions. The researcher used a reflexivity journal through the duration of the research process before any interviews were conducted and data was analyzed to determine biases, opinions, and prejudices to better understand the subjects’ experiences through transcendence. As this is good practice, the researcher was able to present the findings from an emic perspective, rather than their own perspectives. Additionally, to be transparent to the audience, the authors own agricultural education background, experiences, and epistemological stance should be noted so the reader can make his or her own judgments regarding researcher biases.

The researcher grew up in a suburban community in Georgia with a successful multi-teacher school-based agricultural education program. Teachers in the program were skilled and interested in student achievement in Career Development Events (CDE) and SAE programs. Each teacher specialized in specific facets of the school-based agricultural education program. One teacher was a horticulture specialist and also managed the large market hog program. Another teacher managed the dairy heifer program and specialized in leadership and forestry. The third teacher specialized in animal science and agricultural mechanics and managed the beef program. All three teachers in the program focused on specific livestock interests, but two of them also focused on agriscience research projects.

Census sampling methods were employed for this study, however, out of the 14 students chosen to participate, 10 assented to participate in the study. All participants were Caucasian with both males and females represented. They were from across Oklahoma and had experienced an SAE program while enrolled in school-based agricultural education. All participants were either incoming juniors or incoming seniors in high school. The ten subjects represented each of the five Oklahoma Department of Career and Technical Education (ODCTE) districts. As a number of students apply to the Oklahoma State University Agricultural Education Academy each year and have identified themselves as future school-based agricultural education teachers, if data saturation would not have been reached, more subjects would have been selected from this population until saturation was reached. However, no additional subjects were needed because data saturation was achieved with the selected subjects.

The Oklahoma State University (OSU) Future Agricultural Education Teachers Academy (FAETA) was established in 2007 to “encourage and promote the teaching of high school agricultural education as a positive and promising college major and career choice. The academy is aimed at recruiting top-notch students who have a strong desire to pursue a career in Agricultural Education. The weeklong program is housed on the OSU campus in Stillwater, OK and focuses on life at OSU and provides a look into the life and career of a school-based agricultural education teacher” (Ramsey, 2014, p. 1). The goals of the FAETA include promoting awareness of the AGED profession and promote AGED as a promising career choice, having the participants to declare AGED as their future major, and to eventually enter the AGED teaching profession (Ramsey, 2014).

The students that are selected to attend present an outstanding record of FFA membership, are recommended by their agricultural education teacher, and have participated in leadership endeavors

(Ramsey, 2014). Students must submit an application to attend the FAETA. Review and selection of the applicants to attend the FAETA is done through external sources. To date, 100 students have attended the FAETA from across Oklahoma. Of those 100 individuals, 9 individuals have gone into the agricultural education profession as teachers (Ramsey, 2014). Each year, activities and curriculum evolve and commitment numbers have increased as a result. More students, who participated in FAETA, are entering Oklahoma State University as an AGED major than ever before. The 2009 FAETA class yielded six students who graduated with AGED as their primary major and gained SBAE employment.

The FAETA is made possible my sponsors. Those sponsors include the Department of Career and Technology Education, Farm Credit Associations of Oklahoma, College of Agricultural Sciences and Natural Resources – Oklahoma State University, State Program Administrator of Agricultural Education, Oklahoma FFA Alumni Association, and Chesapeake Energy.

Results/Findings

Four themes emerged from the data, which included 364 significant statements and 21 codes. Significant statements from the subjects were used to identify codes. A code is typically a word or phrase that is evocative, summative, or essence-capturing (Saldana, 2009). Theme coding was employed that used phrases or sentences to categorize data (Saldana, 2009) (see Table 1).

Table 1

Codes Identified from Significant Statements (N = 21)

Codes	Codes
Community Embarked on New Content	Positives of Agricultural Education Program
Helps with SAE	Responsibilities of Student
Holistic View	SAE Breakdown
Individual SAE Programs	SAE/Award Misunderstanding
Influencers	Self-Perception
International Student Perspective	Soft Skills
	Continued
Codes	Codes
Inverted Program	Student Initiative
Knowledge of SAEs	Student Teaching Opportunity
Learned Content	Technical Skills Where SAEs are Learned
Misreported SAE Skill	

The themes of student learning as a result of their respective SAE programs and the influencers that attributed to their learning emerged from analyzing the data (see Table 2).

Table 2

Themes of Student Learning as a Result of their Respective SAE Programs and the Influencers (N = 4)

Themes
Subjects attain skills through their SAE programs
Teachers have a great influence on subjects' SAE programs
Subjects have limited and narrow perceptions of SAE
Subjects believe SAE programs diversify their experiences in agriculture

Objective 1; What are the Learning Outcomes Attributed to their Respective SAE Experiences?

Theme 1: *Subjects Attain Skills Through their SAE Programs*. Subjects overwhelmingly reported learning employability skills as a result of their SAE program. Participants revealed a wide array of skills and competencies. Each participant was eager to demonstrate their overall knowledge about their SAE programs. Luke provided an overarching statement that sums up the subjects' points of view when he said, "SAEs are a better place [than compared to athletics] to learn some real skills that you can use when you graduate, either college or a technical school" [Luke: 249].

Table 3 exhibits the theme, *subjects gained employability and life skills as a result of their respective SAE program*. These significant statements were relevant to the theme and were disclosed to make the reader aware of additional data for the purpose of credibility and trustworthiness.

Table 3

Selected Statements from Theme 1: Subjects attain skills through their SAE programs

Participant	Significant statements related to the theme

Luke	"SAEs are a better place [than compared to athletics] to learn some real skills that you can use when you graduate, either college or a technical school" [249].
Terry	"I became a certified National Poultry Improvement Plan tester, where I can test for diseases and keep the stock clean throughout travels" [204].

Objective 2; What are the External Factors that the Subjects Attribute to Learning Outcomes as a Result of their SAE Program? Theme 2: *Teachers have a great influence on subjects' SAE programs?* Individuals who supported student SAE programs, initiated learning opportunities and cultivated meaningful relationships with the subjects. Students reported their agricultural education teachers as the main influencers for learning through their respective SAE programs. Additionally, students revealed a chain reaction began due to the relationship with their agricultural education teacher, having the student become self-motivated within their respective total agricultural education program. This indicated an increase in the students' efficacy to provide teaching opportunities to other students. Most subjects have embarked on peer-peer teaching opportunities and have reported having a holistic understanding of agricultural education (see Table 4).

Table 4

Selected Statements for Theme 2 Teachers have a great influence on subjects' SAE programs

Participant	Significant statements related to the theme
Luke	"He loves it, he lives and breathes it, if he could do that every day that's what he would do. And he has helped me with my livestock SAE. When I was in 8th grade, I could have cared less to show, but he urged me to do it. He was understood that I already raised cattle and he felt that I already knew a great deal of information about cattle production. He has really helped me out and checks up on my program. He does everything he is supposed to and so that he helps me out mostly regarding my SAE program" [79].
John	"If I have a question, of course, I call the agricultural education teachers. I am fortunate because my dad was an agricultural education teacher, I talk to him, ask him questions, and if none of the three of them know, I call my brothers and see if they have an answer to my question" [181].

Objective 2; Theme 3: *Subjects Have Limited and Narrow Perceptions of SAE.* Several subjects deduced SAE into its simplest terms. However, several subjects were unclear with the definition of an SAE program. When the subjects were asked to describe their SAE program, some described it using correct terminology. For example, Charlotte described her SAE as equine production placement and Charlie described his as swine production. Sandra described both her feed business and her swine production operations. However, there are a few subjects that had a different way to operationalize their SAE programs (see Table 5).

Table 5

Subjects' viewpoints regarding classification of SAE and the relationship to the Ag-Ed Model

Participant's Pseudonym	Classification of SAE Program(s)	Components of AGED Model
Sandra	Feed Business and Swine Production	SAE Component Only
John	Sheep, Cattle, and Hog Production	Complete Model of AGED
Abby	Beef Cattle Production	Complete Model of AGED
Charlotte	Equine Production	Complete Model of AGED
Charlie	Goat, Cattle, and Hog Production	SAE Component Only
Terry	Poultry and Rabbit Production	Classroom/Lab & SAE
Maddy	Sheep Production	SAE Component Only
Luke	Beef Production	SAE Component Only

Objective 3; What are the Subjects' Experiences Regarding their SAE Programs? Theme 4: *Subjects Believe SAE Programs Diversify their Experiences in Agriculture.* Most subjects reported an appreciation for learning new content and trying different curriculum and activities. In fact, subjects reported an affinity towards diversifying their respective agricultural education programs with both content and individuals. Overall, the subjects revealed that they appreciated new content and individuals infiltrating their respective SBAE programs (see Table 6).

Table 6

Selected Statements from Theme 4: Subjects Believe SAE Programs Diversify Their Experiences in Agriculture

Participant	Significant statements related to the theme
Charlotte	"My agricultural education teacher incorporated an agricultural leadership program, which is now an art credit. So a lot of kids now want to take that because not only is it going to help them towards school, but also another different way that we are offering involvement. I understand we have a lot of kids that are quiet, that don't necessarily want to go out and do a contest, but they much rather prefer sitting behind a computer and typing an article about news stories" [165].
Charlie	"They actually have broadened our spectrum. The teachers used to focus on the kids that have the agriculture background. Now our school is becoming more diverse and they are starting to broaden the spectrum. My teachers are getting those kids that don't have an agricultural background to come in and give speeches" [59].

Subjects reported increased knowledge from their SAE programs. They revealed employability skills were gained as a result of their respective SAE programs. Teachers of the subjects interviewed were noted as the main influencers of learning through the students' SAE programs. However, most subjects reported only surface level understanding regarding SAE program knowledge. When new content was presented in the total SBAE program, the subjects expressed an overall appreciation to incorporate diversity. Finally, when asked to describe SAE programs, most subjects revealed a skewed and inverted perception of their own SAE program and its overall meaning.

Conclusions/Recommendations/Implications

Objective 1: What are the Learning Outcomes Attributed to their Respective SAE program?

Agricultural education students who participate in SAE programs attained employability and life skills. Subjects of this study shared a wide array of skills and competencies they credited with their SAE experiences. Skills identified include herd health management, illness identification, interpreting swine ear notches, developing feed rations, operating heavy machinery, implementing financial record systems, and business management. The identified skills could be useful when seeking entry-level jobs. These findings are consistent with other studies that determined SAE programs have provided the skill acquisition desirable for the agriculture industry (Dyer &

Williams, 1997; Lewis et al., 2012; Ramsey, 2009; Ramsey & Edwards, 2012; Stewart & Birkenholz, 1991). Additionally, specific skills mentioned by subjects helps to close the literature gap about specific skills learned through SAE programs.

The acquisition of employability skills with application to a variety of careers was a basic tenant of Dewey's philosophy, basing education on personal experiences (Dewey. 1938). The development of these skills was obtained through the content of a SAE program and reflected the four principles of experiential learning: (a) learning through real-life context; (b) learning by doing; (c) learning through projects; and (d) learning through problem solving (Knobloch, 2003; Kolb, 1984). These experiential learning principles were evident in this theme as students discussed their SAE programs. However, to what degree did teachers facilitate experiential learning purposely? What specific components of the experiential learning cycle assist with skill acquisition? To address these questions, further research is needed to assess teachers' implementation of the experiential learning cycle regarding SAE programs.

Objective 2: What are the External Factors That Contributed to the Specified Learning Outcomes as a Result of the SAE Program? The SBAE teacher had the greatest influence on students' SAE. Some research has reported teachers are a barrier to SAE implementation (Clarke & Scanlon, 1996; Dyer & Osborne, 1995). The subjects in this study, however, noted the opposite effect. As teachers are charged with providing meaningful experiences to students (Roberts, 2011), several subjects reported their agricultural education teacher helped them develop an SAE that was interesting and meaningful to them. These meaningful experiences led by the agricultural education teacher promoted participation and achievement. However, several students reported a surface level or unclear understanding of a SAE program. Students could not separate the individual components of the three-component model of agricultural education when describing the classification of their SAE program. Could it be that in-service teachers in Oklahoma are teaching the agricultural education model comprehensively, where the students do not process three separate components, but instead three parts to a holistic model? Could it be that these self-identified future SBAE teachers have been looking through the wrong lens to determine SAE quality? With the time that is spent with students possibly impacting their view on the total agricultural education program, it is recommended that in-service teachers continue to invest in students and their SAE programs to encourage profession recruitment. Additionally, it is recommended that pre-service teacher educators tout the importance of employing sound SAE practices as a method to promote the agricultural education profession during the student teaching internship. In addition, it is recommended to further examine the phenomenon of students providing learning opportunities to their peers and determine the implementation of experiential learning during those opportunities.

Objective 3: What are the Subjects' Experiences Regarding their SAE Programs? Students appreciate learning a wide range of content and experiencing a variety of activities associated with agriculture. Additionally, the subjects revealed that new content provided recruitment opportunities for the agricultural education program. Subjects defined *content* as new curriculum and new CDEs to their respective programs. These diverse opportunities were reported by the subjects as a method to gain more skills needed for their potential future careers. Perhaps with the expansion of content taught and activities in which the subjects participated, the in-service teachers provided a greater opportunity for them to gain more employability skills. Could it be that with the subjects' respective agricultural education programs diversifying across the aforementioned areas, not only is program recruitment taking place, but teacher recruitment is as well? Subjects reported developing relationships with students new to the program and providing encouragement for participation. Much of the literature focuses on barriers for recruitment (Breja, Ball, & Dyer, 2000; Croom & Flowers, 2001; Hoover & Scanlon, 1991; Marshall, Herring, & Briers, 1992). The findings of this study are consistent with Marshall et al. (1992) that addressed factors that have a positive influence on a student's decision to enroll or not enroll in SBAE courses. Some factors for enrollment include the characteristics of the course and encouragement from significant others (Marshall et al., 1992).

Further, the majority of subjects reported an increase in recruitment and participation of FFA members as a result of diversifying content and activities. This finding is consistent with previous researchers that identified strategies for program recruitment that encompass curriculum expansion, CDEs, and recreational or social activities (Myers, Dyer, & Breja, 2003).

It is recommended that in-service teachers employ diverse activities, curriculum, and CDEs within their respective programs to continue with recruitment efforts. Additionally, the subjects reported feeling a sense of obligation to aid in recruitment. Could experiencing a comprehensive, diverse SBAE help students "see" themselves as SBAE teachers? To investigate, it is recommended that in-service teachers identify students with strong SAE programs and a desire to teach agricultural education and engage them as apprentice teachers.

Ultimately, the central essence of this research revealed subjects gained a wide array of skills and competencies as a result of their SAE programs and SBAE teachers were the main determinant of learning in SAE programs.

References

Baker, M. A., Robinson, J. S., Kolb, D. A. (2012). Aligning Kolb's Experiential Learning Theory with a comprehensive agricultural education model. *Journal of Agricultural Education, 53*(4), 1 – 16. doi: 10.5032/jae.2012.04001

Barrick, R. K., Arrington, L. R., Heffernan, T., Hughes, M., Moody, L., Ogline, P., & Whaley, D. (1992). *SAE experience agriculture: A handbook on supervised agricultural experience.* Alexandria, VA: National Council for Agricultural Education.

Breja, L., M., Ball, A. L., & Dyer, J. E. (2000) Problems in student retention: A Delphi study of agriculture teacher perceptions. *Proceedings of the 27th Annual National Agricultural Education Research Conference*, *27,* San Diego, CA, 502 – 513.

Brunswik, E. (1956). *Perception and the representative design of psychological experiments* (2nd ed.). Berkeley, CA: University of California Press.

Cheek, J. G., & Arrington, L. R. (1990). Reshaping SAE to provide experiential learning in the 1990's. *The Agricultural Education Magazine, May 1990, 62,* 5 – 7.

Clarke, R. W., & Scanlon, D. C. (1996). The effects of teacher attitudes and related factors on FFA proficiency awards won above the federation level. *Journal of Agricultural Education, 37*(2), 8 – 16. doi: 10.5032/jae.1996.02008

Creswell, J. W. (2007). Qualitative inquiry and research method: Choosing among five approaches. Sage, Thousand Oaks.

Creswell, J. W. (2012). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks, CA: Sage.

Croom, D. B. (2008). The development of the integrated three-component model of agricultural education. *Journal of Agricultural Education, 49*(1), 110 – 120. doi: 10.5032/jae.2008.01110

Croom, D. B., & Flowers, J. L. (2001). Factors influencing an agricultural education student's perception of the FFA organization. *Journal of Agricultural Education*, *42*(2), 28-37. doi: 10.5032/jae.2001.02028

Dewey, J. (1938). *Experience & Education.* New York, NY: Touchstone.

Dyer, J. E., & Osborne, E. W. (1995). Participation in supervised agricultural experience programs: A synthesis of research. *Journal of Agricultural Education, 36*(1), 6 – 14. doi: 10.5032/jae.1995.01006

Dyer, J. E., & Williams, D. L. (1997). Benefits of supervised agricultural experience programs: A synthesis of research. *Journal of Agricultural Education, 38*(4), 50 – 58. doi: 10.5032/jae.1997.04050

Ewing, J. C. (2010). Supervised agricultural experience programs in the 21st century: Where are we today? *The Agricultural Education Magazine, July/August 2010*, 4.

Graham, J., & Birkenholz, R. (1999). Changes in Missouri SAE programs. *Proceedings of the Annual National Agricultural Education Research Conference, Orlando, FL,* 172 – 178.

Hammond, K. R. (2010). Intuition, No!… Quasirationality, Yes!. *Psychological Inquiry*, *21*(4), 327 – 337.

Hammond, K. R., & Stewart, T. R. (2001). *The essential Brunswik: Beginnings, explications, applications*. New York, NY: Oxford University Press.

Hammond, K. R., Hamm, R. M., Grassia, J., & Pearson, T. (1987). Direct comparison of the efficacy of intuitive and analytical cognition in expert judgment. *Systems, Man and Cybernetics, IEEE Transactions on*, *17*(5), 753 – 770.

Hoover, T. S., & Scanlon, D. C. (1991). Enrollment issues in agricultural education programs and FFA membership. *Journal of Agricultural Education, 32*(4), 2–10. doi: 10.5032/jae.1991.04002

Hughes, M., & Barrick, R. K. (1993). A model for agricultural education in public schools. *Journal of Agricultural Education, 34*(3), 59 – 67. doi: 10.5032/jae.1993.03059

Jenkins III, C. C., & Kitchel, T. (2009). Identifying quality indicators of SAE and FFA: A Delphi approach. *Journal of Agricultural Education*, *50*(3), 33 – 42. doi:10.5032/jae.2009.03033

Kolb, D. A. (1984). *Experiential Learning: Experiences as a source of learning and development.* Englewood Cliffs, NJ: Prentice-Hall, Inc.

Lewis, L. J., Rayfield, J., & Moore, L. L. (2012) Supervised agricultural experience: An examination of student knowledge and participation. *Journal of Agricultural Education, 53*(4), 70 – 84. doi: 10.5032/jae.2012.04070

Marshall, T., Herring, D., & Briers, G. (1992). Factors associated with enrollment in agricultural science and membership in the FFA in Texas. *Journal of Agricultural Education, (33)*4, 17 – 23. doi: 10.5032/jae.1992.04017

Merriam, S. B. (2009). Qualitative research: A guide to design and implementation. Jossey-Bass.

Moustakas, C. (1994). *Phenomenological research methods.* Thousand Oaks, CA: Sage.

Myers, B. E., Dyer, J. E., & Breja, L. M. (2003). Recruitment strategies and activities used by agriculture teachers. *Journal of Agricultural Education, 44*(4), 94 – 105. doi: 10.5032/jae.2003.04094

National Council for Agricultural Education. (2009). *National Quality Program Standards for Secondary (Grades 9-12) Agricultural Education*. Retrieved from https://ffa.learn.com/files/pdf/NQPS.pdf.

National Council for Agricultural Education SAE Renewal Committee. (2014). *Philosophy and guiding principles for execution of the supervised agricultural experience component of the total school based agricultural education program.*

Pals, D. A. (1988). The value of supervised occupational experience programs as perceived by learners. *Journal of Agricultural Education*, *29*(2), 32 – 39. doi: 10.5032/jae.1989.02018

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. (2008). *Handbook on agricultural education in public schools* (6th ed.). Clifton Park, NY: Thomson Delmar Learning.

Polkinghorne, D. E. (1989). Phenomenological research methods. In R. S. Valle & S. Halling (Eds.), *Existential-phenomenological perspectives in psychology* (p. 41–60). New York, NY: Plenum Press.

Ramsey, J. W. (2009). *Identifying entry-level skills expected by agricultural industry experts and determining teachers' perceptions on whether they are being learned through students' participation in the supervised agricultural experience component of the secondary agricultural education program: A two-panel delphi.* (Unpublished doctoral dissertation). Oklahoma State University, Stillwater, OK.

Ramsey, J. W. (2014). *The Future Agricultural Education Teachers Academy Information.* The Future Agricultural Education Teachers Academy Application.

Ramsey, J. W., & Edwards, M. C. (2004). Informal learning in science: Does agricultural education have a role? *Journal of Southern Agricultural Research, 54*(1), 86 – 99.

Ramsey, J. W., & Edwards, M. C. (2012). Entry-Level Technical Skills That Teachers Expected Students to Learn through Supervised Agricultural Experiences (SAEs): A Modified Delphi Study. *Journal of Agricultural Education*, *53*(3), 42 – 55. doi: 10.5032/jae.2012.03042

Retallick, M. S. (2003). Reframing SAE: The tricycle principle. The Agricultural Education Magazine, 75(6), 8 – 9.

Retallick, M. S. (2010). Implementation of supervised agricultural experience programs: The agriculture teachers' perspective. *Journal of Agricultural Education, 46*(1), 44 – 54. doi: 10.5032/jae.2010.040.59

Retallick, M. S. (2011). Learning by doing through SAE: It isn't as easy as it sounds! *The Agricultural Education Magazine, January/February 2011,* 23 – 25.

Retallick, M. S., & Martin, R. (2008). Fifteen-year enrollment trends related to the three components of comprehensive agricultural education programs. *Journal of Agricultural Education, 49*(1), 28 – 38. doi: 10.5032/jae.2008.01028

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1), 17 – 29. doi: 10.5032/jae.2006.01017

Roberts, T. G. (2011). What is Experiential Learning?. *The Agricultural Education Magazine, 83*(4), 4 – 6.

Roberts, T. G., & Ball, A. L. (2009). Secondary agricultural science as content and context for teaching. *Journal of Agricultural Education, 50*(1), 81 – 91. doi: 10.5032/jae.2009.01081

Robinson, J. S., & Haynes, J. C. (2011). Value and expectancy of supervised agricultural experiences as expressed by agriculture instructors in Oklahoma who were alternatively certified. *Journal of Agricultural Education, 52*(2), 47 – 57. doi: 10.5032/jae.2011.02047

Saldana, J. (2009). An introduction to codes and coding. *The coding manual for qualitative researchers* (pp. 1–31). Thousand Oaks, CA: Sage.

Stewart, B. R., & Birkenholtz, R. J. (1991). Outcomes of changing supervised agricultural experience programs. *Journal of Agricultural Education, 32*(3), 35 – 41. doi: 10.5032/jae.1991.03035Stimson, R. W. (1919). *Vocational agricultural education by home projects.* New York: MacMillan.

Talbert, B. A., Vaughn, R., Croom, D. B., & Lee, J. (2007). *Foundations of agricultural education* (2nd ed.). Danville, IL: Professional Educators Publications, Inc.

Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative Inquiry, 16*(10), 837–851. doi: 10.1177/1077800410383121

Wilson, E. B., & Moore, G. E. (2007). Exploring the paradox of supervised agricultural experience programs in agricultural education. *Journal of Agricultural Education, 48*(4), 82 – 92. doi: 10.5032/jae.2007.04082

A Phenomenology of Supervised Agricultural Experiences: The Shared Experiences of Prospective School-Based Agricultural Education

Discussant remarks: J. C. Ricketts, Professor
Tennessee State University

The authors should be commended for tackling Supervised Agricultural Experience (SAE) related research. From my perspective, SAE is an often-omitted component of agricultural education practice and research; therefore I found the article to be interesting addition to the body of knowledge. Embarking on qualitative research for such a traditional topic is also noteworthy. Given the relatively small footprint of agricultural education compared to our counterparts in other disciplines, perhaps qualitative research is an approach we should see more often. This paper does a better job of outlining the purpose of SAE and its relationship to total agricultural education as any I've seen. This explanation is woven into the authors' comprehensive conceptual and theoretical framework supporting the study. While the methods themselves were sound, given my knowledge of qualitative research, I would like to discuss the following decisions made by the authors.

6. Why did the authors choose to use such a homogeneous population as future agricultural education teachers? I would think future agriculture teachers who will undoubtedly espouse the importance of a total program of agricultural education, would have much of the same thing to say.
7. Do most future agriculture teachers have experience with secondary agricultural education in your state? If this study were replicated in the places I've worked with future teachers, many of the pre-service teachers would not have SAE experiences to draw upon which to draw.

Regarding the Conclusions/Recommendations/Implications section, the authors raise some important questions about what is understood about SAE. This section of the paper is so good, I found myself developing several questions of my own. For instance, with the exception of record-keeping and business management, many of the technical skills subjects learned through SAE seemed to be solely related to animal industry. Can the authors discuss why this may be the case? Is it related to the misconceptions of SAE discussed in the manuscript or is SAE equal to livestock showing an enculturation that is here to stay? Related to Objective 2, if the teacher is the greatest influence on students' SAE, are our pre-service teachers part of the problem? Following are a couple other questions for discussion at the conference.

5. Is SAE still relevant? Why or why not?

6. Assuming, SAE is still relevant, what can teacher educators do to clear up misconceptions of SAE?

Session B – Thursday 10:15-11:45

Discussant – Tracy Kitchel; Timekeeper – Kyle Gilliam

Higher Education
Factors Influencing Women Faculty Transitioning Into Tenured Academic Roles within Colleges of Agriculture *Dr. Carolynn Komanski, Dr. Nicole Stedman, Dr. Lisa Lundy, Dr. Kirby Barrick*
Conceptualizing agriculture teaching faculty involvement in study abroad: An examination of structural relationships between personal dimension variables in involvement *Dr. Shelli D. Rampold, Dr. Melissa Cater, Dr. J.C. Bunch, Dr. J. Joey Blackburn*
The Relationship between Student Pre-Entry Attributes and Six-Year Bachelor’s Degree Completion *C. W. Shoulders, L. D. Edgar, and D. M. Johnson*
Hunger Games: Using Q Method to Define Food Perspectives of Stakeholders at a Natural Food Retailer *Kasee L. Smith, Maggie M. Elliot, Tobin Redwine*

Factors Influencing Women Faculty Transitioning Into Tenured Academic Roles within Colleges of Agriculture

Dr. Carolynn Komanski, University of Florida
Dr. Nicole Stedman, University of Florida
Dr. Lisa K. Lundy, University of Florida
Dr. R. Kirby Barrick, University of Florida

Colleges of agriculture continue to hire and promote fewer women than men. The purpose of this study was a critical feminist inquiry of tenured women faculty in colleges of agriculture, to identify factors that helped or hindered their transition into tenured academic roles. The study was conducted at land-grant institutions, specifically within colleges of agriculture. A qualitative approach was used in this study to capture narrative interviews to understand the participants' learning through critical incidents.

Participants were obtained through a snowball method, with a total of 87 participants and 50 participants' responses are the level of saturation. Data were analyzed to identify words, themes, and examples in the critical incident narratives to identify what helped or hindered these tenured women faculty. Findings from this study should encourage associations, institutions, academic departments, and faculty to evaluate and examine what systems and resources they have in place for faculty who will be going through the tenure and promotion process.

Introduction/Literature Review/Framework

The American Association of University Professors (2005; 2003; n.d,) reported that in 2003-2004, among full-time faculty, women were disproportionately represented in lower ranks and poorly represented among full professors. Only 23% of full professors were women, but women made up over half of instructor and unranked positions (Curtis, 2004). Beintema (2006) found that at the professional level, women comprised only about 20% of agricultural researchers in developing countries. The National Science Foundation (NSF) and Burelli (2008) reported that women comprise only 35% of faculty positions within biological/agricultural/environmental life sciences and related fields at four-year institutions across the United States (NSF, 2008). More recent publications from the NSF (2016a, b) report a small increase, approximately 7% over a nine year period, for women achieving tenure roles between 2003 (22.8%) to 2012 (29.5%). NCSE (2017) most recent report from 2016-2017 indicated that only 33% of all full professors are women, which means colleges of agriculture remain significantly lower than the national standard (p.7).

The current state of women's representation within colleges of agriculture is not at a level that could be expected in order to mirror student enrollment ratios (Lee & Won, 2014; Lockwood, 2006). Large numbers of women who entered senior academic roles in previous decades were not promoted at the same rate as their male counterparts (Crabb & Ekberg, 2014; Dever et al., 2008; Doherty & Manfredi, 2006; Bailyn, 2003; Benschop & Brouns, 2003; Krefting, 2003). Women have also remained under-represented in senior university-level administrative positions at universities (Blackmore, et al., 2015; Blackmore, 2014; Davidson & Burke, 2004; Hyer, 1985; Reinert, 1946). Griffeth (2013) remarked:

> The glass ceiling may seem shattered from the perspective of some, but research continues to demonstrate that there are key issues that afford dialogue and discourse as it relates to women's leadership in the workplace, especially in male-dominated

settings such as the agricultural sciences at land-grant institutions of higher education. (p.1)

Some of the key issues shared throughout the body of literature have included the growing number of female students enrolling in higher education and colleges of agriculture, and how they have been served with the visual presentation of women faculty members (Johnson, 2014; Lee & Won, 2014). In reference to the demonstrated statistics, female perspectives should be included in decision-making at the institutions of higher education, and support mechanisms are needed to retain women through the academic tenure process (Beddoes, 2016; Hannun et al., 2015; MacPhee & Canetto, 2015; Corbette & St. Rose, 2010).

This study examined what helped or hindered tenured women faculty at 1862 land-grant institutions, within colleges of agriculture during their tenure and promotion (T&P) process. The conceptual model of this study demonstrates how critical feminism theory, advocacy, charisma, and leadership may be used in understanding what factors help or hinder women faculty through the use of critical incidents. The conceptual model, Figure 1 Conceptual Model: Critical Feminism's Role in Women Faculty Achieving Tenure, demonstrates how women faculty navigate situations which help or hinder them through the T&P process. Critical incident technique (CIT) was utilized to capture participants lived experiences. Participants were identified using a snowball sample method yielding 87 participants. Participants shared their personal incidents that helped or hindered them in work and non-work-related environments. Saturation was established at 50 participants, and 14 institutions covering the six regions, as noted in Figure 2 Regional participation by land-grant institutions beyond saturation, of the continental United States were represented in this study.

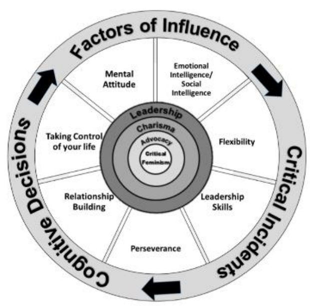

Figure 1. *Conceptual model: Critical feminism's role in women faculty achieving tenure*

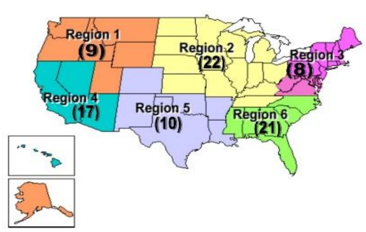

Figure 2. *Regional participation by land-grant institutions beyond saturation*

Overview of the Problem

The purpose of this study was to discover the factors that helped or hindered women academics to advance to tenured roles within colleges of agriculture at land-grant institutions. What enabled or blocked access to tenured faculty roles at land-grant institutions was previously not understood from the perspective of women. Specifically, research is limited on how this phenomenon affects women faculty within agriculture-related fields at land-grant institutions (Bisbee, 2005, 2007). Without further knowledge, factors that help or hinder female faculty in the tenure process cannot be determined. This is important to the academy, as female enrollment continues to rise within agriculture-related fields of study (Lockwood, 2006). Women are underrepresented in agriculture. A need exists to have women faculty in agriculture-related fields to continue in academic roles, which include tenure-track positions (Lockwood, 2006). Research can uncover the complex factors that both help and hinder the development of women as faculty at land-grant institutions, and to identify both the deficits and credits that exist personally, professionally and organizationally so women may be proactively advanced or supported. These factors can be utilized to create support programs to promote, recruit, and retain junior and tenured women faculty within the academy by utilizing a critical feminist theory.

This study is significant in a number of ways. However, the following reasons were most directly related to this research and the subsequent results, which can aid aspiring women who hope to achieve tenure, that can help colleges of agriculture who want to increase support measures for women academics through the tenure process, and universities who seek to retain women in academia. National and international objectives were addressed in this study. The American Association for Agricultural Education (AAAE) published its National Research Agenda for 2016-2020 which has two priorities that align with this research, Priority Three and Priority Six. The Association for Public and Land-Grant Universities' (APLU) Commission on Access, Diversity, and Excellence (CADE) identified two priorities that support the need for this research; Priority Two and Priority Three.

Purpose/Research Objectives

The purpose of this study was to examine factors that helped and hindered women academics through the tenure process in colleges of agriculture at 1862 land-grant universities. Examining data through a critical feminist lens, this study analyzed self-disclosed narratives from a representative sample of women in agricultural academic leadership positions, specifically tenured women faculty at 1862 land-grant institutions. This information will hopefully be utilized to provide context and platform to advocate for the creation of programs and resources for women academics working to achieve a tenure position within a college of agriculture.

The research objectives of this study were as follows:

- Discover factors that help women at 1862 land-grant institutions advance to tenured positions, as reported by currently tenured women faculty members in agriculture disciplines;
- Discover factors that hinder the advancement of women at 1862 land-grant institutions to advance to tenured positions, as reported by women in agriculture disciples; and
- Discover the changes needed to enable women to advance to tenured positions at 1862 land-grant institutions in agriculture disciplines, as reported by women faculty who have participated in this study.

Methodology

Qualitative methods were used in this study, specifically the Critical Incident Technique (CIT). CIT is a form of interview research where participants provide descriptive accounts of events that enabled or hindered a particular goal. A critical incident is one that makes a significant contribution to an activity or phenomenon (Flanagan, 1954). It is a significant occurrence with outcomes. The CIT research technique facilitates the identification of these incidents by a respondent. These “stories” are grouped by similarity into categories that can encompass the events, which can guide the construction of professional development initiatives.

This study utilized study replication of a pre-existing instrument by Airini, Collings, Conner, McPherson, Midson, and Wilson (2011) which identified factors that helped or hindered women attaining leadership positions at higher education institutions in New Zealand.

A snowball sample method was utilized to identify 300 potential participants, the yield was 87 participants, and saturation was established at 50. Participants were tenured women faculty in colleges of agriculture at 1862 land-grant universities. Trustworthiness was built through personal outreach. Using an online survey, participants shared in depth personal responses to questions about past factors and critical incidents that occurred in the course of their work and non-work environments. Participants were asked to describe how they learned from incidents and have, in turn, modified their progression.

After the data were transcribed, member checks allowed for the interviewees to verify the accuracy of the data. The data were analyzed in MAXQDA utilizing a constant comparative method and categorized according to theme. Patterns that were identified and noted in reporting with a critical feminist lens. The analysis technique and methods warrants the researcher to acknowledge preconceived notions or ideas of how colleges of agriculture operate and how tenure processes work, based on experiences as a student and as an employee. Previous understandings allow for an enhanced foundation on which to begin the research process.

Results

Results from this study are segmented into the following groups: demographics, factors that RO1: helped and RO2: hindered, and RO3: changes needed based off literature as reported by 50 women faculty within colleges of agriculture at 1862 land-grant institutions.

Demographics

The study was comprised of 50 participants who were employed at 14 different land-grant institutions within colleges of agriculture. All participants identified their sex as female and achieved tenure status by July 1, 2016. The institutions represented in this study represented all six regions of the United States. Detailed demographic information regarding participants’ ethnicities, age, academic status, and years working in higher education are reported in Table 1 Reported demographics summary. 42% of participants ages’ were 50-59 years old (*n*=21), 50% identified as Caucasian (*n*=25) and 28 % chose other. In the other text box, 12 of 14 participants wrote in the word ‘American’. 92% of participants had a Ph.D. (*n*=46), and 54% (*n*=27) held the current status of full professor. 28% (*n*=14) of participants worked at a university for 16-20 years, and 38% (*n*=19) had worked 16-20 years at a land-grant institution.

Table 1. *Reported demographics summary. (n=50)*

Demographics total percentage		
Category	Number	Percentage

Age		
40-49	13	26%
50-59	21	42%
60+	14	28%
Ethnicity		
Asian	6	12%
European/Caucasian	25	50%
Latin American	4	8%
Other	14	28%
Position Title		
Professor	27	54%
(Other) Faculty	18	36%
Employed at a University		
16-20	14	28%
26-30	11	22%
Employed at a Land-grant University		
11-15	7	14%
16-20	19	38%
26-30	7	14%

RO1: Discover Factors that Helped

218 work and non-work related critical incidents were identified that helped the 50 participants in their careers as noted in Table 2, Factors which helped women faculty. Critical incidents which helped ranged their undergraduate experiences to their professional capacities as faculty. Non-work-related incidents ranged from personal life and familial experiences to community-related situations. While many incidents themselves were positive and resulted in helpful situations, there were incidents which were negative but resulted in helpful situations. The categories of these incidents were clustered to include work ethic, opportunities, and support systems. Work ethic had two highly reported themes of Collaboration (*n*=42) 84% and Solving Problems (*n*=36) 72%. Opportunities have two highly reported themes of Feedback (*n*=42) 84% which was provided to the participants which in turn helped them make decisions. Responsibilities were reported at (*n*=35) 70% in which participants were provided opportunities to add, change or reinvent their work responsibilities to reinvigorate their engagement or motivation. Finally, Support Systems had two highly reported themes of Advice *(n*=41) 82% and Mentorship (*n*=36) 72%. These factors were perceived by the women faculty to help them during their T&P process.

Table 2. *Factors that Helped Women Faculty (n=50)*

Helped total percentage		
Category	Number	Percentage
Work Ethic		
Reaching Beyond	26	52%
Collaboration	42	84%
Solving Problems	36	72%
Opportunities		
Promotion	13	26%
Correcting Mistakes	18	36%
Responsibilities	35	70%
Feedback	42	84%
Coursework	16	32%
Being the First	18	38%
Support Systems		
Advice	41	82%
Family	23	46%
Coaching	29	58%
Mentorship	36	72%
Sponsorship	24	48%
Association Involvement	38	76%
Personal Wellness	22	44%

Collaboration. Participants repeatedly noted collaboration helped them in their career. Josie is a plant and soil scientist. Josie shared how even though she was advised to not collaborate with an additional faculty member she did and they,

> submitted several grant proposals and began developing a program…the combination of unique strengths [they received] funding and created a program which demonstrated statistically significant results.

The collaboration resulted in, “journal articles, presentations and national awards.” Josie claimed this, “contributed to [her] strong tenure document…and paved the way for more collaborative projects and a greater respect for the value of working together.” Lucy’s research is on sustainable agricultural practices. Lucy discussed when she, “became involved in writing a grant to the [agency]…partnered with [diverse groups, across disciplinary roles] and got the grant on the first try.” Lucy explained that what helped was that she felt the “right kind of people were involved and had positions of power to enable the work to be successful.” She concluded by noted that her, “involvement in the project…provided [her] with networking opportunities across campus and leadership experience” which aided in her promotion and advancement.

Solving problems. Several women noted solving problems and having the perseverance to achieve, which ultimately advanced their careers. Mary is an environmental scientist. Mary shared that she, “became aware of a problem…that became an opportunity.” Mary had to “propose alternative ideas… evaluated them…presented the information” which in turn afforded her, “to meet with [scientific] and industrial representative …and make professional contacts.” She believes this experience, “served [her] well” in the future, without the contacts and collaboration she, “would not have been so successful” in solving a problem which impacts almost every human.

Feedback. Participants shared how feedback from colleagues, students, associations, editors, and reviewers helped them in their careers. Clara researches youth and educator development. Clara shared that from feedback provided, she made some, “quick course corrections and the next year’s evaluations were much more supportive.” Clara furthered this by stating she was,

> Grateful that [she] received feedback after [her] first year and not [her] fourth year… early enough to make changes…later would have been too late to change and recover in time to obtain tenure. She too shared advice based on her observations of this situation where “other faculty failed to listen and respond to … feedback and they did not receive tenure.”

Responsibilities. Work-related responsibilities were noted in many incidents that helped these women. Lucretia researches human development. Lucretia talked about renegotiating responsibilities and that she had a feeling to “reinvent [herself] and was seeking new projects and challenges.” Lucretia’s departmental chair recommended speaking with the dean. She shared that, “[it] would never occur for [her] to do this… [she] was able to negotiate a new position that involves work that is exciting and interesting.” This re-adjustment of responsibilities was a “good fit for [her], this will assist [her] as [she goes] further into the world.”

Advice. Phillis researches impacts of youth and family on global extension efforts. Phillis noted that during an interview “a woman, gently told [her] privately that the department was ‘family friendly’ and then [she] need not fret about the pregnancy negatively impacting [her] chances…this set the stage for [her] to feel I could succeed in a tenure-track position and still be a mother.”

RO2: Discover Factors that Hindered

141 work and non-work related critical incidents identified that hindered the participants were identified as noted in Table 3, Factors That Hindered Women faculty. Work related critical incidents which hindered ranged from their undergraduate experiences to their professional capacities as faculty. Non-work related incidents ranged from personal life and familial experiences to community-related situations. While many of these hindering incidents were negative and resulted in positive outcomes, there were incidents which hindered but resulted in negative outcomes and are still looming over participants. The two categories below include personal and politics of the environment. Personal had two highly emergent themes of Children and Family (*n*=28) 56% and Health and Wellness (*n*=31) 62%. Politics of the Environment has three highly reported themes of Accountability (*n*=41) 82%, Advocacy (*n*=42) 84%, and Leaders Actions (*n*=35) 70% which were perceived by the women faculty to hinder them during their T&P process.

Table 3. *Factors that Hindered Women Faculty (n=50)*

Hindered total percentage		
Category	Number	Percentage
Personal		
Children and Family	28	56%
Health and Wellness	31	62%
Politics of the Environment		
Accountability	41	82%
Mentorship Programs	28	56%
Ambition	32	64%
Salaries	22	44%
Advocacy	42	84%
Inclusivity	23	46%
Leaders Actions	35	70%

RO 3: Discover Changes Needed

The conceptual model for this study provided support to the personal processing and learning that occurred from the critical incidents shared by participants'. Grounded in Critical Feminist Theory coupled with the fact that participants of this study identified as female, there was an overwhelming response, "that men and women are equal and should have equal respect and opportunities in all spheres of life personal, social, work, and public" (Wood, 2008, p.324). However, the critical incidents indicate that the participants' were not equal to their male counterparts. Reported incidents that helped or hindered participants were true to Woods (2008) latter part of the statement about the need for opportunity. Participants shared that in many cases, they were provided opportunities; however, the same participants also shared how they struggled at times obtaining equal opportunities to their male counterparts. There was a desire and need to be expressed by participants that equity should exist within their experiences; however, the reality is there were underlying cultural implications to departments, organizations, or committees which inhibited because there were not clear processes or protocols which made opportunities appear to be equitable. Tong (2009) stated,

> in any type of feminist theory we lament the ways in which women have been oppressed, repressed and suppressed and...celebrate the ways in which so many women have beaten the system, taken charge of their own destinies, and encouraged each other to live, love, laugh, and to be happy as women. (p.2)

This statement held true for participants. Participants expressed knowledge of the barriers within their pursuits to achieve tenure, specific to women, but they worked to achieve it anyway. Barriers included power relationships, interruptions, mentorship, culture, and profiles for success.

Power. Respondents shared how they experienced power relationships. Relationships were noted to be with colleagues, mentors, supervisors, students, their institution, and family, among others. Power relationships were not singular to gender differences. Astin and Leland (1991) defined power as, “empowerment treating power as an expandable resource that is provided and shared through interaction by leaders and followers alike” (p.1). Carrroll (1984) noted that “conception views power as energy that transforms one’s self and others, and identifies the effective leader as one who empowers others to act in their own interests.”

Interruptions. Participants shared both work and non-work related critical incidents that caused interruptions within their career path. Interruptions helped and hindered careers. Some participants were able to rebound quickly from interruptions that may have initially hindered their careers, while others noted they are still dealing with repercussions of interruptions and have not recovered, or are struggling to move forward. Interruptions included family, children, personal health and wellness, promotions, leadership positions, and work assignments, among many other examples. Women experienced more career interruptions than males (Cebrian & Moreno, 2015; Rowley 2013; Hayter, 2014; Kearns, 2010; Spivey, 2005). Interruptions can be categorized into parental leave, unemployment, and other types of interruptions (Gerst & Grund, 2017; Cebrian & Moreno, 2015; Grund, 2015; Hayter, 2014; Meures, 2010; Judiesch & Lyness, 1999). Examples of interruptions may include physical mobility, limits to moving for work due to family demands. Women were noted to reject career opportunities for personal or family reasons more often than males, whose career interruptions were more likely due to job loss (Pew Research Center, 2013; Rowley 2013; Kerns, 2010; Spivey, 2005; Kirchmeyer, 2002). Participants in this study did note rejection of career opportunities. The rejections occurred for personal, family, and partner-related reasons. Those interruptions were often because of competing priorities. Interruptions within the participants’ careers may be seen as a factor of Western culture, and the responsibilities women take on. Evidence shows that this difference in responsibilities only occurred for mundane tasks; men and women spent equal amounts of time playing with their children (Biernat &Wortman, 1991; Kotila, Schoppe-Sullivan, & Dush, 2013) and women were reported to be discontent with unequal distributions of household labor (Ruble, Fleming, Hackel, & Stangor, 1988; Kotila et al., 2013). This was true for the participants in this study.

Participants shared children both helped and hindered their careers. It was most often noted as hindrance when there was not a strong support system to help counterbalance responsibilities within the household or with family. Several participants noted that they chose to intentionally wait to expand their family due to the feedback of mentors, colleagues, and their career. While others noted that having children during their T&P process provided them an opportunity to self-advocate beyond their department chair, that policies in place be utilized to “stop the clock” in accordance with their T&P process so that they could be with their family. Participants shared that children and family helped when there was shared support within the household or with family by a family member or partner. Children were reported as a way to connect with other faculty within academic departments that were considered family-friendly, which was helpful to them in fostering connections which impacted their T&P process.

Valian (1998) and Kotila et al. (2013) detailed how gender schemas (masculinity and femininity) lead to expectations of different behaviors and roles from men and women. Several participants noted that they often felt compelled to serve in more feminine roles, and some were even assigned these roles, of event planners or recognition chairs for their departmental units.

Participants noted that they felt these communal connections for the organizational culture would not exist if it were not for them, even if they were not interested in serving in this role.

Women have internalized the feminine gender role about expectations of being a primary caregiver and have come to see this role is incompatible with the long work hours required or associated with academia (Jaschik, 2008; Martin & Barnard, 2013; Mayor, 2015). Participants noted that these responsibilities were often a burden and took away from their research and teaching roles and that their time could have been better utilized within other committees that would have supported their T&P process.

Leadership and advocacy. Participants shared that they had to self-advocate to achieve or get what they needed in work and non-work environments. This advocacy was helpful for some and hindered others the difference is how and for what they advocated. These factors, decisions, and the actual incidents were rooted in the participants' leadership, advocacy and critical feminism. Antobus (2003) supported this by stating,

> advocacy must be based on an analysis of what needs to be changed and why... this analysis must be feminist because only feminism gives an analysis of patriarchy and how it is linked to the structures and relationships of power between men and women that perpetuate violence, poverty — the crises that confront us. (p.1)

Advocates have sought changes in policy as a way to achieve impact that differs from what can be achieved through direct services or programs alone. Participants' repetitively noted that they had to advocate for themselves in both work and non-work related situations. Stachowiak, (2013) wrote that advocates and change makers come to work with a set of beliefs and assumptions about how the change will happen, and this was often true for the critical incidents that helped the participants. Those beliefs shaped their thoughts about what conditions were necessary for success, which tactics to undertake in which situations, and what changes needed to be achieved along the way (Stachowiak, 2013). For the participants who experienced an incident that hindered them, they often utilized advocacy to be resilient and move forward from the incident and turn it into a helpful learning experience.

Vulnerability. Sharing vulnerability can also have a positive long-term effect because such leaders can provide a voice for a social movement or represent a group of minorities by tapping into followers' implicit leadership theories (Schyns & Meindl, 2005). Several participants specifically noted that they did not want to be vulnerable and choose not be vulnerable in their careers. If they showed vulnerability, it was rare and with a trusted mentor or colleague. Participants also noted that they intentionally had not shared personal stories about their career experiences with junior faculty unless they were approached by them. They noted they understood the value of sharing and being vulnerable but chose not to be the one to introduce the conversations. Participants' critical incidents had connections to vulnerability and power relationship. Those participants who chose to be vulnerable, exhibited statements of resilience and were able to rebound from situations that initially hindered them, and the situation turned into a learning opportunity which helped them in the long run.

Mentorship helped. Organizational and management support for women through mentoring is needed (Rowley, 2013; Washington, 2010; Management Mentors, 2006; Inzer & Crawford, 2005). Participants noted that mentorship is needed to navigate the culture, build relationships, and foster collaborative experiences. Participants explained that mentorship was helpful when it was executed well. The examples noted that there was training, preparation, and personal investment in both the mentor and mentee. Since women suffer from a lack of successful mentoring, it is necessary to develop better formal mentoring programs, informal mentoring has shown to provide less positive outcomes (Baranik, Roling, Eby, 2010; Beehr & Raabe 2003). Participants shared that mentoring was helpful in creating their professional plans. Both male and female mentors were helpful in moving them forward. It was often noted that this was a challenge for participants, as they were encouraged to challenge themselves outside of their comfort areas or take risks while being the only, or one of few women in that challenge.

Mentorship hindered. Where mentorship hindered participants is when organized programs, with financial incentives, when mentors had no genuine or personal interest and connection with the mentor and mentee relationship. The literature notes females with mentoring relationships may experience less career-enhancing outcomes than their male counterparts (Hoobler, Lemmon, & Wayne, 2014; Ragins & Scandura, 1994). Participants noted that they had to often self-advocate with their mentor to obtain information or to steer the relationship in a fruitful direction. If there was not a strong mutual-relationship, participants noted that the relationship and mentorship experience was hindered.

Tenure standards. The exemplar model could allow faculty members whose professional portfolios have been deemed successful to serve as guides for early-career faculty. Philipsen & Bostic (2008) noted that a model like this would allow for, "institutions to set standards for tenure according to institutional mission, for departments to show multiple avenues for success within academic fields, and presents realistic examples of professional achievement to level the field" (p 24). Participants' shared they were often underprepared by their department and had to seek to understand elsewhere about how to create a strong T&P packet. Participants shared incidents in which they applied for tenure early. Some participants were successful, others were not, and cited lack of communication and expectations from their department as the cornerstone to these incidents. Utilizing an exemplar model could alter the traditional tenure clock by permitting faculty, at any stage, to set personal and professional goals without limitations of the historical timelines for success in academia (Philipsen & Bostic, 2008).

Profiles for Success. *Challenges of the Faculty Career for Women* presented how old and patriarchal policies created obstacles in both the personal and professional lives of women faculty, and offered creative solutions for reform (Philipsen & Bostic, 2008). Countless participants of this study shared that they were not often equipped to navigate political environments without the assistance of others. Philipsen & Bostic (2008) noted that one overarching challenge for women in all of their career stages is the lack of a clear understanding of standards for success within academe. Participants shared they were helped the most when a plan and strategy made for their T&P process. Participants who shared critical incidents about this noted benchmark measures that were clear and communicated effectively. Philipsen & Bostic (2008) acknowledged that prescribing specific benchmarks of a tenure process could encourage "bean counting" and thus could eliminate professional discretion. Participants did not share information related to the idea of "bean-counting." However, they did share incidents that helped in their T&P process. When objectives for success were established, departments assisted in creating a personal plan by setting milestone dates or a timeline for success.

Career models. Traditional career models are often categorized into the following constructs: continuous, linear, and developmental (Rowley 2013; Sullivan 1999). In the context of this study, female labor patterns are often non-traditional, non-linear, and discontinuous, and are better captured by boundaryless (Sullivan, 1999) and kaleidoscope models (Rowley, 2013). Participants explained the external factors of their non-work lives influenced their careers more than their male counterparts. Participants' shared interruptions often halted their careers. Navigating interruptions was not clear-cut, and they often had to self-advocate to be successful. Rowley (2013) noted five considerations for women's careers: interruptions, organizational culture, mentorship, a profile for success, and culture and location. While Rowley's (2013) considerations are framed to business and industry, but apply to any organization. They were true for the participants in this study.

The literature, while limited, provided both challenge and support to the participants' critical incidents within this study. Further research is needed on the effectiveness of programs and processes for the T&P process for academics.

Conclusions/Recommendations/Implications

This study examined 50 tenured women, within colleges of agriculture, at 14 different 1862 land-grant institutions to identify what helped or hindered them in their T&P process. The conceptual model demonstrates how critical feminism, advocacy, charisma, and leadership may be used in understanding what factors help or hinder women faculty through the use of critical incidents.

Critical incidents. Of the work and non-work related incidents 218 were identified that helped and 141 incidents identified that hindered. Critical incidents ranged from undergraduate experiences to professional capacities as faculty. For incidents that helped, the incidents themselves were positive and resulted in helpful situations. There were incidents which were deemed negative but resulted in helpful situations. For incidents that hindered, many incidents themselves were negative and resulted in positive outcomes. However, there were incidents which hindered but resulted in negative outcomes and are still looming over participants.

Barriers. Participants expressed knowledge of the barriers within their pursuits to achieve tenure that they believed were specific to women, but achieve it anyway. Barriers included power relationships, interruptions, mentorship, culture, and profiles for success which connect to the body of literature.

Recommendations. There are four main areas suggested for further research based on the findings of this study include the need to assess the effectiveness of mentor programs for all levels of faculty and a need to investigate departmental and institutional expectations and communication of the T&P process.

1. Broadening the scope to other academic colleges, institution type, and male participants
2. Inclusion of junior faculty perspectives
3. Studies exploring faculty employment who did not achieve tenure and promotion
4. Mentoring program effectiveness

First, this study is limited generalizable to all tenured women faculty members. Assessing tenured women faculty within additional colleges is an area for further research. This coupled with an understanding of experiences at other types of institutions, other than land-grant, are opportunities for further research. Inclusion of junior faculty living the experience of T&P would provide in depth perspective of factors. Exploring the lived experiences of former faculty who did not achieve T&P would be beneficial to understand in comparison to the results of this study.

Lastly, mentoring programs within academic departments and institutions for academics is an area for evaluation and research. Participants noted incidents in which these programs helped and hindered them in their careers. Identifying what works and what does not can be a determining factor for junior faculty success in a tenure-track position. By having a stronger understanding of these recommended areas, there is an opportunity to create stronger support systems for women and junior faculty to know and understand the expectations for the T&P process. Also, there is an opportunity to understand the gaps of why there are still far fewer women than men in tenured positions at higher education institutions across the United States.

Participants of this study were vulnerable and willing to share their personal lived experiences that helped and hinder their T&P process. The T&P process has likely changed since the time tenure was achieved. While understanding these factors is valuable, the opportunity is knocking at the door for further research. Two theme areas both helped and hindered the women faculty: children and family and mentoring. These themes will require additional time and focus to better understand the overlap of helping and hindering participants of this study, which should result in additional opportunities for research and advancing the body of scholarly research which fulfills the AAAE published National Research Agenda for 2016-2020 which has two priorities that align with this research, Priority Three and Priority Six.

References

Aiston, S. J., & Jung, J. S. (2015). Women academics and research productivity: An international comparison. *Gender and Education, 27*(3), 205-220.

American Association for University Professors. (n.d). Tenure. Retrieved from: http://www.aaup.org/issues/tenure

American Association of University Professors [AAUP]. (1940). 1940 Statement of principles on academic freedom and tenure. Retrieved from: https://www.aaup.org/file/1940%20Statement.pdf

American Association of University Professors [AAUP]. (2003). Unequal progress: The annual report on the economic status of the profession, 2002-03. https://www.aaup.org/reports-publications/2002-03salarysurvey

American Association for University Professors. (2005). Inequities persist for women and non-tenure-track faculty: The annual report on the economic status of the profession. Retrieved from https://www.aaup.org/reports-publications/2004-05salarysurvey

AAUP. (2006). The Devaluing of Higher Education: The Annual Report on the Economic Status of the Profession, 2005-06. https://www.aaup.org/reports-publications/2005-06salarysurvey

AAUP. (2007). Financial Inequality in Higher Education: The Annual Report on the Economic Status of the Profession, 2006-07. https://www.aaup.org/reports-publications/2006-07salarysurvey

AAUP. (2008). Where Are the Priorities? The Annual Report on the Economic Status of the Profession, 2007-08. https://www.aaup.org/reports-publications/2007-08salarysurvey

AAUP. (2009). On the Brink: The Annual Report on the Economic Status of the Profession, 2008-09https://www.aaup.org/reports-publications/2008-09salarysurvey

AAUP. (2010). No Refuge: The Annual Report on the Economic Status of the Profession, 2009-10. https://www.aaup.org/reports-publications/2009-10salarysurvey

AAUP. (2011). A Very Slow Recovery: The Annual Report on the Economic Status of the Profession, 2011-12. https://www.aaup.org/reports-publications/2011-12salarysurvey

AAUP. (2012). Here's the News: The Annual Report on the Economic Status of the Profession, 2012-13. https://www.aaup.org/report/heres-news-annual-report-economic-status-profession-2012-13

AAUP. (2013). Losing focus: The annual report on the economic status of the profession, 2013-14. https://www.aaup.org/reports-publications/2013-14salarysurvey

AAUP. (2014). Losing focus: The annual report on the economic status of the profession, 2013-14. https://www.aaup.org/reports-publications/2013-14salarysurvey

AAUP. (2015). Busting the myths: The annual report on the economic status of the profession, 2014-15. https://www.aaup.org/reports-publications/2014-15salarysurvey

AAUP. (2015). Policy Documents and Reports, 11th ed. [Baltimore: Johns Hopkins University Press, 2015], 94–98.

AAUP. (2016). Higher Education at a Crossroads: The Annual Report on the Economic Status of the Profession, 2015-16. https://www.aaup.org/report/higher-education-crossroads-annual-report-economic-status-profession-2015-16

AAUP. (2017). Visualizing change The Annual Report on the Economic Status of the Profession, 2016-17. Retrieved https://www.aaup.org/report/visualizing-change-annual-report-economic-status-profession-2016-17

Alemán, A. M. M. (2017). Generational Dispositions of Women Faculty: A Critical Examination. In Critical Approaches to Women and Gender in Higher Education (pp. 215-234). Palgrave Macmillan US.

American Council on Education [ACE]. (2009, March). The 2009 COA census: A national profile of chief academic officers. Washington, DC: Author.

American Council on Education [ACE], American Association of University Professors [AAUP], and United Educators [UE]. (2000). Practice good tenure evaluation in advice for tenured faculty, department chairs, and academic administrators. Washington, DC: American Council on Education. Retrieved from: https://www.aaup.org/sites/default/files/files/Good%20Practice%20in%20Tenure%20Evaluation.pdf

Andenoro, A. C., Allen, S. J., Haber-Curran, P., Jenkins, D. M., Sowcik, M., Dugan, J. P., & Osteen, L. (2013). National Leadership Education research agenda 2013-2018: Providing strategic direction for the field of leadership education. Retrieved from Association of Leadership Educators website: https://www.leadershipeducators.org/ResearchAgenda.

Antonella, E. (2016). Research 2.0 and the impact of digital technolgoies on scholarly inquiry. IGI Global, DOI: 10.4018/978-1-5225-0830-4

Antrobus, P. (2003). Peresonal quote. In Association for Women's Rights in Development.(2003) An advocacy guide for feminists. Young Women and Leadership.

Association for Agriculture Education [AAAE]. (2011). National research agenda 2011 -2015. Retrieved from: http://aaaeonline.org/Resources/Documents/AAAE%20National%20Research%20Agenda.pdf

Association for Agriculture Education [AAAE]. (2015). National research agenda 2016-2020. Retrieved from:

http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf

Astin, H. S., & Leland, C. (1991). Women of influence, women of vision: A cross-generational study of leaders and social change. San Francisco: Jossey-Bass.

Bailyn, L. (2003). Academic careers and gender equality: Lessons learned from MIT. Gender, Work and Organization, 10, 137-153.

Beddoes, K. (2016). Selling policy short? Faculty perspectives on the role of policy in addressing women's underrepresentation in engineering education. Studies in Higher Education. 1-12. http://dx.doi.org/10.1080/03075079.2016.1266610

Beintema, N. (2006). Participation of female agricultural scientists in developing countries. Agricultural Science and Technology Indicators Brief. Washington, DC: IFPRI.

Benschop, Y. & Brouns, M. (2003). Crumbling ivory towers: Academic organizing and its gender effects. Gender, Work and Organization, 10, 194-212.

Bielby, R., Posselt, J. R., Jaquette, O., & Bastedo, M. N. (2014). Why are women underrepresented in elite colleges and universities? A non-linear decomposition analysis. Research in Higher Education, 55(8), 735-760.

Biernat, M., & Wortman, C. B. (1991). Sharing of home responsibilities between professionally employed women and their husbands. *Journal of Personality and Social Psychology*, *60*, 844–860.

Bisbee, D.C. (2005). Current practices of land grant universities for identifying and training academic leaders. PhD diss., University of Arkansas, 2005. Retrieved from http://search.proquest.com/docview/305026855?pq-origsite=summon&accountid=10920

Bisbee, D.C. (2007). Looking for leaders: Current practices in leadership identification in higher education. *Planning and Changing*, *38*, 77-88. Retrieved from: http://files.eric.ed.gov/fulltext/EJ785728.pdf

Blackburn, T. R., & Lawrence, H. J. (1995). *Faculty at work: Motivation, expectation, satisfaction*. Baltimore: John Hopkins University Press.

Blackmore, J. (2014). 'Wasting talent'? Gender and the problematics of academic disenchantment and disengagement with leadership. *Higher Education Research & Development*, *33*(1), 86-99.

Blackmore, J., Sanchez-Moreno, M., Sawers, N. (2015). Globalized re/gendering of the academy and leadership. *Gender and Education*, *27*(3) Special Issue: SI Published: APR 16 2015.

Burelli, N. (2008). Thirty-three years of women in s & e faculty positions. National Science Foundation *NSF 08* (308) 1-10. Retrieved from: https://wayback.archive-it.org/5902/20160210222049/http://www.nsf.gov/statistics/infbrief/nsf08308/nsf08308.pdf

CADE Executive Committee. (2011, November 14). The CADE Strategic Plan. Retrieved from: http://www.aplu.org/members/commissions/access-diversity-and-excellence/cade-strategic-plan.html.

CATU (Canadian Association of University Teachers). (2003). CAUT almanac of post-secondary education in Canada. Retrieved from https://www.caut.ca/latest/publications/almanac

CAUT. (2005). Almanac of post-secondary education in 2005. Ottawa: CAUT.

CAUT. (2005). Ivory Towers: Feminist and equity audits 2005. Ottawa. CAUT.

Carli, L.L. & Eagly, A.H. (2016). Women face a labyrinth: An examination of metaphors for women leaders. *Gender in Management, 31* (8).514-527, https://doi.org/10.1108/GM-02-2015-0007

Colleges of Agriculture at the Land Grant Universities (1996). Public Service and Public Policy

Crabb, S. & Ekberg, S. (2010). Retaining female postgraduates in academia: the role of gender and prospective parenthood. *Higher Education Research and & Development 33* (6). 1099-1112. http://dx.doi.org/10.1080/07294360.2014.911251

Cushing, P. (1996). Gendered conversational rituals on the Internet: An effective voie is based on more than simply what one is saying. Anthropologica, XXXVIII : 47-80.

Davidson, M. and Burke, R. (2004). Women in management world-wide: Facts, figures and analysis. Aldershot:Gower Publishing.

Dever, M., Laffan, W., Boreham, P., Behrens, K., Haynes, M., Western, M. & Kubler, M. (2008). Gender differences in early post-PhD employment in Australian universities: The influence of PhD experience on women's academic aareers: Final Report. Brisbane:University of Queensland, Retrieved from: http://arts.monash.edu.au/womens-studies/research/projects/documents/report.pdf.

Doherty, L. & Manfredi, S. (2006). Women's progression to senior positions in English universities. Employee Relations, 28, 553-572.

Duderstadt, J. J. (2000). New roles for the 21st-century university. *Issues in Science and Technology 16*, (2). Retrieved from: http://issues.org/16-2/duderstadt/

Flanagan, J. (1954). The critical incident technique. *Psychological Bulletin, 51,* 327–358.

Gangone, L.M. and Lennon, T. (2014). Benchmarking women's leadership in academia and beyond. In Longman, K., & Madsen, S. R. (2014). Women and leadership in higher education.

Glazer-Raymo, J. (2008). *Unfinished agendas: New and continuing challenges in higher education*. Baltimore, MD: Johns Hopkins University Press.

Gluck, S. & Patai, D. (1991). Women's words: The feminist practice of oral history. New York, NY: Routledge.

Griffeth, L.L. (2013). Growing into leadership: A study of the informal and incidental learning of women agricultural deans and vice presidents. PhD diss., University of Georgia, 2013. Retrieved from: https://getd.libs.uga.edu/pdfs/griffeth_lauren_l_201312_phd.pdf

Hannun, K. M., Muhly, S. M., Shockley-Zalabak, P., & White, J. S. (2015). Women leaders within higher education in the united states: Supports, barriers, and experiences of being a senior leader. Advancing Women in Leadership, 35, 65-75. Retrieved from https://login.lp.hscl.ufl.edu/login?URL=http://search.proquest.com/accountid=10920?url=https://search.proquest.com/docview/1682223456?accountid=10920

Hult, C., Callister, R., & Sullivan, K. (2005). Is there a global warming toward women in academia?. *Liberal Education, 91*(3), 50-57.

Hyer, P. B. (1985). Affirmative action for women faculty: Case studies of three successful institutions. *The Journal of Higher Education*,, 282-299.

International Leadership Association. (2015). Asilomar declaration and call to action on women and leadership. Retrieved from: http://www.ilanet.org/Communities/AG/Asilomar_Declaration2015.pdf

Jaschik, S. (2008). Does academe hinder parenthood?. Inside Higher Ed. May, 23, 2008. Retrieved from: https://www.insidehighered.com/news/2008/05/23/nokids

Johnson, I.Y. (2014). Female faculty role models and student outcomes: A caveat about aggregation. Research in Higher Education, 55 (7). 686-709.

Kendall, L. (1999). Recontexualizing cyberspace: Methodological considerations for on-line research. In S. Jones (ed.), *Doing Internet Research* (57-75). Thousand Oaks, CA, and London: Sage.

Kotila, L. E., Schoppe-Sullivan, S. J., & Dush, C. M. K. (2013). Time in Parenting Activities in Dual-Earner Families at the Transition to Parenthood. *Family Relations, 62*(5), 795–807. http://doi.org/10.1111/fare.12037

Kramarae, C. & Taylor, H. (1993). Women and men on electronic networks: A conversation of monologue? In H. Taylor, C. Kramarae and M. Ebben (eds.), *Women, Information*

Technology, and Scholarship. University of Illinois, Urbana-Champaign: Center for Advanced Studies.

Krefting, L.A. (2003). Intertwined discourses of merit and gender: Evidence from academic employment in the USA. Gender, Work and Organization, 10, 260-278.

Kulis, S., Sicotte, D. & Collins, S. Research in Higher Education (2002) 43: 657. https://doi.org/10.1023/A:1020988531713

Lee, Y., & Won, D. (2014). Trailblazing women in academia: Representation of women in senior faculty and the gender gap in junior faculty's salaries in higher educational institutions. *Social Science Journal, 51*(3), 331-340.

Lockwood, P. (2006). Someone like me can be successful: Do college students need same- gender role models? *Psychology of Women Quarterly, 30*(1), 36-46.

Mainiero, L.A, & Sullivan, S.E. (2006). The ABC's of kaleidoscope career. *Change This, 25* (2). 2-20. Retrieved from http://changethis.com/manifesto/25.02.ABCKal/pdf/25.02.ABCKal.pdf

Martin, P. & Barnard, A. (2013). The experience of women in male-dominated occupations: A constructivist grounded theory inquiry. *Journal of Industrial Psychology, 39* (2). doi:10.4102/sajip.v39i2.1099

Matter, W. T. (2015). Public Research Universities. Retrieved from: https://www.amacad.org/multimedia/pdfs/publications/researchpapersmonographs/publicresearchuniv_whytheymatter.pdf

Mayor, E. (2015). Gender roles and traits in stress and health. *Frontiers in Psychology, 6*, 779. http://doi.org/10.3389/fpsyg.2015.00779

MacPhee, D. & Canetto, S.S. (2015). Women in academic atmospheric sciences. Women in academic. https://doi.org/10.1175/BAMS-D-12-00215.1

Meindl, J. (1995). The romance of leadership as a follower-centric theory: A social constructionist approach. The Leadership Quarterly, 6(3), 329–341.

Morrill Land Grant Act of 1862, ch. 130, 12 Stat. 503, 7 U.S.C. §§ 301 et seq.American.

National Center for Education Statistics [NCES]. (2002). Table 171, Chapter 3: Post-secondary education. In Digest of education statistics. Retrieved from: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2002130

National Center for Education Statistics [NCES]. (2017). Characteristics of Postsecondary Faculty. Figure 2. Chapter: 4/Postsecondary Education Section: Postsecondary Environments and Characteristics: https://nces.ed.gov/programs/coe/pdf/coe_csc.pdf

National Research Council. 1995a. Colleges of Agriculture at the Land Grant Universities: A Profile. Washington, D.C.: National Academy Press.

National Research Council. 1995b. Reshaping the Graduate Education of Scientists and Engineers. Washington, D.C.: National Academy Press.

National Research Council. 1995c. Research-Doctorate Programs in the United States: continuity and Change. Washington, D.C.: National Academy Press.

National Research Council. (1996). Colleges of Agriculture at the Land Grant Universities: Public Service and Public Policy. Washington, DC: The National Academies Press, 1996. doi:10.17226/5133

National Science Foundation (2008). Characteristics of doctoral scientist and engineers in the United States. National Center for Science and Engineering Statistics. Retrieved from http://www.nsf.gov/statistics/nsf13302/pdf/nsf13302.pdf

National Science Foundation (2016a). Chapter 5: Academic research and development. Retrieved from https://www.nsf.gov/statistics/2016/nsb20161/#/report/chapter-5/doctoral-scientists-and-engineers-in-academia/trends-in-academic-employment-of-s-e-doctorate-holders

National Science Foundation (2016b). Women in S&E occupations: 1993–2013. Retrieved from https://www.nsf.gov/statistics/2016/nsb20161/#/figures

Newington, L. and Metcalfe, A. (2014). Factors influencing recruitment to research: Qualitative study of the experiences and perceptions of research teams. BMC Medical Research Methodology 14 (10) https://doi.org/10.1186/1471-2288-14-10

Philipsen, M. and Bostic, T. (2008). Challenges of the faculty career for women: Success and sacrifice. John Wiley & Sons.

Reinert, P. C. (1946). *Faculty tenure in colleges and universities from 1900 to 1940*. Saint Louis: Saint Louis Univ. Press.

Rodríguez, H. (2017, June). Building support for women into your programs and structures: Best practice examples. In STEM Gender Equality Congress Proceedings (Vol. 1, No. 1, pp. 127-142). Science Impact Ltd.

Rosser, S. V. (2017). Conclusion: What Can the Last Fifteen Years Tell Us about the Future of Academic Women in STEM. In Academic Women in STEM Faculty (pp. 121-135). Springer International Publishing.

Schyns, B., & Meindl, J. R. (2005). Implicit leadership theories: Essays and explorations. Greenwich, CT: Information Age Publishing.

Stachowiak, S. (2013). Pathways for change: 10 Theories to inform advocacy and policy change efforts. Center for Evaluation Innovation. Retrieved from: http://orsimpact.com/wp-content/uploads/2013/11/Center_Pathways_FINAL.pdf

Sullivan, B., Hollenshead, C., & Smith, G. (2004). Developing and implementing work-family policies for faculty. Academe, 90(6), 24.

Sullivan, S. (1999). The changing nature of careers: A review and research agenda. Journal of Management 25 (3). 457-484.

The White House Project. (2009). *The White House Project: Benchmarking women's leadership.* New York, NY: The White House Project.

Tong, R. (2009). Feminist thought: A more comprehensive introduction (3rd ed.). Boulder, CO: Westview Press.

Valian, V. (1998). Why so slow? The advancement of women. Cambridge, MA: MIT Press.

Ward, K., & Wolf-Wendel, L. (2004). Academic motherhood: Managing complex roles in research universities. The Review of Higher Education, 27, 233–257.

Winter, D. & Huff, C. (1996). Adapting the internet: Comments from a women-only electronic forum*, The Amaerican Scoiologist, 27* (1) 30-54.

Wood, J. (2008). Critical feminist theories: Giving voice and visibility to women's experiences in interpersonal communication. In Baxter, L. & Braithwaite, D., (Eds.), Engaging theories in interpersonal communication: multiple perspectives. Thousand Oaks, CA: Sage Publications.

A Critique of:
Factors Influencing Women Faculty Transitioning into Tenured Academic Roles within Colleges of Agriculture

Tracy Kitchel, The Ohio State University

The authors of this study focused on women faculty transitioning into tenured academic roles within colleges of agriculture. The introduction/literature review/framework section began with a broad perspective of women in academia, which is helpful in setting the stage for the specific context of this study. The authors presented points on why this type of study would be important. The authors presented a conceptual model but would note there's not citation for the framework. I was confused if the authors are positing that this framework is from some another study or the result of this study. If the latter, even for qualitative research, I would argue this is not the appropriate location to introduce. To tighten this section, I would recommend to the authors to answer the question "why would we expect to see something different in colleges of agriculture?" There's a nod to that in the overview of the problem section, but I think the front sections would be more complete if the context was fleshed out further. I think that addition could also bolster the discussion section.

The authors move the manuscript into the purpose and methodology. I was surprised that this was listed as a critical feminist study. The tone thus far did not give me that indication. I would expect a stronger case for the flaws in the system. I will acknowledge that our field does not tend to respond well to studies that stray away from post-positivism, so perhaps the tone was purposeful. However, as I read on, I am still not convinced this is a critical feminist study. By in large, the methods align with post-positivist approaches. I would expect methods that get richer data and findings that contextualize life in a college of agriculture as opposed to higher education, in general.

There are valuable findings and discussion, outlining factors supported by representative quotes that bring the quantitative components to life. Again, if this was a critical theory approach, I would hear the stories and voices more prominently. The RO3 is something I would expect in the discussion section or to be drawn out as a part of a framework. Regardless of approach, the discussion section was shorter than I had hoped.

I cannot underscore the importance of the work by the authors. There is much work to be done in the area of diversity and inclusion in higher education. I also believe there are good data here, but I would argue the need to reframe the study or to provide more support for some of the research choices and framings that seem outside of some of the qualitative conventions for critical theory work.

Conceptualizing agriculture teaching faculty involvement in study abroad: An examination of structural relationships between personal dimension variables in involvement

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Abstract

Faculty involvement in study abroad can influence significantly student participation in study abroad programs. However, faculty involvement in study abroad can be limited by institutional, professional, and personal factors. This study was conducted as part of a larger study to examine the relationship between and predictive nature of personal dimension variables on agriculture teaching faculty involvement in study abroad. Results of this study suggest the personal factors influencing agriculture faculty involvement in study abroad include their perception of the knowledge, skill, and ability (KSA) outcomes of study abroad, their awareness of study abroad programs and procedures, and their prior international experiences (PIE). The effect of agriculture faculty perception of the KSA outcomes of study abroad on their involvement in study abroad is mediated by their perception of the importance of those KSA outcomes for professionals in their field. Further, agriculture faculty perceived importance of KSA outcomes was moderated by PIE. Recommendations for future practice include providing professional development and training to increase faculty awareness of study abroad, as well as increase opportunities for agriculture faculty to gain international experience. Future research should be conducted to replicate this study with agriculture faculty at other institutions, and should examine relationships between factors in the professional and institutional dimensions.

Key Terminology: study abroad, agriculture faculty, faculty involvement, personal factors

Introduction

Initiatives to produce globally competent students have transpired across many U.S. institutions over the past decade (ACE, 2012; Green, 2012). As a means of supplementing on-campus initiatives to internationalize the educational experience, efforts have been directed to the development and promotion of study abroad opportunities (ACE, 2012; Childress, 2009). While a steady increase in student participation in study abroad programs has been observed each year, there remains room for growth in study abroad participation rates (IIE, 2016). Much of the increase in numbers of students studying abroad may be attributed to an observed shift from traditional, semester long programs to short-term (i.e., one to six weeks) faculty-led programs (Dwyer, 2004; IIE, 2016; McCabe, 2001; Zamastil-Vondrova, 2005).

Although faculty involvement may still be critical to student participation in long term exchanges, the increase in student interest in short-term, faculty led study abroad programs demonstrates a more pressing need to involve faculty. In addition to leading study abroad programs, faculty involvement in study abroad is needed regarding dissemination of study abroad information to students, encouraging study abroad participation, and assisting students through the process of studying abroad (Lukosius & Festervand, 2013; O’Hara, 2009; Umbach & Wawrzynski, 2005). Moreover, Green and Olson (2003) identified the engagement of faculty as a driving force behind successful internationalization overall, and noted that this engagement encompasses teaching, research, service, and advising appointments of faculty. As such, a comprehensive approach to examining faculty involvement in study abroad is needed. However, in much of the research pertaining to the involvement of faculty study in abroad programs, involvement has been defined as faculty participation in leading a study abroad program for students. Considering the other activities in which faculty can participate and facilitate student participation in study abroad, future research is needed to examine faculty involvement in this respect and the factors influencing their involvement.

Literature Review and Conceptual Framework

Wade and Demb's (2009) Faculty Engagement Model (FEM) was modified by the researchers in a prior study to propose a comprehensive framework for explaining faculty active involvement in study abroad (Authors, n.d.). Per this model, the targeted engagement behavior included the active involvement of faculty in study abroad activities. Further, institutional, personal, and professional level factors influencing faculty involvement in study abroad were identified as influential (Authors, n.d.). For the purposes of this study, specific variables within the personal dimension were proposed vis-à-vis an extensive review of literature and incorporated as an expansion of the original model developed by the researchers (see Figure 1).

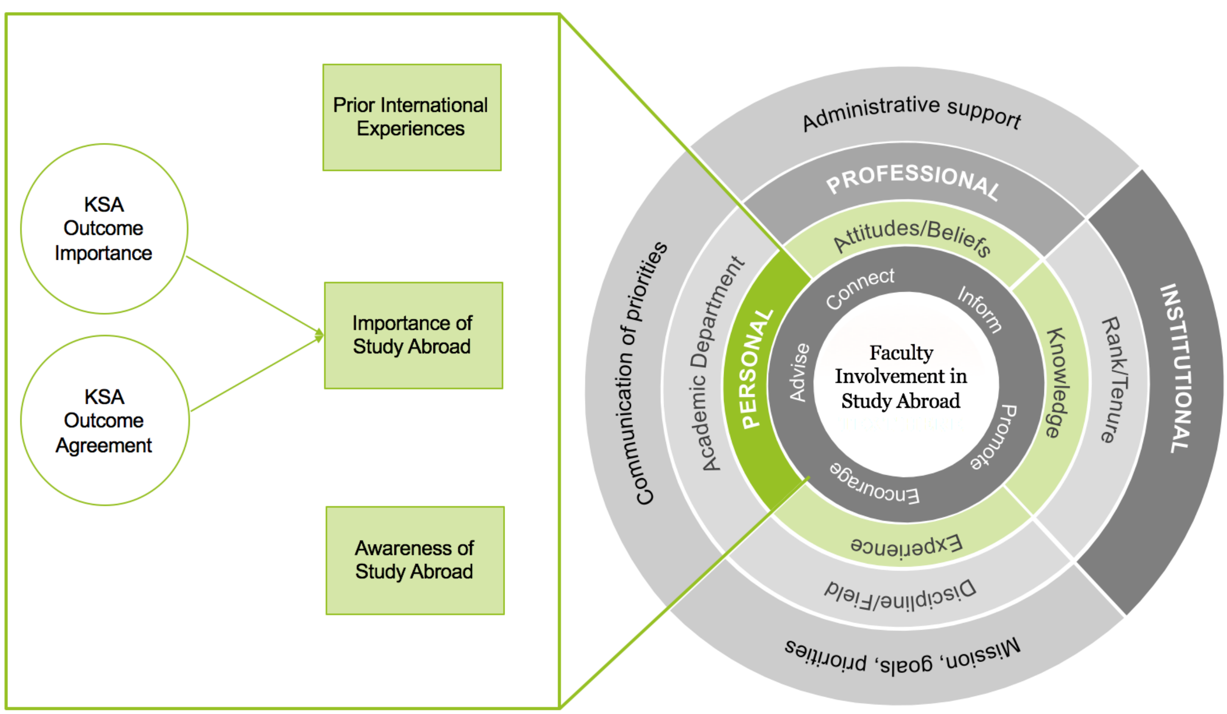

Figure 1. Personal dimension factors influencing faculty involvement in study abroad.

Personal Dimension

The personal dimension includes factors that pertain to faculty beliefs and attitudes, personal experience, and demographic characteristics (Authors, n.d; Wade & Demb, 2009). The variables within the personal dimension hypothesized to influence faculty involvement in study abroad include (a) faculty attitudes beliefs regarding the importance of study abroad, including their perceptions of knowledge, skill, and ability (KSA) outcomes produced by study abroad and the importance of those KSAs for professionals in their field; (b) faculty awareness and knowledge regarding study abroad opportunities for students, the international programs office through which students study abroad, and study abroad policies and procedures; and (c) faculty prior international experience (PIE), including both personal and professional experiences (see Figure 1).

Faculty beliefs and attitudes. Faculty perceptions of the importance of study abroad may influence positively or negatively their degree of involvement in study abroad activities. If faculty perceive studying abroad as an effective means of producing learning outcomes among students, as well as perceive those outcomes as important for students to develop, they will be more likely to engage in promoting, encouraging and facilitating study abroad participation among their students (Green & Olsen, 2003; NSSE, 2008; Paus & Robinson, 2008). However, faculty may be less inclined to engage in study abroad activities if they do not perceive studying abroad as a valuable endeavor for students (Green & Olsen, 2003). Data from the National Survey of Student Engagement (NSSE) (2008) demonstrated a 20 percent increase in student study abroad participation per one-point increase in faculty response on a Likert-type scale rating of importance of study abroad. Unfortunately, O'Hara (2009) reported only 43 percent of U.S. faculty perceived study abroad as being important for students. Considering a 16.5 percent annual growth rate in study abroad participation is needed to achieve the national study abroad goals by the end of the decade (IIE, 2016b), further examination of faculty perceptions of study abroad importance is warranted.

Prior international experience. The international experience acquired by faculty has been found to influence significantly faculty personal attitudes and beliefs, faculty attitudes and behaviors in their professional setting, and the attitudes and behaviors of their students (ACE, 2012; Akpan & Martin, 1996; Bond, 2003; Green & Olsen, 2003; Hulstrand, 2009; O'Hara, 2009; SRI, 2002). Gains in international experience can influence faculty perception of internationalization overall, as well as their involvement in study abroad. In a study conducted with agriculture faculty, Akpan and Martin (1996) found that faculty who had traveled to a foreign country held more positive perceptions of internationalizing the agricultural education curriculum than faculty who did not have international experience. Additionally, faculty who have lived, traveled, or worked abroad have been found to be more inclined to incorporate international components into their teaching, research, and service responsibilities (ACE, 2012; Bond et al., 2003; Green & Olsen, 2003).

In a study conducted to examine the outcomes of the U.S Fulbright Scholar Program, the largest U.S exchange program for research and teaching professionals, the majority of faculty participants (a) developed a greater understanding of their host country, (b) shared information about their host country with colleagues, (c) continued to collaborate with host country or institutional colleagues, and (d) incorporated their experiences into their curricula or teaching methods (SRI, 2002). Regarding the impact of faculty international experiences on their involvement in study abroad, Hulstrand (2009) found that faculty members' prior international experiences influenced their degree of involvement in study abroad activities. Further, students who had more internationally involved and experienced professors were more likely to pursue an international experience themselves (Hulstrand, 2009). Similarly, in a follow up study with faculty Fulbright participants, O'Hara (2009) found that 80 percent of the participating faculty later encouraged their students to study abroad.

Faculty international experience may also assist faculty who choose to lead a study abroad program. Goode (2008) examined the informal preparation of faculty study abroad directors and found that the personal international experiences of faculty better prepared them to lead students abroad. The types of international experiences these faculty members had acquired included (a) participating in a study abroad program as a student, (b) attending a seminar or international conference abroad, (c) studying a foreign language abroad, (d) working or volunteering in another country, and (e) conducting research abroad. Some faculty in this study also noted that the most helpful international experience they had acquired was their first experience as a study abroad director (Goode, 2008). Conversely, Woodruff (2009) found that increased prior international experience among faculty did not directly translate into increased promotion of study abroad opportunities by faculty. Faculty in this study who had some degree of international experience held positive attitudes toward study abroad, but they did not encourage students to study abroad more so than faculty with less international experience (Woodruff, 2009). The inconclusive findings observed in prior research in this area warrants further examination of the relationship between faculty international experience and their involvement in study abroad.

Faculty knowledge and awareness. The extent to which faculty are involved in study abroad may also be explained by their degree of awareness of study abroad programs, knowledge of the administrative policies and processes associated with study abroad, and their familiarity with the international programs office on campus (Bond et al., 2003; Doyle et al. 2010; Lukosius & Festervand, 2013; Woodruff, 2009). Lukosious and Festervand (2013) examined students' decision process to study abroad and identified faculty knowledge of administrative procedures as necessary to help students move through the final steps of the study abroad process and reduce the likelihood they will drop out at this point. However, faculty lack of awareness of study abroad has been reported previously as an inhibiting factor in faculty study abroad involvement (Bond et al., 2003; Doyle et al., 2010). Moreover, faculty knowledge and awareness may counteract factors that would otherwise motivate faculty involvement in study abroad. For example, faculty knowledge may explain why Woodruff (2009) found no differences in faculty involvement based on their prior international experiences. Faculty in this study who had international experiences had positive perceptions of study abroad, but they reported having a lack of knowledge and awareness of study abroad opportunities available to their students (Woodruff, 2009). As such, examination of the relationships between factors influencing faculty involvement is needed to better understand the complex interactions of these factors and how they influence faculty involvement.

Personal interest in leading a study abroad program. Faculty involvement in study abroad was operationalized in this study to include a range of faculty activities in addition to leading a study abroad programs. However, as increasing student participation in study abroad is highly dependent upon faculty willing to lead study abroad programs (Stohl, 2007), faculty interest in leading a study abroad program deserves examination. Barriers to faculty involvement in leading study abroad programs identified in prior studies include (a) time constraints, (b) perceived lack of support from administration, and (c) lack of guidance and formal preparation (Dewey & Duff, 2009; Goode, 2008). In a study conducted by Dewey and Duff (2009) to examine barriers to faculty involvement in leading study abroad programs, faculty emphasized the issue of time required to develop or direct a study abroad program. To this, faculty noted that it is discouraging or even off putting when administration views faculty participation in study abroad as a merely a fringe benefit, especially considering the amount of time and work required to do so (Dewey & Duff, 2009). Additionally, faculty in this study identified the lack of useful templates or guidelines for initiating a new study abroad program as problematic (Dewey & Duff, 2009). Similarly, Goode (2008) examined the formal and informal preparation of faculty study abroad directors and found faculty had little to no formal preparation, nor did they perceive that their academic program supported their consideration of leading a study abroad program.

Purpose and Objectives

The purpose of this study was to examine factors within the personal dimension that may influence agriculture teaching faculty involvement in study abroad. This research study addresses national research priority three: Workforce that addresses the challenges of the 21st century (Stripling & Ricketts, 2016). The objectives included in this study were to (a) describe personal factors of agriculture teaching faculty, including perception of study abroad importance and personal interest in leading a study abroad program; and (b) develop a model to explain agriculture teaching faculty involvement in study abroad in terms of personal dimension factors.

Methodology

Population

The population for this study consisted of all faculty employed in the colleges of agriculture at Louisiana State University (LSU; N = 173) and University of Florida (UF; N = 388) who held a formal teaching appointment at the time the study was conducted (combined N = 561). Frame error was discovered during analysis, and a total of 50 faculty were removed due to not meeting the criteria of holding a formal teaching appointment. Additionally, one faculty member opted out and 12 faculty were removed due to incomplete responses, which yielded a revised sample of 498. Useable responses were collected from 184 faculty for a 37% response rate.

Faculty participants in this study were employed in colleges of agriculture at LSU (f = 54; 29%) and UF (f = 130; 71%). Regarding professional status, more faculty held the rank of full professor (f = 74; 40%) and the majority were tenured (f = 109; 59%). Additionally, slightly more faculty were males (f = 103; 56%), and the majority were White, Non-Hispanic (f = 149; 81%).

Data Collection

An electronic mail (email) listserv of LSU faculty and UF faculty was obtained from college administrators and used to distribute an online questionnaire via Qualtrics email service. The email to faculty included a description of the study and a link to the questionnaire. A modified approach to Dillman, Smyth, and Christians' (2009) Tailored Design Method was used to collect responses. A second request for participation was sent to non-responding faculty following the initial contact. A third reminder and request for participation was sent one week following the second reminder. Due to lack of response, a fourth and final reminder was sent.

Instrumentation

An original instrument was developed by the researcher to assess agriculture teaching faculty involvement in and perceptions of study abroad for students. To ensure content validity, an extensive review of the literature was conducted to identify (a) activities associated with study abroad programs in which faculty can be or are involved; (b) the knowledge, skills and abilities (KSAs) most frequently identified as being outcomes of study abroad programs; and (c) institutional and individual-level factors found to influence agriculture faculty involvement in and perceptions of study abroad programs, as well as (d) factors that influence agriculture faculty involvement and perceptions of other components of internationalizing higher education that may be transferrable to study abroad. The developed questionnaire was then reviewed for content validity by an expert panel consisting of the researcher and faculty with collective proficiencies in study abroad program development and instrument development. The panel deemed the instrument acceptable. Lastly, *post hoc* reliability estimates were calculated using Cronbach's alpha.

Seven sections of the survey instrument were used for data analysis in this study including (a) involvement in study abroad programs, (b) perceived importance of study abroad for students, (c) agreement with KSAs as outcomes of studying abroad, (d) perceived importance of KSA outcomes, (e) awareness of study abroad programs, (f) personal interest in leading a study abroad program for students, and (g) the prior international experience (PIE) acquired by agriculture teaching faculty.

The first section of the instrument was designed to assess the active involvement of agriculture teaching faculty in activities associated with increasing student participation in study abroad programs. To measure involvement, faculty responses to check all that apply items were coded (0 = item not selected; 1 = item selected), and a composite score was computed. Faculty participants were asked to indicate by checking all that apply which of the 12 activities they have conducted. Examples of the activities listed include "I have encouraged students I teach/advise to study abroad", "I have used time in class to inform students I teach of study abroad opportunities in the College of Agriculture", and "I have helped design a study abroad program for students."

The second section of the instrument was designed to assess agriculture faculty perceived importance of study abroad for students. Faculty participants were asked to indicate their level of agreement with the following statement: "I believe study abroad is important for students." Responses were collected using a 6-point Likert-type scale (1 = *disagree strongly*, 2 = *disagree*, 3 = *disagree slightly,* 4 = *agree slightly*, 5 = *agree,* 6 = *agree strongly*). Real limits were set to interpret responses (1.00 to 1.50 = *disagree strongly;* 1.51 to 2.50 = *disagree;* 2.51 to 3.50 = *disagree slightly;* 3.51 to 4.50 = *agree slightly;* 4.51 to 5.50 =*agree*; = 5.51 to 6.00 = *agree strongly*).

The third section of the instrument was designed to measure agriculture teaching faculty perceptions of the KSAs students develop as a result of studying abroad. The KSA Outcome Agreement construct comprised seven items that were identified through the review of literature as the KSAs most frequently reported as student outcomes of study abroad. Faculty were asked to indicate their agreement with statements such as "studying abroad increases students' acceptance of other cultures" and "studying abroad increases students' knowledge of global issues". Responses were collected using a 6-point Likert-type scale (1 = *disagree strongly*, 2 = *disagree*, 3 = *disagree slightly,* 4 = *agree slightly,* 5 = *agree*, 6 = *agree strongly*). Real limits were set to interpret responses (1.00 to 1.50 = *disagree strongly;* 1.51 to 2.50 = *disagree;* 2.51 to 3.50 = *disagree slightly;* 3.51 to 4.50 = *agree slightly;* 4.51 to 5.50 =*agree*; = 5.51 to 6.00 = *agree strongly*). A mean score was created to represent faculty agreement with KSAs as outcomes of study abroad. The internal consistency reliability for this scale was α = .92.

The fourth section of the instrument was designed to measure agriculture teaching faculty perceptions of the importance of select KSAs for professionals in their field. The KSA Outcome Importance construct comprised 10 items intended to mirror the items in the KSA Agreement construct. Faculty were asked to indicate their agreement with statements such as "being accepting of other cultures is important for professionals in my field" and "having knowledge of global issues is important for professionals in my field". Responses were collected using a 6-point Likert-type scale (1 = *disagree strongly*, 2 = *disagree*, 3 = *disagree slightly,* 4 = *agree slightly,* 5 = *agree,* 6 = *agree strongly*). Real limits were set to interpret responses (1.00 to 1.50 = *disagree strongly;* 1.51 to 2.50 = *disagree;* 2.51 to 3.50 = *disagree slightly;* 3.51 to 4.50 = *agree slightly;* 4.51 to 5.50 =*agree*; = 5.51 to 6.00 = *agree strongly*). A mean score was created to represent agriculture teaching faculty perceptions of KSA importance. The internal consistency reliability for this scale was α = .94.

The fifth section of the instrument was designed to assess agriculture teaching faculty knowledge and awareness of study abroad programs, policies, and procedures. The Study Abroad Awareness construct comprised five items representative of the areas in which faculty need to be familiar to facilitate student participation in study abroad programs. Faculty were asked to indicate their agreement with statements such as "I am aware of study abroad opportunities for my students" and "I am familiar with the process of transferring study abroad credits to students' degree plan at home". Responses were collected using a 6-point Likert-type scale (1 = *disagree strongly*, 2 = *disagree*, 3 = *disagree slightly,* 4 = *agree slightly,* 5 = *agree,* 6 = *agree strongly*). Real limits were set to interpret responses (1.00 to 1.50 = *disagree strongly;* 1.51 to 2.50 = *disagree;* 2.51 to 3.50 = *disagree slightly;* 3.51 to 4.50 = *agree slightly;* 4.51 to 5.50 =*agree*; = 5.51 to 6.00 = *agree strongly*). A mean score was created to represent agriculture teaching faculty awareness of study abroad programs. The internal consistency reliability for this scale was α = .87.

The sixth section of the instrument was designed to assess the prior international experience (PIE) of agriculture teaching faculty. To measure PIE, faculty responses to check all that apply items were coded (0 = item not selected; 1 = item selected), and a composite score was computed. Faculty participants were asked to indicate by checking all that apply which of the 13 experiences they had acquired. Examples of the activities listed include "I have participated in international activities on campus", "I have worked in a country other than the U.S.", and "I have participated in a study abroad program for faculty."

Lastly, faculty were asked to indicate their personal interest in leading a study abroad program for students. Responses were collected using a 4-point Likert-type scale (1 = *definitely not*, 2 = *probably not,* 3 = *probably yes,* 4 = *definitely yes*).

Data Analysis

Objective one was descriptive in nature and was reported using means and standard deviations. For objective two, structural equation modeling (SEM) was employed to examine structural relationships between variables predicted to influence faculty involvement in study abroad. SEM analysis was selected due to its predictive ability, as well as the ability to examine the mediating effect of variables for which a direct effect may not be observed. SEM procedures were conducted using the MPlus 7.31 software package. Indices of absolute fit included the standardized root mean square residual (SRMR) and Steiger's (1999) root mean square error of approximation (RMSEA), with smaller values indicating a better fit to the data. SRMR values range from 0 to 1, with values less than .08 indicating a good fit (Hu & Bentler, 1999); RMSEA values below .10 indicate a good fit, and values below .05 indicate a very good fit (Steiger, 1990). Indices of comparative fit included the comparative fit index (CFI) and the Tucker-Lewis Index (TLI). The CFI ranges from 0 to 1, with values exceeding .95 as indicative of a good fit (Hu & Bentler, 1999). The TLI, or non-normed fit index is a measure of incremental fit that attempts to (a) capture the percentage improvement of a hypothesized model over the null model, (b) adjust this improvement for the number of parameters in the hypothesized model. Values exceeding .95 indicate good fit (Hu & Bentler, 1999).

Findings

Objective One

Objective one sought to describe agriculture teaching faculty perceptions of the importance of study abroad for students, as well as their personal interest in leading a study abroad program. Descriptive information for other variables examined in this study were reported previously in a prior study and were, therefore, not reported in this study. Regarding agriculture teaching faculty perceptions of the importance of study abroad, faculty agreed that study abroad was important for students (M = 5.17; SD = .86). Regarding their personal interest in leading a study abroad program for students, agriculture faculty indicated low, but possible interest (M = 2.71; SD = .94).

Objective Two

Objective two sought to develop a model to explain agriculture teaching faculty involvement in study abroad in terms of personal factors. The dependent variable was faculty involvement in study abroad. Independent variables included agreement with KSAs as outcomes of study abroad, study abroad awareness, and prior international experiences. Possible mediating variables included perception of the importance of KSA outcomes and perceived importance of study abroad.

The chi-square statistic for the full mediation model (see Table 1, M2) was statistically significant. The absolute fit index for SRMR was borderline, and RMSEA was within Steiger’s recommended range of values for good fit of the data. Further, the comparative fit indices CFI and TLI did not meet the recommended cutoff value of .95 (Hu & Bentler, 1999; see Table 1, M2). As such, this model was not considered a good fit and a partial mediation model was examined. The chi-squared statistic was significant for the first partial mediation model. The absolute and comparative indices showed mixed results with slight improvements to SRMR and TLI; however, the overall model did not suggest a good fit for the data (see Table 1, M3). As such, two exploratory partial mediation models were examined (see Table 1, M4, M5). Chi-square statistic was significant for both models. Again, neither absolute nor comparative indices for either model suggested a well-fitted model. The absolute index SRMR, as well as the comparative indices CFI and TLI, were slightly better for the second exploratory partial mediation model (see Table 1, M5). As such, this model was deemed the best fit of the models examined (see Figure 2).

Table 1
Full and Partial Mediation Exploratory Model Fit

Model	X^2	*df*	RMSEA[a]	CFI	TLI	SRMR
Null (M1)	69.01	19	.092	.908	.869	.143
Full (M2)	764.80	272	.093	.843	.827	.092
Partial 1 (M3)	742.56	269	.091	.849	.832	.080
Partial 2 Exploratory (M4)	751.64	270	.092	.847	.830	.089
Partial 3 Exploratory (M5)	738.53	270	.091	.851	.834	.083

Note. RMSEA, Root-Mean-Square Error of Approximation; CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; SRMR, Standardized Root-Mean-Square Residual.
[a] 90% confidence interval
****p <0.001*

All factors in the model (see Figure 2) contributed to faculty involvement in study abroad to some degree. Faculty awareness of study abroad had a direct effect on faculty involvement in study abroad. The effect of faculty agreement with KSAs as outcomes of study abroad on their involvement in study abroad was partially mediated by their perception of the importance of KSA outcomes for professionals in their field, as well as by their perception of the overall importance of study abroad. Additionally, faculty perception of the importance KSA outcomes for professionals in their field was partially moderated by their prior international experiences (see Figure 2).

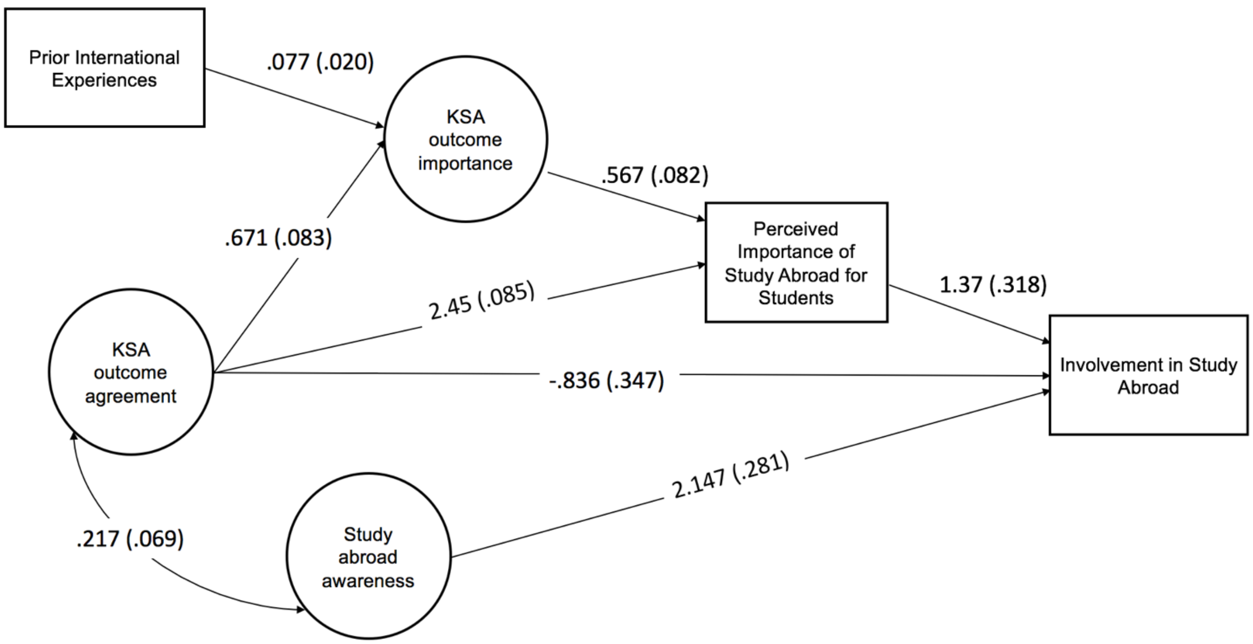

Figure 2. Partial mediation model for personal dimension factors influencing faculty involvement in study abroad.

Conclusions and Recommendations

While none of the models met the criteria for a well-fitted model, all of the models exhibited elements of close fit in some areas with marginal fit in other areas. Per the accepted model, the following personal dimension factors predicted agriculture teaching faculty involvement in study abroad: (a) faculty agreement with KSAs as being outcomes of study abroad; (b) faculty perceived importance of KSA outcomes for professionals in their field; (c) faculty perception of the overall importance of study abroad for students; (d) faculty awareness of study abroad programs, policies, and procedures; and (e) faculty PIE.

The effect of agriculture teaching faculty agreement with KSAs as being outcomes of study abroad on their involvement in study abroad was partially mediated by their perceptions of the importance of those KSA outcomes and the overall importance of study abroad for students. As indicated by the relationships observed in this model, agriculture faculty who believe studying abroad produces KSA outcomes among students will perceive studying abroad as more important and will be more likely to be involved if they also perceive those KSA outcomes as important for professionals in their field. Consistent with prior research, the findings of this study support the notion that convincing faculty of the value of study abroad programs can influence positively their involvement in efforts to increase student participation in such programs (Green & Olsen, 2003; Paus & Robinson, 2008). As such, future research should be conducted to examine why agriculture faculty do or do not perceive select KSAs as being outcomes of study abroad, as well as to examine why agriculture faculty do or do not perceive those KSA outcomes as being important for professionals in their field. Considering the high potential for the global nature of academic disciplines to influence faculty perceptions (Bond et al., 2003; Ellingboe, 1988), it may also be beneficial to include academic discipline in future models to explain faculty perceptions of the importance of KSA outcomes.

Additionally, faculty perceptions of the importance of KSA outcomes was moderated by their prior international experience. Consistent with prior research, agriculture faculty in this study are more likely to perceive KSA outcomes of study as important for professionals in their field if they have acquired international experiences themselves (ACE, 2012; Akpan & Martin, 1996; O'Hara, 2009). As such, efforts should be directed toward increasing the international experience of faculty. Qualitative inquiry to explore how specific international experiences have impacted faculty beliefs toward study abroad programs could aid in determining the types of opportunities that should be offered for faculty.

Agriculture faculty awareness of study abroad had a direct effect on their involvement. As consistent with prior research, agriculture faculty are more likely to be involved in study abroad if they are aware of study abroad opportunities and processes associated with study abroad (Bond et al., 2003; Doyle et al. 2010; Woodruff, 2009). Therefore, future efforts should be directed toward faculty professional development and training regarding study abroad. Such efforts may include informational sessions or seminars designed to inform faculty of upcoming study abroad programs within their departments and communicate to faculty how those programs can benefit their students.

The complexity of the model employed in this study causes limitations regarding the power of this model. As such, it would be beneficial to explore separate, more simplified models in future research to better explain the personal dimension factors influencing faculty involvement in study abroad. Moreover, considering the limitation posed by the small sample size in this study, it is recommended future studies of this nature be conducted with a larger sample size that includes agriculture faculty from other institutions. Finally, future research should be conducted to examine the relationships between variables in the professional and institutional dimensions to further develop and test the conceptual model for faculty involvement in study abroad (see Figure 1).

References

Akpan, M., & Martin, R. A. (1996). Perceptions and activities of agricultural education professors in U.S. institutions of higher education regarding internationalization of the agricultural education curriculum. *Journal of International Agricultural and Extension Education, 3*(2), 63–71. doi:10.5191/jiaee.1996.03208

American Council on Education (ACE). (2012). *Mapping internationalization on U.S. campuses: 2012 edition.* Washington, DC: American Council on Education. Retrieved from http://www.acenet.edu/news-room/Documents/Mapping-Internationalizationon-US-Campuses-2012-full.pdf

Bond, S. L., Qian, J., & Huang, J. (2003). The role of faculty in internationalizing the undergraduate curriculum and classroom experience. *Canadian Bureau for International Education, 8,* 1–20. Retrieved from http://files.eric.ed.gov/fulltext/ED549872.pdf

Childress, L. K. (2009). Internationalization plans for higher education institutions. *Journal of Studies in International Education, 13*(3), 289–309. doi:10.1177/1028315308329804

Dewey, P., & Duff, S. (2009). Reason before passion: Faculty views on internationalization in higher education. *Higher Education, 58*(4), 491–504. doi:10.1007/s10734-009-9207-z

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method*. Hoboken, NJ: John Wiley & Sons, Inc.

Doyle, S., Gendall, P., Meyer, L. H., Hoek, J., Trait, C., McKenzie, L., & Loorparg, A. (2010). An investigation of factors associated with student participation in study abroad. *Journal of Studies in International Education, 14*(5), 471–490. doi:10.1177/1028315309336032

Dwyer, M. M (2004). More is better: The impact of study abroad program duration. *Interdisciplinary Journal of Study Abroad, 10,* p. 151–163.

Engle, L., & Engle, J. (2004). Assessing language acquisition and intercultural sensitivity development in relation to study abroad program design. *The Interdisciplinary Journal of Study Abroad, 10,* 219–236. Retrieved from https://eric.ed.gov/?id=EJ891458

Green, M. F., & Olsen, C. L. (2003). *Internationalizing the campus: A user's guide.* Washington DC: American Council on Education. Retrieved from http://www.d.umn.edu/vcaa/intz/users%20guide.pdf

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indixes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. doi: 10.1080/10705519909540118

Hulstrand, J. (2009). Attracting faculty to education abroad. *International Educator, 18*(5), 48–51. Retrieved from https://www.nafsa.org/_/File/_/sepoct09_edabroad.pdf

Institute of International Education (IIE). (2016). *Open doors report.*

Lukosius, V., & Festervand, T. A. (2013). Marketing study abroad programs: A student recruitment model. *American Journal of Business Education, 6*(5), 483–494. doi:10.19030/ajbe.v6i5.8038

McCabe, L. T. (2001). Globalization and internationalization: The impact on education abroad programs. *Journal of Studies in International Education*, *5*(2), 138–145.

National Survey of Student Engagement (NSSE). (2008). *Promoting engagement for all students: The imperative to look within.* Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.indiana.edu/NSSE_2008_Results/docs/withhold/NSSE2008_Results_revised_11-14-2008.pdf

O'Hara, S. (2009). *Vital and overlooked: The role of faculty in internationalizing U.S. campuses* (White Paper Issue No. 6). Retrieved from Institute of International Education website: http://www.iie.org/en/Research-and-Publications/Publications-and-Reports/IIE-

Paus, E., & Robinson, M. (2008). Increasing study abroad participation: The faculty makes the difference. *The Interdisciplinary Journal of Study Abroad, 17,* 33–49. Retrieved from http://files.eric.ed.gov/fulltext/EJ899295.pdf

Schwietz, M. (2006). *Internationalization of the academic profession: An exploratory study of faculty attitudes, beliefs, and involvement at public universities in Pennsylvania* (Unpublished doctoral dissertation). University of Pittsburgh, Pittsburgh, PA.

Stanford Research Institute (SRI). 2002. *U.S Fulbright Scholar program outcome assessment.* Stanford, CA: Author. Retrieved from https://eca.state.gov/files/bureau/fulbright-us-scholar-one-pager-aug-2002.pdf

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research, 25*(2), 173–180. doi:10.1207/s15327906mbr2502_4

Stripling, C. T., & Ricketts, J. C. (2016). Research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 29–35). Gainesville, FL: Department of Agricultural Education and Communication

Umbach, P. D., & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education, 46*(2), 153–183. doi:10.1007/s11162-004-1598-1

Wade, A., & Demb, A. (2009). A conceptual model to explore faculty community engagement. *Michigan Journal of Community Service Learning, 15*(2), 5–16. Retrieved from https://u.osu.edu/demb.1/files/2008/09/Wade-Demb-MJCLS-vz7pf0.pdf

Woodruff, G. A. (2009). *Internationalizing the curriculum and campus paper series.* Minneapolis, MN: University of Minnesota Office of International Programs. Retrieved from https://global.umn.edu/icc/documents/woodruff_curriculum_integration.pdf

Zamastil-Vondrova, K. (2005). Good faith or hard data? Justifying short-term programs. *International Educator, 14*(1), 44–49.

A Critique of:
Conceptualizing Agriculture Teaching Faculty Involvement in Study Abroad: An Examination of Structural Relationships between Personal Dimension Variables in Involvement

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The authors of this study focused on university faculty involvement in study abroad and the possible factors that may attribute to said involvement. The introduction section begins broadly about the importance of study abroad then moves into the role of faculty. The thesis of the study is around faculty involvement with study abroad, but much of the introduction focuses on peripheral arguments. The authors attempt to make the case in the second paragraph but lacks depth. Without citations, one could argue that several of the points of how faculty contribute to study abroad could be accomplished through staff. What *uniquely* is it about the faculty role that make faculty so important to study abroad? In many ways, that's where the article could start and in fleshing that out, the authors could further distinguish how this study fits a gap in the literature. Finally, I would expect an argument of why we should study agriculture faculty, otherwise this is a study of any faculty, where agriculture faculty constitutes a convenience sample. The manuscript then leads to what I consider to be a well-established framework based partially on a mid-level framework and partially on a substantiated framework. The authors do a great job of synthesizing the literature in building the case for the newer, substantiated portion of the framework.

The manuscript then leads us through the methodology section, which is robust and has solid blueprint should someone wish to replicate the study. Even though, in sum, I would denote this section as rather thorough, there are a few gaps the authors need to address. The first is the authors need to address non-response error. Secondly, the authors need to address reliability for the second section (that item likely needs to have undergone test-retest). Third, the authors need to describe how any assumptions were met with structural equation modeling (SEM). The findings were succinct yet met the objective. I would like more explanation as to the figure 2 as per the last paragraph in that section. For someone who is not as familiar with SEM, that would be helpful.

The conclusions and recommendations section follows the cadence familiar to studies in our field. I appreciate the authors providing recommendations that match their findings. There is some linking back to literature but this linking focuses on whether the findings confirm or refute previous literature. This is important to do and the authors did their due diligence. However, the components missing in this section are 1) a discussion of the original framework from which this study was based and 2) a more explicit conversation about the gaps that this study filled in the literature. I appreciate the limitations section and the transparency by the authors. Personally, I appreciate when that leads this final section so I have an appropriate lens in reviewing the discussion.

The Relationship between Student Pre-Entry Attributes and Six-Year Bachelor's Degree Completion

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Donald M. Johnson, University of Arkansas

Abstract

This study examined the six-year graduation status of freshmen (N = 1,839) entering the College of Agricultural, Food and Life Sciences (AFLS) between 2001 and 2010. The overall graduation rate was 64%, including 23% who had transferred out of AFLS. Multinomial logistic regression was used to determine if student entry data differentiated between graduates and non-graduates and between AFLS and non-AFLS graduates. High school GPA (HSGPA), first-generation status, and year of admission significantly ($p < .001$) differentiated between graduates and non-graduates. Each standard deviation increase in HSGPA was associated with a 224% increase in the relative odds of graduating. Students entering each subsequent year had a 10% increase in the relative odds of graduating. Being a first-generation student decreased the relative odds of graduating by 52%. Year, major (agriculture or human environmental sciences), and composite ACT score (CACT) significantly ($p < .001$) differentiated between AFLS and non-AFLS graduates. Students entering each subsequent year had a 16% increase in the relative odds of being AFLS graduates, while agriculture majors were about twice as likely to be AFLS graduates. Each standard deviation increase in CACT score was associated with a 26% decrease in the relative odds of being an AFLS graduate.

Introduction and Theoretical Framework

The need for more graduates with degrees in agriculture, food, and natural resources (AFNR) has been well documented. In 2015, the USDA released figures showing an estimated 34,500 AFNR graduates available each year to fill 57,900 annual AFNR job openings, resulting in a 40% annual shortage of graduates (Goecker, Smith, Fernandez, Ali, & Theller, 2015). In 2009, the National Research Council called for changes in higher education in order to reduce the shortage of qualified AFNR graduates. In 2014, the STEM Food and Ag Council sounded the alarm again, "We are not producing nearly enough … professionals to meet industry demand—which continues to grow year after year" (p. 9). In 2016, the American Association of Agricultural Educators (AAAE) stated in its National Research Agenda, "The range of issues and subject matters important to agriculture has broadened, and the educational system to provide skilled individuals to fill the needed occupations has scrambled to keep pace" (Roberts, Harder, & Brashears, 2016, p. 30). While recruitment efforts have assisted in reducing the gap between workforce needs and available human capital (Roberts et al., 2016), stalled graduation rates continue to temper increases in recruitment (NRC, 2009). The number of students recruited to pursue AFNR degrees has increased. However, "The number of students earning degrees in agriculture has been relatively stable since 2000" (NRC, 2009, p. 26). Efforts taken to understand the gap between enrollment in AFNR degree programs and graduation from AFNR degree programs can assist institutions of higher education in taking action to improve graduation rates.

Tinto (1975, 1993) developed a widely accepted model of student attrition from higher education (Figure 1). According to this model, student pre-entry attributes contribute to the development of tentative academic and institutional goals and commitments that students bring with them as they enter institutions of higher education. Once enrolled, students interact with the formal and informal academic and social systems present in the institution, resulting in a greater or lesser degree of academic and social integration into the institution, and to the reaffirmation, reconsideration, or revision of the previous academic and institutional goals and commitments. These academic and institutional goals, together with the student's external commitments lead to student decisions about attrition or retention, and ultimately graduation. In four-year institutions with more than one college, the college in which a student is enrolled can impact his or her experiences, which then interacts with his or her pre-college characteristics (Wohlgemuth, Whalen, Sullivan, Nading, Shelley, & Wang, 2007). An examination of how each of these pre-college factors influences AFNR students' likelihood to graduate can shape university retention efforts to mitigate the effects of specific factors that put students at-risk of dropping out (Astin & Oseguera, 2005; DeAngelo, Franke, Hurdado, Pryor, & Tran, 2011).

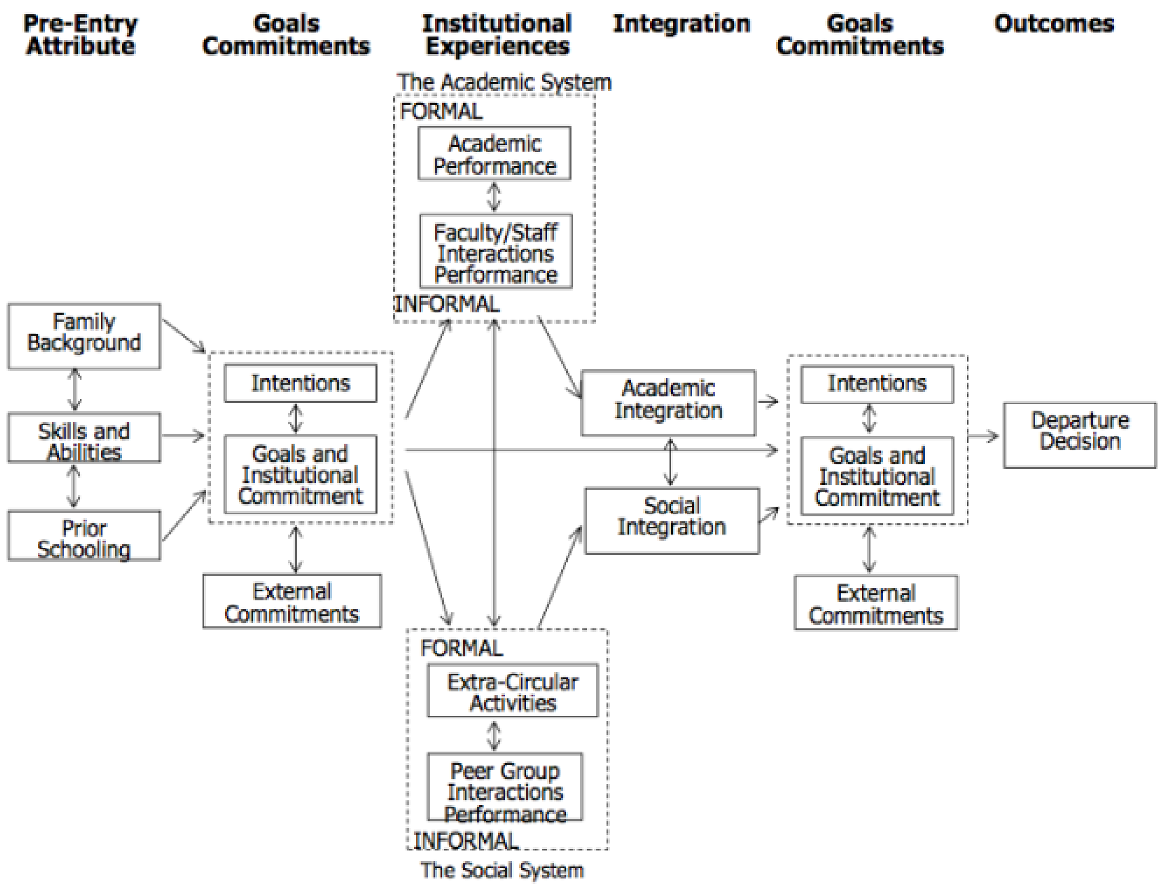

Figure 1. Tinto's (1993) longitudinal model of student attrition from higher education.

An institution's six-year graduation rate is defined as the percentage of full-time, first-time freshmen who graduate within six years (Institute of Educational Sciences, 2016). The six-year graduation rate is an important educational metric because it is the graduation rate that institutions must report under the Student Right-to-Know Act (Institute of Educational Sciences, 2016).

Identifying variables predicting college graduation has been the subject of numerous studies, some with conflicting findings. In 2005, Astin and Oseguera studied graduation rates from 3,700 four-year institutions and found that 57.6% of freshmen had earned a bachelors' degree within six years of entering as full-time freshmen. DeAngelo et al. (2011) found that the six-year graduation rate had increased to 61.2% and that women graduated at a higher rate (63.6%) than did males (58.1%). They also found that first-generation college students graduated at a lower rate (50.2%) than other students who had at least one parent who had attended college (64.2%), and that students with higher high school GPAs and higher standardized test scores were more likely to graduate than their less academically prepared peers.

Wohlgemuth et al. (2007) found that females, students receiving financial aid, and students entering the College of Agriculture were more likely to graduate within six years with a bachelor's degree from Iowa State University. The researchers found that while ACT scores predicted four-year graduation rates, they did not predict five- or six-year graduation rates.

Pike, Hansen, and Childress (2013) sampled 4,006 students at one Midwestern institution, examining their pre-college characteristics and degree status. They found that first-generation students were less likely to have graduated within six years of initial enrollment. Students with higher SAT scores and those with higher high school class percentile ranks were more likely to have graduated within six years.

Stebleton and Soria (2013) examined self-perceived academic obstacles encountered by first-generation college students at six large, public research universities. First-generation students rated job, family, and other responsibilities; weak English, math, and study skills; and feelings of depression or stress as significantly higher obstacles to graduation than did non-first-generation students. In addition, Oldfield (2007) posited that first-generation students bridge two cultures and often find higher education to be "a rarified and often mystifying culture" (p. 2) with unfamiliar customs, rules, and values. Oldfield (2007) recommended increased institutional efforts to assist first-generation students to acquire the cultural capital necessary for academic and social success.

The percentage of out-of-state freshmen entering the University of Arkansas increased from 30.5% in 2006 to 52.3% in 2016 (University of Arkansas, n.d.a). Previous research indicates out-of-state students were less likely to be retained because of a propensity to transfer to institutions in their home states (Campbell & Mislevy, 2013). Thus, student residency classification (in-state vs. out-of-state) was included as a potential predictor in this study.

This study was conducted as part of the university effort to assess annual progress toward its retention and graduation goals. By tracking six-year graduation rates of AFLS students by year of admission and identifying factors associated with graduation versus non-graduation, AFLS can both assess its contribution to the university's six-year graduation goals and tailor intervention efforts to meet the needs of students at risk of non-graduation. Factors examined as potential predictors of six-year graduation rate included year of admission (Jones, 2017), high school GPA (DeAngelo et al., 2011; Mau, 2016), composite ACT score (Mau, 2016), gender (Mau, 2016; Wohlgemuth et al., 2007), major, Pell Grant eligibility ([as students eligible for Pell Grants have an established financial need] Wohlgemuth et al., 2007), residency (Campbell & Mislevy, 2013), and first-generation college student status (Pike et al., 2003).

The University of Arkansas has a longstanding goal of increasing its six-year graduation rate (Hale, Graham, & Johnson, 2009), with a current goal of improving from 62.5% in 2015 to 70% by 2021 (Jones, 2017). The university's six-year graduation rate increased by approximately 0.78% per year between 1998 and 2010 (University of Arkansas, n.d.b). Because the university goal is incremental improvement in graduation rates over time, year of admission was included in this study as a potential predictor of six-year graduation.

The College of Agricultural, Food and Life Sciences (AFLS) has contributed to this overall growth with an overall graduation rate increase of 15.9%. The college houses majors in the agricultural disciplines, as well as a School of Human and Environmental Sciences (HES), leading to the convergence of two student groups within one college. Johnson, Shoulders, and Edgar (in press) found that HES students comprised approximately one-third of AFLS enrollment, and that while females constituted slightly over half of the agriculture majors, they made up 94% of the HES majors. Additionally, they found that HES students were 39% more likely to transfer out of AFLS as sophomores than were agriculture students. The differences between these two groups of students warrants examination of majoring in either HES or agriculture as a predictor of six-year graduation rate.

Purpose and Objectives

The purpose of this study was to determine if university admissions data could be used to predict six-year graduation for first time, fulltime freshmen enrolling in the College of Agricultural, Food and Life Sciences (AFLS) at the University of Arkansas from 2001 to 2010. Specific objectives were to:

1. Determine the six-year degree status (graduated, enrolled, or not enrolled) of first-time, fulltime freshmen admitted to the AFLS from 2001 to 2010;

2. Determine if selected variables (year of admission, high school GPA, composite ACT score, gender, major, Pell Grant eligibility, residency, and first-generation college student status) could differentiate between students graduating (in any major) and students not graduating from the university for first time, fulltime freshmen entering AFLS from 2001 to 2010; and

3. Determine if selected variables (year of admission, high school GPA, composite ACT score, gender, major, Pell Grant eligibility, residency, and first-generation college student status) could differentiate between AFLS graduates and non-AFLS graduates for first time, fulltime freshmen entering AFLS from 2001 to 2010.

Methods

The population for this study included all AFLS students entering a land-grant university as new, first-semester, fulltime freshmen (*N* = 1,839) from 2001 to 2010. After institutional IRB approval, the Office of Institutional Research (OIR) provided the researchers with a data file containing the following admissions data for each student: year of admission, high school GPA (HSGPA), composite ACT score (CACT), major (categorized as human environmental sciences or agriculture), Pell Grant eligibility, and first-generation college student status. The OIR also supplied matched data for each student's sixth-year graduation outcome (graduated; enrolled, but not graduated; or not enrolled) and the student's undergraduate college (for graduates and currently enrolled students) or the last college of enrollment (for students no longer enrolled). Complete admissions data were available for 1,672 (90.9%) total students and for 1,176 (92.0%) of the 1,272 students who graduated in six years. Descriptive statistics are reported for all (*N* = 1,839) students. Logistic regression models were based on complete cases after removal of outliers and leverage points. The dataset was deemed valid and reliable because it consisted of official university records supplied by the OIR.

Descriptive statistics and logistic regression were used to analyze the data. According to Peng, Lee, and Ingersoll (2002), "Logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables" (p. 4). To meet the study objectives, two logistic regression models were estimated. The first model sought to identify variables differentiating between six-year graduates and non-graduates. The second model sought to differentiate between sixth-year AFLS graduates and students transferring to and graduating from other undergraduate colleges at the university (non-AFLS graduates).

Prior to logistic regression analysis, the continuous variables (CACT and HSGPA) were converted to *z* scores as recommended by Osborne (2015). Year of admission (Year) was converted to a 10-point basis (2001 = 1 to 2010 = 10). Values for all binary categorical variables were coded as either zeros or ones (Table 1).

Table 1

Variable Coding for Logistic Regression

Variable	Coding
Gender	Female = 0
	Male = 1
Major	Human environmental sciences = 0
	Agriculture = 1
Pell Grant eligible	No = 0
	Yes = 1
First-generation college student	No = 0
	Yes = 1
Arkansas resident	No = 0
	Yes = 1
HSGPA	Converted to *z* scores
CACT	Converted to *z* scores
Year of Admission	2001 = 1 to 2010 = 10
Six-year graduation status	Not graduated = 0

	Graduated = 1
College of graduation	0 = Non-AFLS 1 = AFLS

The assumptions of logistic regression differ from those of ordinary least squares (OLS) regression. Logistic regression, a non-parametric method, does not require the OLS assumptions of linearity, normality, and homoscedasticity (Osborne, 2015). The two primary assumptions of logistic regression are independence of error terms and linearity of continuous independent variables and log odds (Peng et al., 2002). Independence of error terms was assumed, because each observation in the dataset represented one unique student. Linearity of the three continuous independent variables (HSGPA, CACT, and year of admission) and their respective log odds was assessed using procedures recommended by Field, Miles, and Field (2012). The results indicated the linearity assumption was not violated.

The dataset was examined for outliers and leverage points by plotting and testing the significance of the standardized residuals as recommended by Osborne (2015). Sixty-six observations (3.4%) were removed from the dataset leaving 1,606 observations for analysis. Analysis of the deleted observations indicated these students were primarily a unique subgroup of non-graduates, characterized by above average CACTs (z = 0.35) and HSGPAs (z = 0.87).

Results

Of the 1,839 new, first-semester freshmen entering AFLS from 2001 to 2010, a majority were female (69.0%) and had majors in agriculture (62.1%), as opposed to human environmental sciences (37.9%). Females comprised a slight majority (53.2%) of agriculture majors and the vast majority (94.7%) of human environmental sciences majors.

About one-fourth of freshmen were from out-of-state (23.3%), were first-generation college students (24.0%), and almost one-fifth were eligible for Pell grants (19.1%). The students had a mean HSGPA of 3.55 (SD = 0.44), with a range of 1.42 to 5.0. HSGPAs greater than 4.0 were due to schools' use of weighted GPA calculations. The mean CACT score was 24.70 (SD = 3.71), with a range of 15.0 to 35.0.

For new, first semester freshmen entering AFLS between 2001 and 2010, the overall six-year graduation rate was 64.0% (Table 2). Over one-third (36.2%) of these graduates had transferred out of AFLS and graduated from other colleges. Of the remaining students, 44 (2.4%) were still enrolled as undergraduates and 619 (34.7%) had not received a degree and were not enrolled six years after entering AFLS as freshmen.

Table 2

Overall Six-Year Retention and Graduation Rates for New Freshmen, 2001 to 2010

Outcome	*F*	%
Graduated (total)	1176	64.0
AFLS	750	40.8
Non-AFLS	426	23.2
Enrolled (total)	44	2.4
AFLS	18	1.0
Non-AFLS	26	1.4
Not Enrolled (total)	619	33.7

Overall, six-year graduation rates trended upward for new freshmen entering AFLS from 2001 to 2010, increasing from 58.8% to 67.5%. Year of admission had a moderate correlation (Davis, 1971) with six-year graduation rates (r = .34). Because of this relationship, year of admission was retained as a potential predictor in logistic regression analyses.

The correlations between year of admission and HSGPA (r = .01) and CACT (r = .06) were negligible (Davis, 1971). The point-biserial correlations between year of admission and gender (r_{pb} = -.01), Pell grant eligibility (r_{pb} = .01), and majoring in agriculture were negligible (r_{pb} = -.10), while the correlations between year of admission and in-state status (r_{pb} = -.14), and first-generation status (r_{pb} = .17) were low (Davis, 1971).

Model 1: Graduates (Any Major) vs. Non-Graduates

The first stepwise logistic regression model compared students graduating in six years in any major (graduates, n = 1,078) with students not graduating in six years (non-graduates, n = 528), including students still enrolled. Graduates were entered as the reference group in this analysis. Thus, positive logistic regression coefficients and odds ratios (*OR*s) greater than one for a specific variable indicated that increases in the variable were associated with increased odds of being a graduate as opposed to being a non-graduate, with all other variables held constant. Negative coefficients and *OR*s less than one indicated that increases in the variable were associated with decreased relative odds of being a graduate.

The global null hypothesis that no logistic regression coefficient was significantly different from zero was rejected, $\chi^2(2)$ = 356.18, p < .001, pseudo-R^2 = .29. Three variables entered into the model were significant at the .001 *alpha* level: HSGPA, first-generation student status, and year of admission (Table 3).

HSGPA was the first predictor to enter into the equation, resulting in a pseudo-R^2 of .26. The *OR* of 3.24 indicated each one standard deviation (z = 1.0) increase in HSGPA was associated with a 224% increase [(*OR* - 1) * 100)] in the odds of being a graduate as compared to a non-graduate. First-generation entered second, with a negative regression coefficient and a pseudo-R^2 increase of .02. The *OR* of 0.48 indicated that being a first-generation college student decreased the relative odds of being a graduate by 52% [(*OR* - 1) * 100]. Year of admission was entered last and provided a pseudo-R^2 increase of .01. The *OR* of 1.10 indicated students entering in each subsequent year had a 10% increase in the relative odds of being a graduate as compared to students entering in the previous year.

Table 3

Results of Stepwise Logistic Regression Analyses Predicting Six-Year Graduation, Any Major, 2001 to 2010

	Cumulative Pseudo-R^2	β (SE)	Odds Ratio	CI_{95} for Odds Ratio Lower Limit	CI_{95} for Odds Ratio Upper Limit
Intercept		0.55 (0.15)***			
HSGPA[a]	.26	1.18 (0.07)***	3.24	2.81	3.74
First-Generation Student	.28	-0.74 (0.14)***	0.48	0.36	0.63
Year of Admission	.29	0.09 (0.02)***	1.10	1.05	1.15

Note. [a]Converted to *z* scores. [b]Coded as no = 0 and yes = 1. [c]Coded as 2001 = 1 to 2010 = 10.
*p < .05, **p < .01, ***p < .001.

HSGPA was the first predictor to enter into the equation, resulting in a pseudo-R^2 of .26. The *OR* of 3.24 indicated each one standard deviation (z = 1.0) increase in HSGPA was associated with a 224% increase [(*OR* - 1) * 100)] in the odds of being a graduate as compared to a non-graduate. First-generation entered second, with a negative regression coefficient and a pseudo-R^2 increase of .02. The *OR* of 0.48 indicated that being a first-generation college student decreased the relative odds of being a graduate by 52% [(*OR* - 1) * 100]. Year of admission was entered last and provided a pseudo-R^2 increase of .01. The *OR* of 1.10 indicated students entering in each subsequent year had a 10% increase in the relative odds of being a graduate as compared to students entering in the previous year.

The logistic regression model consisting of these three predictors correctly classified 73.8% of all observations into their correct six-year outcome (graduate or non-graduate), Somers D = .55. The model was more accurate in predicting graduates (89.1% correct) than in predicting non-graduates (42.6% correct).

Model 2: AFLS Graduates vs. Non-AFLS Graduates

Of the 1,078 graduates, 63.8% graduated from AFLS (AFLS graduates), while 36.2% had transferred and graduated from a different college (non-AFLS graduate) at the University of Arkansas. The second stepwise logistic regression analysis was conducted to determine if the predictor variables could differentiate between these two groups. AFLS graduates were used as the reference group, so, again, positive regression coefficients and *OR*s greater than one indicated increases in the predictor variables were associated with increased odds of being an AFLS-graduate as opposed to a non-AFLS graduate, with all other variables held constant.

The global null hypothesis that no logistic regression coefficient was significantly different from zero was rejected, $\chi^2(1) = 34.16$, $p < .001$, pseudo-R^2 = .09. Three variables entered into the model and were significant at the .001 *alpha* level: Year of Admission, Major, and CACT (Table 4).

Table 4.

Results of Stepwise Logistic Regression Analyses Predicting Six-Year AFLS vs. Non-AFLS Graduates

	Cumulative Pseudo-R^2	β (*SE*)	Odds Ratio	CI_{95} for Odds Ratio Lower Limit	Upper Limit
Intercept		-0.69 (0.18)***			
Year of Admission[a]	.04	0.14 (0.02)***	1.16	1.10	1.21
Major[b]	.07	0.78 (0.14)***	2.19	1.66	2.88
CACT[c]	.09	-0.31 (-0.07)***	0.74	0.64	0.84

Note. [a]Coded as 2001 =1 to 2010 = 10. [b]Major coded as 0 = human environmental sciences and 1 = agriculture. [c]Converted to *z* scores.
*p < .05, **p < .01, ***p < .001.

Year of admission was the first predictor to enter into the equation, resulting in a pseudo-R^2 of .04. The *OR* of 1.16 indicated each subsequent year of entry increased the relative odds of being an AFLS graduate by 16% over graduates entering in the previous year. Major entered second resulting in a pseudo-R^2 increase of .03. Students entering AFLS as agriculture majors were slightly more than twice as likely (*OR* = 2.19) to be AFLS graduates as were students entering as human environmental sciences majors. CACT entered last, with a negative regression coefficient, and resulted in a pseudo-R^2 increase of .02. The *OR* of 0.74 indicated a one *SD* (z = 1.0) increase in CACT was associated with a 26% decrease in the relative odds of being an AFLS graduate.

The logistic regression model consisting of these three predictors correctly classified 65.5% of all graduates into the correct category (AFLS graduate or non-AFLS graduate), Somers' *D* = .32. The model correctly predicted 67.3% of AFLS graduates and 54.8% of non-AFLS graduates, showing a predictive bias in favor of AFLS graduates.

Discussion and Summary

Tinto (1993) and Wohlgemuth et al. (2007) outlined the importance of understanding how student characteristics and college experiences influence student success. This study examined the six-year graduation status of new, first-semester freshmen (*N* = 1,839) entering a land-grant university's College of Agricultural, Food, and Life Sciences (AFLS) between 2001 and 2010. Overall, six-year graduation rates trended upward about 10% for new freshmen entering AFLS majors within the 10 years included in this study. Year of admission had a moderate positive correlation (Davis, 1971) with six-year graduation rates. The overall graduation rate for students was 64%, including 23% who had transferred out of AFLS.

Findings indicated that high school GPA, first-generation student status, and year of admission were significant predictors of six-year graduation rate. Students with higher GPAs were more likely to graduate, as were students who were admitted later (each subsequent year increasing the likelihood of graduating by 10%); conversely, being a first-generation college student decreased the relative odds of graduating by 52%.

These findings lead to two divergent strategies for improving six-year graduation rates: improved students or improvements within the university. The first strategy is to emphasize recruitment of high-GPA freshmen with college-educated parents who are most likely to graduate. Such an approach would focus on increasing the quality of entering students and less on improvement of the college and university into which these students enter. The second strategy is more difficult, but more consistent with this university's land-grant mission. This strategy would entail using these results to identify and provide additional academic assistance and needed services to lower-GPA and first-generation students designed to help overcome potential barriers to graduation. Emphasis on this strategy would necessarily focus on improvements within the college and university so these students are better served.

Student services are currently available at this land-grant university within both AFLS and the overall university to assist students with academic, study, and time-management issues. Thus, efforts in this area should focus on better identifying students who can benefit from these services and motivating them to participate. However, few if any formal services are available specifically designed to assist first-generation students in developing the cultural capital (Oldfield, 2007) necessary for both academic success and social integration into the college and university. Development of effective student services for first-generation students should be a priority for both AFLS and the university.

Findings also indicated that agriculture majors were slightly more than twice as likely to graduate from AFLS as students who entered as HES majors. Students entering the university as HES majors were more apt to transfer to a different major outside AFLS and graduate from a different college within the university. Additionally, students who were admitted to the university later were more likely to graduate from AFLS, with each subsequent year increasing the likelihood by 16%. Alternately, students with higher CACT scores were 26% less likely to graduate from AFLS, but instead graduate from a different college within the university.

Although the specific reasons agriculture majors were more likely than human environmental sciences majors to graduate from AFLS could not be determined from the data, the authors posit this may be a result of agriculture students' backgrounds and self-identity with agriculture and rural life (Shoulders & Myers, 2011). Additional research in this area is definitely warranted, as the potential for HES students to feel "out of place" within a college of AFLS may contribute to their greater likelihood to pursue other majors. In the meantime, human environmental sciences faculty and administrators should open a dialogue with undergraduate students to identify factors related to their increased likelihood to transfer out of AFLS.

The finding that students with higher CACT scores were relatively more likely to be non-AFLS graduates also warrants further study. Future research should focus on why these students leave AFLS and into which colleges and majors they transfer. In the meantime, AFLS faculty and administrators should more fully engage these students in the college honors program, with faculty mentors, and in undergraduate research experiences in an effort to retain these high-ability AFLS students (Edgar, Whitehead, & Davis, 2017).

Residency was not a significant predictor of six-year degree completion or completion of an AFLS degree; both Arkansas and non-Arkansas students were equally likely to graduate and to receive AFLS degrees. This is an important finding, given the increasing percentage of out-of-state freshmen entering the University of Arkansas.

Improving six-year graduation rates has been a longstanding priority for both the university and for AFLS (Hale et al., 2009). These results indicate relative year-to-year improvements in both overall six-year graduation rates and in AFLS-retained graduation rates over the 10-year period, despite relatively little change in either HSGPA or CACT scores. Edgar, Johnson, Graham, and Dixon (2014) reported no significant changes in selected AFLS course GPAs between 2000 and 2012, providing some evidence that increased graduation rates were not due to grade inflation. Thus, current university and AFLS retention efforts appear to be working without changes in student academic characteristics or achievement.

Although the results of this study are generally consistent with findings from previous studies (DeAngelo et al., 2011; Mau, 2016; Pike et al., 2013; Wohlgemuth et al., 2007), caution should be exercised in generalizing these results to other students and universities. Other researchers are encouraged to conduct similar studies at their own universities to determine specific factors identifying students potentially at-risk for non-retention. Subsequent meta-analysis of a group of similar studies could potentially yield a generalizable set of predictor variables capable of identifying students at-risk of dropping out of AFNR programs.

Concerns regarding the need for increased graduates with degrees in agriculture, food, and natural resources (AFNR) and in STEM fields have been well documented (NRC, 2009; Roberts et al., 2006; Goecker et al., 2015). This research was an attempt to identify specific characteristic of students entering AFLS and their relationship to six-year degree completion. Through a better understanding of how pre-college factors influence AFLS students' likelihood to graduate, college and university retention efforts can be directed toward the students most needing these services (Astin & Oseguera, 2005; DeAngelo et al., 2011; Mau, 2016; Pike et al., 2013; Wohlgemuth et al., 2007).

Literature Cited

Astin, A. W., & Oseguera. L. (2005). Pre-college and institutional influences on degree attainment. In A. Seidman (Ed.), *College student retention: Formula for student success* (pp. 245–276). Westport, CT: American Council on Education/Praeger.

Campbell, C. M., & Mislevy, J. L. (2013). Student perceptions matter: Early signs of undergraduate student retention/attrition. *Journal of College Student Retention, 14*(4), 467–493. doi:http://dx.doi.org/10.2190/CS.14.4.c

Davis, J. A. (1971). *Elementary survey analysis*. Englewood, NJ: Prentice Hall.

DeAngelo, L., Franke, R., Hurdado, S., Pryor, J. H., & Tran, S. (2011). *Completing college: Assessing graduation rates at four-year institutions*. Los Angeles, CA: Higher Education Research Institute, UCLA.

Edgar, L. D., Johnson, D. M., Graham, D. L., & Dixon, B. L. (2014). Student and faculty perceptions of plus/minus grading and its effect on course grade point averages. *College Student Journal, 48*(1), 184–197.

Edgar, L. D., Whitehead, I., & Davis, K. J. (2017). College of agriculture honors students' needs: Developing a process for faculty change to enhance student success. Oral presentation at the

NACTA Conference, West Lafayette, Indiana (June 28-July 1, 2017). Proceedings available at https://www.nactateachers.org/images/website/2017_Purdue/2017_NACTA_Program.pdf

Field, A., Miles J., & Field, Z. (2012). *Discovering statistics using R*. Thousand Oaks, CA: Sage Publications.

Goecker, A. D., Smith, E., Fernandez, J. M., Ali, R., & Theller, R. (2015). *Employment opportunities for college graduates in food, agriculture, renewable natural resources, and the environment, 2015-2020*. Retrieved from https://www.purdue.edu/usda/employment

Hale, M. D., Graham, D. L., & Johnson, D. M. (2009). Are students more satisfied with academic advising when there is congruence between actual and preferred advising styles? *College Student Journal, 43*(2), 313–324.

Institute of Educational Sciences. (2016). *Graduation rates.* Retrieved from *https://nces.ed.gov/pubs2017/2017046.pdf*

Johnson, D. M., Shoulders, C. W., & Edgar, L. D. (In press). Predictors of freshman to sophomore retention in a college of agricultural, food and life sciences. Accepted for publication in the *North American Colleges and Teachers of Agriculture (NACTA) Journal.*

Jones, M. (2015, December 5). Within five years, UA officials want 70 percent graduation rate. *Razorback Reporter.* Retrieved from http://razorbackreporter.uark.edu/2015/12/within-5-years-ua-officials-want-70-percent-graduation-rate/

Lani, J. (2014). *Assumptions of logistic regression*. Retrieved from https://www.statisticssolutions.com/assumptions-of-logistic-regression

Mau, W. C. (2016). Characteristics of US students that pursued a STEM major and factors that predicted their persistence in degree completion. *Universal Journal of Educational Research, 4*(6), 1495–1500. doi:10.13189/ujer.0406.30

National Research Council (NRC). (2009). *Transforming agricultural education for a changing world*. Washington, DC: National Academies Press.

O'Connell, A. A., & Amico, K. R. (2010). Logistic regression. In G. R. Hancock and R. O. Mueller (Eds.). *The reviewer's guide to quantitative methods in the social sciences* (pp. 241-254). New York, NY: Routledge.

Oldfield, K. (2007). Humble and hopeful: Welcoming first-generation poor and working-class students to college. *About Campus, 11*(6), 2–12.

Osborne, J. W. (2015). *Best practices in logistic regression*. Thousand Oaks, CA: Sage Publications.

Peng, C-Y. J., Lee, K. L., & Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *The Journal of Educational Research, 96*(1), 3–14.

Pike, G. R., Hansen, M. J., & Childress, J. E. (2013). The influence of students' pre-college characteristics, high school experiences, college expectations, and initial enrollment characteristics on degree attainment. *Journal College Student Retention, 16*(1), 1–23. doi:10.2190/CS.16.1.a

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds.) (2016). *American Association for Agricultural Education national research agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication.

Shoulders, C. W., & Myers, B. E. (2011). Considering professional identity to enhance agriculture teacher development. *Journal of Agricultural Education, 52*(4), 98–108. doi:10.5032/jae.2011.04098

Stebleton, M., & Soria, K. (2013). Breaking down barriers: Academic obstacles of first-generation students at research universities. *The Learning Assistance Review, 17*(2), 7–19. Retrieved from http://hdl.handle.net/11299/150031

STEM Food and Ag. Council. (2014). *STEM Annual Report* (No. 1). Retrieved from https://www.stemconnector.com/wp-content/uploads/2016/11/STEM-Food-And-Ag-Annual-2014.pdf

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition*. (2nd ed.) Chicago, IL: The University of Chicago.

University of Arkansas. (n.d.a). *Enrollment* [Data file]. Retrieved from https://oir.uark.edu/students/enrollment.php

University of Arkansas. (n.d.b). *Retention and graduation summary: 1998 to present* [Data file]. Retrieved from https://oir.uark.edu/students/retention-graduation.php

Wohlgemuth, D., Whalen, D., Sullivan, J., Nading, C., Shelley, M., & Wang Y. R. (2007). Financial, academic, and environmental influences on the retention and graduation of students. *Journal College Student Retention, 8*(4), 457–475.

A Critique of:
The Relationship between Student Pre-Entry Attributes and Six-Year Bachelor's Degree Completion

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The authors of this study focused on degree completion within colleges of agriculture. The manuscript begins with a compelling argument around the need for the study, focusing on the agricultural job prospects. The manuscript then leads to the conceptual framework. Tinto is well-known for his work in degree persistence to degree among undergraduate. Related, I appreciate how the authors succinctly establish why 6 years is an important threshold. The authors move into discussion regarding possible independent variables. Many times this is absent from studies investing models using multiple independent variables. The introduction and framework section circles around to more of the local need for the study, establishing the context for the study.

The following are recommendations to improve the introduction and framework section. First, even though the authors make the case for the need to study students in a college of agriculture, it would be helpful to further that conversation to discuss why we might expect differences from studies that investigate entire universities. This would also develop an argument for the gap in the literature, which is somewhat absent. Secondly, even though the authors discuss studies that have included the independent variables of interest for the current study, they do not provide depth as to why one might expect to see a relationship between the independent variable and dependent variable outside of the framework, which broadly defines these pre-entry attributes. It might be helpful to reorganize this part of the section around the independent variables where the literature is more synthesized, as opposed to a more annotated bibliography approach.

The authors had clear objective matching the previous section. The methods are clearly outlined. I am appreciative of the sample size. In addition to the argument that the data were valid and reliable, those data were also valid and reliable because many of them were direct measures. The coding table was very helpful for interpretation. The researchers also discussed assumption testing, which is typically absent. The results were well organized. In particular, the discussion of the odds of the independent variable as it related to the dependent variable was fantastic and provided fantastic utility to the findings. There are two minor critiques in the findings. The first is the correlations seemed out of place given the objectives and the more robust regression models. Secondly, and I acknowledge this is somewhat of a profession norm, but somewhere the authors need to acknowledge the research hypothesis as the null hypothesis does not indicate direction (which might be a moot point for this particular statistical procedure).

In the discussion section, I was most appreciative of the third paragraph. It was a thought-provoking conversation that is sometimes absent in research articles. The authors tended to focus more on recommendations rather than implications. They also spent little time linking their findings to the conceptual model and the literature, which is indicative of the issues outlined previously regarding a lack of a gap in the literature being defined and a strong argument of why one might expect to see relationships between the independent variables and the dependent variable. If these issues can be resolved, this can be an excellent model paper for how to conduct higher education research with larger data sets in our field.

Hunger Games: Using Q Method to Define Food Perspectives of Stakeholders at a Natural Food Retailer

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Abstract

American consumers have stated an increased desire for food that is produced through natural methods. Although the term natural is poorly defined, consumers are deciding to frequent natural food retailers at rapidly increasing rates. This study allowed us to employ Q methodology to examine the perspectives of stakeholders in a natural food retailer. Data analysis led to the extraction of five unique factors, each representing a unique persona among participants. We labeled the five personas Selectively Conventional, Trend Followers, Egocentric Eaters, Agrarian Idealists, and Food Curators. Examining the distinguishing statements for each of these personas, along with an exploration of the Q set statements which received consensus or disagreement across factors could be helpful for agricultural producers, food retailers, and agricultural communicators as they work to reach the increasing number of consumers who express concerns about the production, processing, and impact of the food they choose to purchase.

Introduction

A general movement of the population away from the farm has led to decreased knowledge and understanding of the complexities involved in agricultural production systems (Doerfurt, 2011). The number of Americans born on farms has declined from 24% in 1958 to less than 1% in 2015 (Hudson & Laingen, 2016). An increasing number of people are disconnected from the production practices associated with the agricultural products they are purchasing (Hudson & Laingen, 2016). Coupled with this distance from the farm is an increasing consumer concern about food processes, practices, and safety (Brewer & Rojas, 2008). Public unrest with regard to the environmental, animal welfare, food purity, and health impacts of agricultural practices have led to the rise of niche food products, which often highlight unconventional production practices on the label (Belasco, 2014).

The widening knowledge gap between what consumers believe to be true and what is actually happening in agricultural production has placed the agricultural industry in unchartered territory related to educating the public about how agricultural products reach retail locations (Fernqvist & Ekelund, 2014; Hudson & Laingen, 2016). Understanding consumer perspectives of food products is a pressing issue for agricultural communicators, and helps to answer the research question “what methods, models, and programs are effective in informing public opinions about agriculture and natural resource issues?" posed in the research agenda of the American Association for Agricultural Education (Roberts, Harder, & Brashears, 2016).

Consumers make choices about their food products on a daily basis (Belasco, 2014). These decisions are based on factors including cost, origin, perceived health benefits, production methods, environmental concerns, and convenience (Fernqvist & Ekelund, 2014). In a growing food-centric society, a focus on local, sustainably-produced food products has resulted in a massive increase in the prevalence of farmer's markets, farm-to-table initiatives, and natural food retailers (Martinez, 2010). Although the term is not well defined, most industry experts consider retailers who specialize in local, organic, or sustainable food the "natural food market" (Belasco, 2014). Whole Foods, Inc., the largest company in the world focusing on providing retail natural food touts their commitment to "providing the most natural and organic foods available, maintain the strictest quality standards in the industry, and have an unshakeable commitment to sustainable agriculture" (Whole Foods, 2018). The natural food sector of the grocery industry has shown growth at much more rapid rates than the grocery industry as a whole in the United States over the last 10 years (Belasco, 2014). In 2013, the natural foods sector grew at a rate of 9.6% while the entire grocery industry grew at a rate of only 6.8% (Belasco, 2014).

What drives consumers to purchase foods from natural food retailers? According to Belasco (2014), consumer demands for food have changed because of an increased desire for "socially safe consumption." A shift in consumers who are more likely to care about the political, environmental, and societal impacts of their food choices may be at the forefront of consumer perspectives about natural foods (Belasco, 2014). Public concern regarding traditional agricultural production practices has increased as consumers care more about their global footprint (Dimitri, Effland, & Conklin, 2005).

There is limited research concerning consumer beliefs and opinions about the role agriculture plays in food consumption, especially in the United States. Studies have been conducted in Nigeria and India to examine consumer perspectives of agriculture related to food (Adekunle, et. al., 2002; Shingi & Mody, 1976). These studies found consumers wanted increased awareness of the methods used to produce their food. A comparison of consumer views related to organic versus conventional production was conducted in Canada (Yiridoe, Bonti-Ankomah, & Martin, 2005) and of meat production in Europe (McEachern & Seaman, 2005). As these studies were not conducted in the United States, there are leave unanswered questions about U.S. consumer food perspectives.

To bridge the gap between producers and consumers, agricultural communicators need effective solutions to connect to an audience on food-related issues (Abrams & Meyers, 2016). It is crucial to identify the perspectives and opinions or specific groups concerning the food system in order to maximize production and feed a growing global population in an industry driven by consumer demands (Kovar & Ball, 2013). Once agricultural communicators identify similarities and differences in consumer groups, information can be tailored to meet the needs and perspectives of different consumer groups (Leggette & Redwine, 2016). Adapting each message to a target audience will foster maximum communication efficiency, as personalizing the message to the personal beliefs and opinions enhances the relevance of the subject (Hawkins et al., 2008). Taking into account how the public perceives and assesses risks is integral to developing an effective communication strategy (Lusk, Roosen, & Bieberstein, 2014). Science and risk communication is a key determinant of the extent to which new technologies in food and agriculture will be accepted (Lusk, et.al., 2014).

Kovar and Ball (2013) conducted a comprehensive examination of agricultural literacy research, and found that of the 49 research articles related to agricultural literacy efforts, only 6 (12.2%) were related in any way to educating non-agricultural adults. With such little effort going into educating the consumer population, it is no wonder that American adults have widespread misconceptions about agricultural production practices (Fernqvist & Ekelund, 2014).
Commodity organizations and those involved in agriculture have spurred a movement to try and develop greater awareness and understanding between producers and consumers, urging agriculturalists to tell their story and advocate for the industry (Rollins, Kennedy, & Wills, 2011). Educational efforts about conventional agriculture are in place and research has highlighted the difficulty in changing attitudes which have already been formed (Perloff, 2008), inciting a demand for a more proactive communication approach (Abrams & Meyers 2016).

The purpose of this study was to explain perspectives about agriculture and food to inform educators and communicators. Since over half of the U.S. population lives in suburban areas, it is crucial to build positive rapport with the public to gain the support of policies benefiting agriculture (Homeyer, 2016). Our study allowed for a holistic examination of perspectives from stakeholders involved in a natural food retailer, and the potential to identify factors of influence for consumers as they develop preconceived ideas about their food and how it is produced. The data gathered through this investigation could have widespread implications for agricultural producers, those who work to market agricultural products, and the communicators responsible for sharing information about how food products that reach consumers' plates.

Homeyer (2016) used Q method investigate and characterize the food views of consumers and stakeholders in agriculture, further substantiating our decision to approach consumer types through Q method (Redwine & Leggette, 2016). Understanding how perspectives of the agricultural industry influence consumers' decisions and attitude is important (Kovar & Ball, 2013). Consumers drive demand for food, and their purchasing decisions shape the types of food produced, and to a lesser extent, the production practices used to bring those foods into the marketplace (Hudson & Laingen, 2016). Market trends that are propelled by misinformation and fear have the ability to destabilize production practices and threaten food security (Belasco, 2014). Public acceptance of innovations in agriculture will impact the wellbeing of farmers and consumers in the coming decades (Belasco, 2014).

Theoretical Framework

Ajzen's (1991) theory of planned behavior (TPB) was used to help frame this study. Ajzen (1991) noted that "intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior, subjective norms, and perceived behavioral control" (p. 182). The use of Q methodology allowed us to examine individual attitudes toward the behavior of making food purchases. The employment of a Q sort also allowed an examination of the perceived subjective norms, by allowing participants to rate their level of agreement with statements from a variety of viewpoints. The unique relationship participants had as stakeholders in a natural food market allowed us to explore their connections to food, the natural food retailer, and their intentions surrounding food purchases.

The purpose of this portion of a larger study of consumer food perspectives was to examine perspectives of food among individuals involved with a natural food retailer. The identification of perspectives was completed to identify the factors that resonate with this audience. To meet this purpose, the following objectives guided the study:

1. Identify consumer level of agreement with statements related to food and agricultural production practices.
2. Describe personas related to food and food production practices for individuals involved with a natural food retailer.

Methods

This study was completed through the employment of Q methodology. Q method is in order when the objective of research is to identify personal beliefs, opinions, or subjective meaning in an attempt to define general types or patterns of perspectives held by a particular group (Watts & Stenner, 2012). Q Methodologists accomplish such analyses by flipping traditional *spearman r* correlations (Leggette & Redwine, 2016). "Instead of using instruments to test the performance of an individual and make comparisons to the population, Q methodology uses each individual, complete with all the subjectivity and holistic diversity, as tests for the performance of items." (Leggette & Redwine, 2016, p. 51). Q methodology combines qualitative and quantitative methods, and is appropriate to questions about personal opinion and matters of taste, values, and beliefs (Stephenson, 1953). Q methodology was chosen as the appropriate research method in this study as the perspectives of a food among those involved with a natural food retailer was the topic of interest. The use of this method requires careful attention to the Concourse (the population of ideas on a given topic), Q set (or the sample of ideas that will analyzed), P Set (or the participants who will sort statements in the Q set), and data analysis and interpretation rooted in factor analysis (Watts and Stenner, 2012; Van Exel & de Graaf, 2005).

Concourse and Q Set

Using 40-60 statements in a Q sort is recommended to allow adequate coverage of the relevant topic (Watts & Stenner, 2014). Although some researchers advocate for additional statements, many agree that a 40 statement Q set will yield viable responses (Kerlinger & Lee, 1999; Watts & Stenner, 2012). We decided to use a 40 statement sort based on logistical factors and the desire to avoid respondent fatigue. An eleven column Q sort distribution board, as shown in Figure 1, was selected as the layout for the Q set. The choice to use an 11 point distribution was guided by the suggestion of Watts and Stenner (2012) to use a more flattened distribution in cases with 40 statements and respondents with excellent topic knowledge.

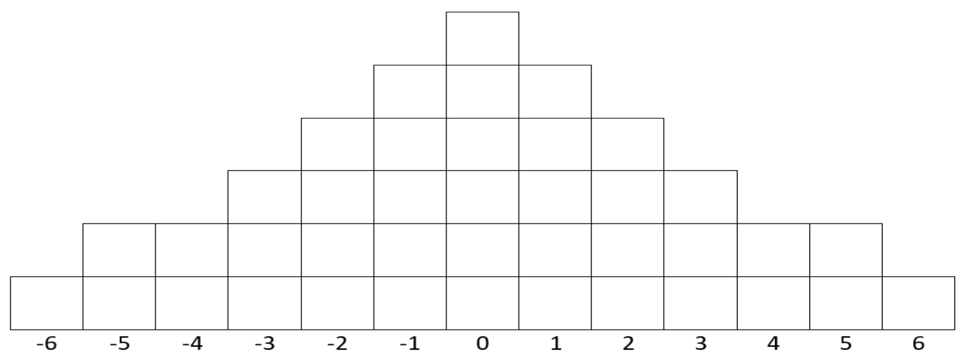

Figure 1. Q sort distribution used in this study.

The concourse of statements used in a Q sort should be based on the all perspectives, opinions, and beliefs related to the topic under investigation (Brown, 1993; Watts & Stenner, 2012), and should be derived from previous literature and/or qualitative methods (Watts & Stenner, 2012). The concourse used for this Q sort was informed by previous literature, including a study by Homeyer (2016). Homeyer (2016) suggested a list of twenty screening statements related to consumer personas in food choices. We compared these screening statements with the collection of knowledge from the concourse and evaluated them through personal interviews with natural food stakeholders to derive a Q set.   The evaluation process resulted in the generation of 40 statements related to perspectives of food, loosely based on Homeyer's (2016) screening questions, and curated to be representative of the concourse. Watts and Stenner (2012) suggest using a common stem for all statements in a Q set. All statements for this study were written with the stem "food should".   The initial Q set was piloted to a group of 22 consumers in order to examine statements for clarity and understanding. Following the pilot, respondents provided information about the clarity and face validity of each statement which assisted in revision and of the final Q set statements. Changes to the original statements included only semantic refinement and minor word choice revision.

Participants

Participants in this study were selected based on their strong relationship with a natural food retailer. Respondents included those involved with marketing and customer relations at the company level, along with patrons who had a strong level of commitment and patronage with the natural food location. The Board of Directors at the store assisted in identifying individuals who would be considered experts in natural foods topics, and those with strong opinions on factors related to food choices. Following identification, participants were recruited through email or personal contact. Recruitment efforts resulted in $N = 20$ participants who completed the Q sort process. Participants ranged in age from 21 to 63 and represented a wide variety of annual income, education, and background information.

After recruitment of participants, arrangements were made for administration of the Q sort. Magnetic Q sort boards were formatted with an eleven column forced choice distribution, with each column numbered from -6 to +6. Each statement in the Q set was prepared on a 2" by 3" laminated card attached to a magnet, and statement numbers were assigned to the back of each Q set card. We scheduled time for participants to complete the Q sort individually at the location of their choice. At the time of administration, participants were instructed to place each statement on the board according to their level of agreement and were informed that there was no ranking within columns, only a ranking between columns. We observed each participant during their completion of the Q sort, and recorded observations including comments, placement times for decisions, and overall speed of completion. Due to logistics, provisional ranking categories were not recorded, only the final sorting of Q set statements into the forced choice distribution. Final placement of each Q set statement were recorded by statement number on a paper form, and a digital picture was taken of each completed Q sort. Exit interviews were conducted with each participant, with questions including demographic information, overall views of natural food retailers, and experience in methods of producing food products.

Data Analysis

Data collected from the Q sort tables were coded based on placement and analyzed using PQMethod software (Schmolk, 2014). In accordance with Q Method analysis (Watts & Stenner, 2012; Schmolk, 2014), we used Principal Component Analysis (PCA) to create an unrotated factor matrix, and used the Kaiser-Guttman Criterion as an initial guide to determine an appropriate factor extraction solution. Once factors with an Eigenvalue greater than 1.0 were selected, they were considered defining sorts and factor loading values were used to select a workable and meaningful solution, as recommended by Watts and Stenner (2012). Then, we used VARIMAX rotation to generate a rotated factor matrix and select defining sorts for characterization of viewpoints. PQMethod software uses these steps in factor analysis to generate factor arrays based on factors extracted and identify distinguishing sorts (Schmolk, 2014), which we used to interpret and characterize viewpoints.

Findings

Five factors were extracted and rotated based on the Eigenvalue set *a priori at* 1.0 or higher. These factors together explained 72% of the study variance. Analytical characteristics for each of the extracted factors is shown in Table 1.

Table 1. *Characteristics of Extracted Factors*

	Factor				
	1	2	3	4	5
Number of Defining Variables	2	4	3	3	3
Composite Reliability	0.89	0.94	0.92	0.92	0.92
Eigenvalues	7.53	3.35	1.30	1.26	1.01
% Explained Variance	15	17	10	14	16
Cumulative Explained Variance	15	32	42	56	72

Correlations between factors were also examined. Correlation coefficients ranged from -0.31 to 0.35 between factors. Watts and Stenner (2012) cautioned against extraction of any factor which had a correlation coefficient outside +/- 0.38 with any other factor, as they may be too alike to interpret as separate factors. Based on the correlation coefficients, we determined that each of the five factors could be interpreted separately. Both Watts and Stenner (2012) and Schmolk (2014) recommend checking defining sorts to prevent overfactoring. We evaluated defining sorts to make sure that no defining sorts loaded more than .5 on any other factor as a means of mitigating the risk of overfactoring, and determined that all five factors could be individually interpreted.

Factor one included two defining sorts and accounted for 15% of explained variance. Distinguishing statements associated with factor one, along with their respective Q sort and Z score values are shown in Table 2.

Table 2. *Distinguishing Statements for Factor One*

#	Statement	Q Sort Value	Z-Score
37	Food should be produced without chemicals	-5	-1.90*
26	Food should be grown without GMOs	-6	-2.29

Note. *indicates significance at the p = 0.01 level

Factor two was comprised of four defining sorts and included 11 distinguishing statements. This factor had an Eigenvalue of 3.35, and accounted for 17% of explained variance. Distinguishing statements associated with factor two are shown in Table 2.

Table 2. *Distinguishing Statements for Factor Two*

#	Statement	Q Sort Value	Z-Score
15	Food animals should be free-range or cage-free	6	1.99*

31	Food should be organic	4	1.45
37	Food should be produced without chemicals	4	1.38
22	Food containing GMOs should be labeled	3	1.11*
26	Food should be grown without GMOs	2	0.72
23	Food should be scrumptious	1	0.26
34	Food should be profitable for producers	-1	-0.31*
14	Food prices should vary according to quality	-4	-1.29
19	Food should be available in heirloom varieties	-5	-1.58*
17	Food should be grown by more knowledgeable producers	-5	-1.68*
5	Food should be available in many varieties	-6	-2.00*

Note. *indicates significance at the p = 0.01 level

Results for factor three included three defining sorts and an Eigenvalue of 1.35. This factor accounted for 10% of the study variance. Nine distinguishing Q set statements were identifying for this factor, as included in Table 3.

Table 3. *Distinguishing Statements for Factor Three*

#	Statement	Q Sort Value	Z-Score
14	Food prices should vary according to quality	5	1.69*
18	Food production should be driven by consumer opinion	5	1.57*
21	Food should be accessible to all	-1	-0.53*
37	Food should be produced without chemicals	-2	-0.57*
2	Food should be produced with a focus on water conservation	-2	-0.61
7	Food packaging should be sustainable	-2	-0.81
24	Food should be produced by workers earning a living wage	-2	-0.90
26	Food should be grown without GMOs	-5	-1.37
12	Food should be produced on small-scale farms	-5	-1.69*

Note. *indicates significance at the p = 0.01 level

Factor four included three defining sorts, had an Eigenvalue of 1.26 and explained 16% of study variance. There were eight distinguishing statements for this factor, which are shown in Table 4.

Table 4. *Distinguishing Statements for Factor Four*

#	Statement	Q Sort Value	Z-Score
8	Food should be grown with respect to the land	6	2.17*
32	Food should be grown locally	5	1.90*
12	Food should be produced on small-scale farms	4	1.22
19	Food should be available in heirloom varieties	2	0.78*
21	Food should be accessible to all	1	0.48*
4	Food should be produced with safety as the highest priority	-3	-0.80*
13	Food should be convenient	-4	-1.40*
16	Food should be produced with more government oversight	-5	-1.88*

Note. *indicates significance at the p = 0.01 level

Factor five was the final factor extracted with an Eigenvalue of 1.01, and explained 16% of variance in the study. This factor included three defining sorts and five distinguishing statements, which are shown in Table 5.

Table 5. *Distinguishing Statements for Factor Five*

#	Statement	Q Sort Value	Z-Score
32	Food should be grown locally	2	0.79
31	Food should be organic	2	0.54
30	Food should be free from additives	0	0.21
23	Food should be scrumptious	-2	-0.49
20	Food should be produced as efficiently as possible	-5	-1.95*

Note. *indicates significance at the p = 0.01 level

An examination of agreement and disagreement for Q set statements revealed several statements which warrant further discussion based on their overall variance across factor arrays. These statements along with their Q sort values for each factor can be found in Table 6.

Table 6. *Q Sort Values Across Factors for Selected Statements Based on Consensus/Disagreement*

		Q Sort Values by Factor				
#	Statement	1	2	3	4	5
9	Food should be affordable	2	2	-1	3	3
33	Food should only come from plant sources	-3	-2	-6	-3	-6
15	Food animals should be free-range or cage-free	3	6	-4	2	-2
37	Food should be produced without chemicals	-5	4	-2	2	1
20	Food should be produced as efficiently as possible	4	-2	4	-2	-5

The identified statements were flagged for examination because they had the highest and lowest levels of agreement between factors. Statement 9 “food should be affordable” received a positive Q sort value across all factors, while statement 33, “food should only come from plant sources” was had a negative Q sort value in all five factors. The statements “food animals should be free-range or cage-free,” “food should be produced without chemicals,” and “food should be produced as efficiently as possible” had high levels of agreement in some factors and low levels of agreement in other factors, and can be discussed as polarizing statements between factor personas.

Conclusions/Discussion/Recommendations

Each factor characterizes a distinct persona of consumer at the natural foods market. Examining the distinguishing statements, along with the Q sort values can assist in characterizing and explaining the personas. According to Watts and Stenner (2012), it is important to include both the quantitative information surrounding factor arrays and the qualitative interpretation of distinguishing statements to allow for a complete analysis of Q set statements as they relate to each extracted factor.

We classified factor one as Selectively Conventional. The distinguishing statements for this sort indicate that Selectively Conventional individuals embrace GMO technology and did not discriminate against food which is produced with chemicals. Based on an examination of demographic characteristics, individuals making up the defining sorts for this factor were middle-class and middle-aged. An examination of the entire Q sort values for this factor also revealed that Selectively Conventional individuals preferred food products from animals who were produced free-range or cage-free and in humane environments. While they supported having food that was processed or contained additives, they were selective in their acceptance of all conventional agricultural practices.

Trend Follower was the classification given to individuals in factor two. The distinguishing statements associated with this factor included a focus on food that is produced with minimal impact. Trend Followers desired food from animals who are free-range or cage-free, foods that are organic, produced without chemicals, and non-GMO. These individuals did not believe that food should be available in multiple or heirloom varieties and did not feel as though producers should be more knowledgeable about the products they produce. They also did not feel as though food prices should vary based on quality. Trend Followers in this study had noted expendable income and ranged in ages from mid-thirties through their fifties.

We labelled factor three the Egocentric Eaters. Egocentric Eaters were characterized by statements revealing they desired price fluctuation in food quality, were comfortable with food produced on a large scale, valued accessible food for everyone, and felt production should be driven by consumer opinion. This type of consumer was accepting of GMOs, although they did not agree that all workers should receive a living wage for food production. From a demographic standpoint, these individuals were older than other participants and reported higher annual earnings than individuals in the other four factors.

Factor four was classified as the Agrarian Idealists. The distinguishing statements revealed that these consumers desire food that is grown locally, with respect to the land, on small-scale farms. In addition, Agrarian Idealists are less concerned with food safety and convenience than other personas, and strongly oppose government oversight in the food production process. This persona most closely aligned with the perspective described by Belasco (2014). People sorting into this factor were middle aged or older and had a variety of annual income and education levels.

Food Curator was the classifying label we assigned to factor five. These individuals put thought into the preparation of food, with a desire for food that is both organic and local. Food Curators do not believe that food should be produced as efficiently as possible, indicating that they value the time and energy required to produce quality food. These individuals came from a wide range of demographic characteristics, but were grouped together based on the value they place on quality, artisanal food.

There were several statements worth noting based on their consensus or disagreement across factors. Participants in all factors agreed with the statement "food should be affordable." It is comforting to know that stakeholders associated with a natural food retailer, where prices are typically higher than a traditional grocer, there is an importance placed on keeping food affordable. Overall, participants were in disagreement with the statement "food should be produced with more government oversight." This statement may indicate a distrust in regulatory agencies and the policies surrounding food safety. In addition, the statement "food should come from plant sources only" was consistently ranked very low. This could indicate that although veganism and vegetarian diets are often associated with natural food retailers, having only plant-based products may not be a priority for many of the stakeholders. Differences in Q scores existed between factors on items including "food animals should be free-range or cage-free," "food should be produced without chemicals," and "food should be produced as efficiently as possible," indicating these statements are likely more polarizing than others in the Q set.

This study helps us understand several discussion points for agricultural producers, food retailers, and agricultural communicators. Understanding characteristics of the five extracted factors can help producers as they frame the message about their production practices. Increased education could be the key to bridging the gap between production practices and consumer understanding. For example, Trend Followers indicated their desire for food that was organic and also indicated high agreement with the statement "food should be produced without chemicals." There may be a misunderstanding of organic practices within this group, who may not understand that "organic" does not necessarily mean "chemical-free." Across factors, participants indicated a desire to know how their food was being produced and processed, and many participants expressed a desire to know producers on a personal level in their exit interviews. We recommend additional efforts from commodity groups and individual producers to help identify and close knowledge gaps identified through this study, and to allow consumers the opportunity to better understand both the people and processes that bring food to their table.

Natural food retailers can benefit from the explanation of the broad range of customer expectations when purchasing food. Addressing consumer expectations using Q Methodology provided key insight into consumer perspectives. By understanding the roots of misinformation and how it influences consumer trends, agricultural outreach coordinators may be able to more effectively shape their messages to resonate with varying audiences. Indications from this study may aid retailers in crafting an individualized marketing approach. Consensus statements highlighted perspectives that each consumer group agree upon. For example, every persona group rejected the statement "food should come only from plant sources," indicating that while the reputation of the natural foods retailer is largely in catering towards consumers with meat-restricted or meat-free diets, it may be wise to invest less messaging in the accommodation of vegans and vegetarians. Each persona also rejected the statement "food should be produced with an emphasis of health over taste," implying that the degree of nutrition regarding products sold should not come at the expense of flavor.

Understanding consumer personas may also aid agricultural communication professionals as they identify misconceptions concerning the food industry and work to help educate the growing number of consumers who are making the decision to buy food from natural food retailers. In addition, the distinguishing statements for each factor along with the statements reaching consensus or disagreement bring up many additional questions for agricultural communicators. This study focused only on the natural food industry; what differences exist between the five factors identified in this study and the stakeholders involved with a traditional grocer? Where is information about food coming from? How can we best tailor messages to influence the attitudes and change the subjective norms that consumers will used to plan their food purchasing behaviors?

We recommend the continued use of Q Methodology in the examination of consumer food perspectives. Further research could examine differences and similarities between traditional and natural foods retailers to determine patterns of consumer trends. Also, exploring characteristics of persona groups in other natural foods markets across the country would lend a more refined image of consumer expectations based on locations across the United States. In addition, while Q methodology grants keen views into consumer perceptions, it does not provide insight into the representation of these groups. Future research could work to determine the relative population size of each persona to supplement the marketing approaches to these target segments. By learning more about consumer food choices, we can not only work to inform consumers, but to shed light on the role of everyone in the production system in feeding the world.

References

Abrams, Katie & Meyers, Courtney. (2016). Feeding the debate: A qualitative framing analysis of organic food news media coverage. *Journal of Applied Communications*, 95(3).

Adekunle, A. A., Onyibe, J. E., Ogunyinka, O. M., Omenesa, Z. E., Auta, S. J., & Kuyello, A. U. (2004). *Agricultural information dissemination: An audience survey in Kano State*. Ibadan, Nigeria: International Institute of Tropical Agriculture (IITA).

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211.

Belasco, W. J. (2014). *Appetite for change: How the counterculture took on the food industry*. Ithica, NY: Cornell University Press.

Brewer, M. S., & Rojas, M. (2008). Consumer attitudes toward issues in food safety. *Journal of Food Safety*, *28*(1), 1-22.

Brown, S. R. (1993). A primer on Q methodology. *Operant Subjectivity*, *16*(3/4), 91- 138.

Dimitri, C., Effland, A. B., & Conklin, N. C. (2005). *The 20th century transformation of US agriculture and farm policy* (Vol. 3). Washington, DC: US Department of Agriculture, Economic Research Service.

Doerfert, D.L. (Ed.).(2011). *National Research agenda: American Association for Agricultural Education's research priority areas for 2011-2015.* Lubbock, TX: Texas Tech University, Department of Agricultural Education and Communications.

Fernqvist, F., & Ekelund, L. (2014). Credence and the effect on consumer liking of food–A review. *Food Quality and Preference*, *32*, 340-353.

Hawkins, R. P., Kreuter, M., Resnicow, K., Fishbein, M., & Dijkstra, A. (2008). Understanding tailoring in communicating about health. *Health Education Research, 23*(3), 454-466. doi: 10.1093/her/cyn004

Homeyer, M. *Speaking their language: Communicating to the different perspectives of agriculture.* (master's thesis) Texas A&M University, College Station, TX.

Hudson, J. C., & Laingen, C. R. (2016). *American Farms, American Food: A Geography of Agriculture and Food Production in the United States*. Lanham, MD: Lexington Books.

Kerlinger, F. N., & Lee, H. B. (1999). *Foundations of behavioral research.* San Diego, CA: Harcourt College Publishers.

Kovar, K. A., & Ball, A. L. (2013). Two decades of agricultural literacy research: A synthesis of the literature. *Journal of Agricultural Education*, *54*(1), 167-178. doi: 10.1032/jae/054.001.167

Leggette, H. R. and Redwine, T. (2016). Using Q methodology in agricultural communications research: A philosophical study, *Journal of Applied Communications 100*(3), 57-67. doi.org/10.4148/1051-0834.1230

Lusk, J. L., Roosen, J., and Bieberstien, A. (2014) Consumer acceptance of new food technologies: Causes and roots of controversies, *Annual Review of Resource Economics*, 6(1): 381-405.

Martinez, S. W. (2010). *Local food systems; concepts, impacts, and issues*. Collingdale, PA: Diane Publishing.

McEachern, M. G., & Seaman, C. (2005). Consumer perceptions of meat production: Enhancing the competitiveness of British agriculture by understanding communication with the consumer. *British Food Journal*, *107*(8), 572-593. doi: 10.1108/00070700510610986

Perloff, R. M. (2008.) *The Dynamics of Persuasion: Communication and attitudes in the 21st century*.(3rd. ed). New York, NY: Lawrence Erlbaum Associates.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication.

Rollin, F., Kennedy, J., & Wills, J. (2011). Consumers and new food technologies. *Trends in Food Science & Technology*, *22*(2), 99-111.

Schmolck, P. (2014). *PQMethod manual*. Retrieved from http://schmolck.userweb.mwn.de/qmethod/pqmanual.htm. Accessed on January 14, 2018.

Shingi, P. M., & Mody, B. (1976). The communication effects gap: A field experiment on television and agricultural ignorance in India. *Community Research, 3* (2), 171- 190.

Stephenson, W. (1953). *The study of behavior; Q-technique and its methodology*. Chicago, IL: University of Chicago Press.

Van Exel, J., & de Graaf, G., (2005). *Q methodology: A sneak preview*. Retrieved from http://Q method.org/articles/vanExel.pdf.

Watts, S., & Stenner, P., (2012). *Doing Q Methodological Research*. Thousand Oaks, CA: Sage.

“Whole Foods Market” (2018). Retrieved from https://wholefoodsmarket.com/companyinfo

Yiridoe, E. K., Bonti-Ankomah, S., & Martin, R. C. (2005). Comparison of consumer perceptions and preference toward organic versus conventionally produced foods: A review and update of the literature. *Renewable Agriculture and Food Systems, 20*(4), 193-205. doi: 10.1079/RAF2005113

A Critique of:
Hunger Games: Using Q Method to Define Food Perspectives of Stakeholders at a Natural Food Retailer

Tracy Kitchel, The Ohio State University

The authors of this study focused on food perspectives of stakeholders at a natural food retailer. The introduction outlines broad perspectives regarding the relationship between producers and consumers. The introduction is well-written, but I would challenge the authors to find ways to focus the narrative further. By the time I ended the introduction, I was unclear what exactly the study was aiming to do. For example, the first sentence in the fifth paragraph about limited research seemed rather nebulous and had me asking "really?" Perhaps I don't know the literature well enough, but it took me reading the findings to understand what question was being attempted. The authors use of Ajzen's (1991) theory of planned behavior to frame the study. The framework is acceptable, but I wonder if there are other theories that might inform the study more strongly. In looking at the manuscript as a whole, I think the introduction undersells the findings.

The methods section is well-crafted, explaining the Q sort process well. The remainder of this section also outlines methods adequately. The findings are clear and well-balanced between tables and narrative content. I would argue the need for the referenced demographics in the discussion section be presented here as those data helped to craft the factors.

The discussion section defines the factors well and the discussion adequately supported the nomenclature. I would challenge the authors to think about the third factor's use of egocentric. It runs counter to its use in development, which would be appropriate for teenagers and those in their early 20's as opposed to an older audience as the theme outlines. The discussion also addresses items loading in all factors and those not loading, which was interesting. My critique with the discussion section is that it does not connect back to the theory and literature. This study adds to the body of knowledge but fails to make the case. The lack of a connection to the theory may also be an indicator the theory is not a good match for the study.

Overall, I think there's tremendous potential with this study. It made me think about consumers and left me with more questions relative to the findings (as opposed to questions about the researchers' choices), which is a sign of good science.

Discussant – Jon Ulmer; Timekeeper – Keith Frost

Science Technology Engineering & Math
Socioeconomic Status, STEM Education, and Experiential Learning: An Examination of Sequencing Instruction *Kasee L. Smith, John Rayfield*
STEM Knowledge, Learning Disabilities and Experiential Learning: Influences of Sequencing Instruction *Kasee L. Smith, John Rayfield*
Visualizing visual literacy: Using heat maps to illustrate potential differences in gaze behavior in agricultural communications students *Redwine, T.D., Nielsen, S.N., Roberts, L.N., Rogers, T.J., McKim, B.R., and Rutherford, T.A.*
Assessing the Effects of the Smartphone as a Learning Tool on the Academic Achievement of School-Based Agricultural Education Student in Louisiana *H. Eric Smith, J. Joey Blackburn, Kristin S. Stair, Michael F. Burnett*

Socioeconomic Status, STEM Education, and Experiential Learning: An Examination of Sequencing Instruction

Kasee L. Smith, University of Idaho
John Rayfield, Texas Tech University

Abstract

Socioeconomic status is a factor shown to have an impact on student achievement. Agricultural education has been sought as a potential solution to teaching abstract STEM concepts through experiential learning methods. This study was designed to describe the learning preferences of students with regard to socioeconomic status, and to examine the relationship between socioeconomic status and cognitive sequencing through ELT. Results indicated that students in four Texas schools who were classified as low SES (n = 52) had similar preferences for experiential learning than those who were not classified as low SES (n= 69). When instruction was sequenced to match student learning preference, no significant differences were found in the change scores from pretest to posttest between students with low SES classification and those who were not. Implications of these findings show that factors outside of SES may have a larger impact on STEM learning in agricultural education courses. Examining students through ELT may provide a platform for mitigating the effects of socioeconomic status.

Introduction

It has been reported that more than half of students enrolled in public primary and secondary schools can be classified as low-SES based on participation in the free and reduced lunch programs (Harwell & LeBeau, 2010). Socio-economic factors play an important role in academic achievement by influencing student motivation, self-efficacy, and involvement (Bradley & Corwyn, 2002; Sirin, 2005; White, 1982). The impacts of SES are so well recognized that low SES is a factor used to determine at-risk classification for students in many school systems (Iceland & Wilkes, 2006).

In an educational climate focused on Science, Technology, Engineering and Mathematics (STEM) education, numerous student variables are being considered as more and more researchers focus on the best way to approach STEM concepts for each student (Maltese, Potvin, Lung, & Hochbein, 2014). Factors including gender, ethnicity, rural or urban settings, and others have all been used as variables to examine STEM learning concepts. Socioeconomic status (SES) has repeatedly manifested as a factor influencing student learning (Hoover-Dempsey, Bassler, & Brissie, 1987; Sirin, 2005; White, 1982), and should not be overlooked in teaching STEM concepts (Maltese, et. al., 2014).

Career and Technical Education (CTE) courses, including agricultural education, have been identified as a potential platforms for delivering abstract concepts in STEM areas (Stone, 2007, 2011). The hands-on nature and application of knowledge inherent to CTE courses may be a catalyst to student learning, especially among students who struggle with academic achievement (Stone, 2011). Agricultural education is rooted in the foundational tenets of experiential learning theory (Baker, 2012; Roberts, 2006). Understanding the role experiential learning theory plays for student learning of abstract concepts is an important step to helping all students succeed (Kolb, 1984, 2015). By examining socioeconomic status in relation to experiential learning in an agricultural education setting, the ties between preference for grasping information and abstract learning can be investigated for students with differing SES classifications.

There are vast amounts of information available on SES and academic achievement. The role of experiential learning theory (ELT) has also been widely studied both in and out of agricultural education. To examine the interaction between socioeconomic status and student learning preference through experiential learning theory requires background related to the impacts of socioeconomic status on academic achievement, socioeconomic status as a factor in agricultural education, and sequencing instruction through experiential learning theory in agricultural education.

The concept of differentiated instruction, as examined by Tomlinson (2014) is based on the premise that each student is unique in their educational requirements and should therefore be instructed in a manner which best meets their individual needs. To fully understand the individual needs of each student, Tomlinson (1999, 2014) recommended gathering information related to their personal and environmental characteristics. One of the factors thought to play a large role in academic achievement is socioeconomic status (Bradley & Corwin, 2002; Sirin, 2005; White, 1982). Socioeconomic status can be defined as the standing or social class of an individual, as derived from economic, education, and environmental factors (White, 1982). Socioeconomic status has been widely studied as a holistic factor affecting student learning (Bradley & Corwin, 2002; Hoover, et. al., 1987; Sirin, 2005; White, 1982). Bradley and Corwyn (2002) stated "for over 70 years findings on the relationship between SES and intellectual/ academic competence has accumulated" (p. 375).

One of the foundational pieces of literature on socioeconomic status in education was a meta-analysis of research on SES and school performance (White, 1982). White concluded from his analysis that an estimated 5% of the variance in academic achievement could be contributed to SES. In a 2005 replication of White's (1982) meta-analysis, Sirin (2005) suggested that 5% of variance would be a very conservative estimate of the impact of SES on student achievement. Researchers have suggested the use of SES, rather than ethnicity or race to help identify students who at at-risk of low academic achievement (Iceland & Wilkes, 2008). Although race and low-income are viewed as variables with large amounts of overlap, examining students through SES allows a wider and more accurate net to be cast and more at-risk students to be identified (Berg, 2016). Researchers have suggested numerous reasons low SES has a correlation to lower student aptitude (Bumgarner & Brooks-Glenn, 2013). Some researchers view low SES as an indicator of a genetic predisposition to lower IQ and academic performance (Duncan & Magnuson, 2014; St. John, 1970; Skiba, Poloini-Staudinger, Simmons, Feggins-Azziz, & Chung, 2005). Other researchers point to the fact that often in low SES families, both parents spend extended time working, leaving less time for individual parental interaction with students in their pre-school years, allowing these students to fall behind before they ever enter the school system (Bornstein & Bradley, 2014; Hoover-Dempsey, et. al., 1987; Neiss & Rowe, 2000).

There are many different methods for determining student SES. Bradley and Corwyn (2002) outline the importance of integrating as many factors contributing to student SES as possible, citing parental occupation, education level, and income as the most important factors to classify. One of the factors indicating SES which has been widely employed by educational researchers is qualification for the free and reduced lunch program (Harwell & LeBeau, 2010). This program provides students with access to the school nutrition program at low or no cost to students whose household income is below a specified level. While there are concerns that using free and reduced lunch classification as an indicator of SES is not the most complete assessment of student overall

SES (Harwell & LeBeau, 2010), it has been reported that this assessment is “perhaps the most accessible and efficient way to classify students as low SES” (Skiba, et. al., 2005, p. 235). For this reason, the SES classification used in this study was student qualification for free or reduced lunch.

Within all CTE courses, it appears as though there is a higher proportion of students with low SES than those without low SES classification. In a study of more than five million students, including more than 1.2 million CTE concentrators, there were significant differences in SES status between CTE concentrators and non CTE concentrators when SES status was determined based on parental education (Stone & Aliaga, 2005). When lower self-reported parental education was used as a determinant of low SES, CTE concentrators reported much lower SES than students indicating a focus on academic preparation or general education (Stone & Alagia, 2005). Little is known about the socioeconomic makeup of students on a national level within agricultural education.

Agricultural education as a profession has recognized the need to include SES as a variable of interest for student learning. Myers and Osborne (2005) sought to analyze areas for strengthening agricultural education research. Within this conceptual model, they suggested variables of interest in student, context, and teacher categories (Myers & Osborne, 2005). Student variables of interest included demographic information, including an understanding of student income and background (Myers & Osborne, 2005). The research agenda for the American Association for Agricultural Education also includes components related to low-income students, and includes the statement “research is needed to help the profession do a better job of attracting underrepresented people” (Stripling & Ricketts, 2016, p. 31). By continuing to focus on students from lower SES classifications, we can continue to understand how to attract these students into agricultural education and agricultural careers. According to Talbert and Larke (2005), students from low income backgrounds cannot be ignored as an important part of the future of agricultural education.

Many theories of instruction do not propose a preferred order for sequential presentation of information, however, there are several which give specific outlines for the sequencing of information. The concepts of sequencing instruction are most commonly related to the sequencing of critical thinking skills or presenting information which builds from basic to more advanced concepts (Reigeluth, 2013). Several prominent theorists have given their endorsement for instruction which is sequenced based on the complexity level of concepts. Of these theorists, most have advocated for a progression from surface level or more basic thinking skills to higher order thinking skills (Bloom, 1956; Bruner, 1966; Scandura, 1983). Bruner (1966) showed strong favor for what he called a “concept then application” order for sequencing thinking skills.. Bloom’s (1956) theory is widely accepted and rooted in the presentation of lower level thinking skills first, and progressively instructing students using higher levels of cognitive thinking skills.

Other theorists have disagreed with the simple to complex order of sequence, and have been advocates for a sequence of instruction which begins with higher order thinking and progresses to surface thinking. Landa’s (1983) algo-heuristic theory of instruction strongly suggests instructing students at the highest order first, and allowing them to work through the harder concepts to reveal the base knowledge. These theories provide conflicting views of sequence for higher levels of thinking and abstract concepts, and highlight the importance of studying the effects of sequencing instruction in the context of STEM concepts in agricultural education.

Kolb (2015) stated “the aim of experiential learning theory is to create, through a synthesis of the works of foundational scholars, a theory that helps explain how experience is transformed into learning and reliable knowledge” (p. xxi). The resulting model is the cyclical process of the experiential learning cycle. This cycle includes two sets of dialectically opposed modes of learning: Active Experimentation (AE) and Reflective Observation (RO) in relation to the perception of information, and Concrete Experience (CE) and Abstract Conceptualism (AC) in relation to the processing of information. The abstract/concrete dialectic is considered prehension, and deals with grasping or “taking hold” of experience, through either reliance on abstract conceptualization (comprehension) or concrete experience (apprehension), (Kolb, 2015). In contrast, the active/reflective dimension is related to the transformation of experience, and can been seen as the conflict between active experimentation (extension) and reflective observation (intention). Combining both the prehension dialectic and the transformation dialectic results in building knowledge (Kolb, 2015).

Kolb stated that the experiential learning cycle may be entered at any point, and gave only a caution that the stages should be followed in sequence from wherever the learner begins (Kolb, 2015). Very rarely has the concept of a particular sequence related to the learning cycle appeared in ELT literature. An experiment was conducted by Baker, Brown, Blackburn & Robinson (2014) to determine if the order of abstraction and type of reflection impacted overall student scores. Their exploratory examination provided a glimpse into the concept of sequencing ELT concepts in agricultural education. The findings of their exploratory experiment led them to conclude that the order of abstraction and type of reflection resulted in no significant differences for the post-secondary experimental groups.

This study was developed to examine student scores on pre and posttest assessments of STEM knowledge when information was presented beginning with either abstract conceptualization or concrete experience. By gathering information on STEM-based assessments, differences between students with differing SES classifications could be explored. In addition, we were interested in describing learning preferences in the experiential learning cycle (Kolb, 1984, 2015) for students both with and without low socioeconomic status, to examine potential interactions between student socioeconomic status and the two methods Kolb proposes for grasping information. Cognitive sequencing in this study was an examination of the prehension dimension of grasping information. Each student in the study was exposed to two units of instruction, one which presented new concepts beginning with apprehension and one which presented new concepts beginning with comprehension. Through combining cognitive sequencing principles and an examination of student factors, student learning in STEM context areas could be evaluated to see if interactions existed.

Theoretical Framework

Kolb’s (1984) experiential learning theory was used as the foundational method for presenting STEM concepts to students. Kolb’s model, is a “dynamic view of learning based on a learning cycle driven by the resolution of the dual dialectics of action/reflection and experience/abstraction” (Kolb, 2015, pp. 50-51). This model shows the cyclical process of learning as a relationship between the four modes of active experimentation (AE), concrete experience (CE), reflective observation (RO) and abstract conceptualization (AC) as shown in Figure 1 (Kolb, 1984, 2015).

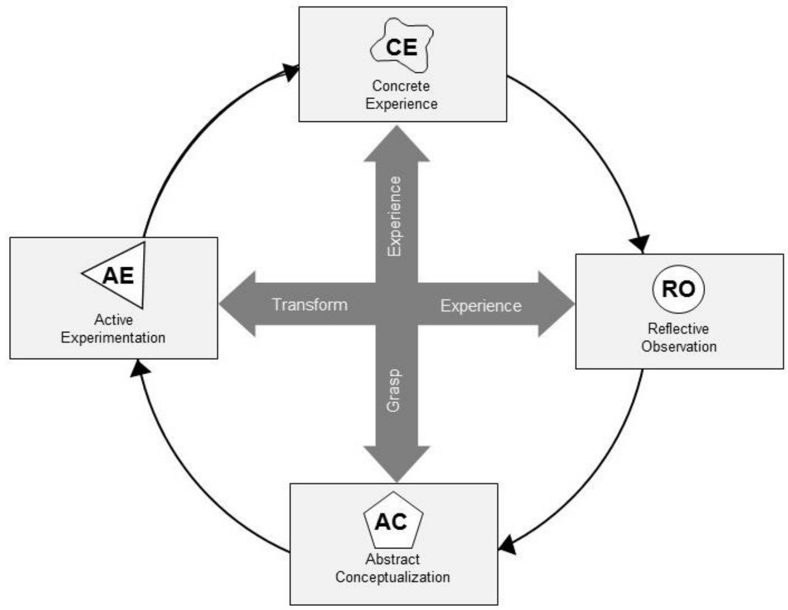

Figure 1. Kolb's experiential learning cycle

Experiential learning theory is "the foundation for an approach to education and learning as a lifelong process that is soundly based in intellectual traditions of social psychology, philosophy, and cognitive psychology" (Kolb, 2015, p. 3). This educational theory has been prominent in educational literature since the late 1970s, and continues to garner popularity as a framework for educational curriculum, philosophical discussions, and research (Kolb, 2015). This study was developed using experiential learning theory to examine student preferences for grasping information and to purposefully sequence information as it was presented to students.

Purpose and Objectives

The purpose of this study was to examine socioeconomic status as a variable related to preference for grasping information through experiential learning theory. To accomplish this purpose, the following objectives served to guide the research process:

1. Describe the learning preferences of students in relation to experiential learning theory and socioeconomic status
2. Determine the interaction between cognitive sequence of instruction and socioeconomic status

Methods

This study was conducted as a quasi-experimental cross-over examination (Shadish, Cook, & Campbell, 2002) of the factors related to student learning on STEM content assessments in agricultural education. The crossover design was chosen based on the ability of this design to provide an examination of the effects of two separate treatments on each participant, in an effort to decrease threats to external validity (Shadish, et. al., 2002). The dependent variables in this study were the change scores from pretest to posttest on two researcher-developed assessments for science-infused units of instruction. Independent variables of interest for this portion of the study included student socioeconomic status and preference for grasping information through either apprehension (CE) or comprehension (AC).

Students enrolled in a freshman level introduction to agriculture course at four Texas high schools served as the population for this study (N = 128). A total of n = 121 students completed the consent and assent process and were in attendance for at least 80% of the class time during the instructional units. Two week-long units of instruction were created, one in water science and one in soil science. Each of the content area units were created with two cognitive sequences, one with lesson plans presenting each new concept through a concrete experience and moving to abstract conceptualization, and another complementary unit with lesson plans presenting each new concept first through abstract conceptualization and then progressing to a concrete experience activity. Each test unit (site) received both content areas, and sites were randomized as to which content area and cognitive sequence they would receive first. The resulting model allowed each student to experience both units of instruction and both cognitive sequences. Identical pre and posttest assessments were given to students for each content area, regardless of the cognitive sequence of instruction.

A group of experts in agricultural education, experiential learning theory, educational psychology, and curriculum planning assisted in the preparation and development of the treatment curricula. Instructors at each school were trained in the utilization of the curriculum models provided and signed agreements of compliance to verify their instruction of the units exactly as presented in the trainings.

Three instruments were used in the collection of data for this study; the two researcher-developed content knowledge assessments for the water and soil science units, and the commercially available *KLSI v 3.1*. Unit assessments were developed to directly assess each of the unit objectives with exam questions at multiple levels of cognition. Linkages between individual instrument items and objectives, along with cognitive levels of exam items were established during instrument development. Frisbie (1988) assessed the most appropriate method for determining the reliability of a typical teacher-made test using multiple question formats, and proposed the employment of a *KR-20* coefficient. Resulting coefficients (*KR-20*) were 0.75 for the water science pretest and 0.78 for the water science posttest. For the soil science tests, the resulting reliability coefficients (*KR20*) were 0.81 for the pretest and 0.86 for the posttest. Reliability coefficients derived from a *KR-20* analysis for teacher-made tests are considered to be acceptable at a level of 0.65 or higher (Frisbie, 1988), thus the reliability of both unit assessments were deemed acceptable for the intended purpose of this study.

To determine the learning style preference for respondents in regard to grasping information, the paper version of the *KLSI v. 3.1* instrument was used. This instrument is commercially available from Haygroup. The format of *KLSI v. 3.1* is a forced-choice response to 12 instrument items. Each item contains a sentence prompt and asks respondents to rank their preferences for four answer choices, which correspond to the four learning modes of Kolb's (1984) experiential learning theory (ELT). Respondent rankings are ordinal from 4 "most like me" to 1 "least like me" (Kolb & Kolb, 2013). Validity of the KLSI v. 3.1 has been widely established for use in the field of education (Kolb & Kolb, 2005), and a panel of experts in agricultural education determined the instrument validity acceptable for the purposes of this study. Previous measures of reliability for the four learning modes included in the KLSI range from $\alpha = 0.77$ to $\alpha = 0.84$ (Kolb & Kolb, 2005). A post hoc analysis of the four KLSI factors for this study yielded alpha levels from α = 0.81 to α = 0.92.

To collect the information related to socioeconomic status, teachers provided the school district data related to student free and/or reduced lunch classification (Skiba, et. al., 2005). In one site, SES information was not readily available to teachers. We contacted school district personnel who were able to provide the data directly.

Resulting data were analyzed using IBM SPSS © version 23. We first examined the descriptive data for each of the dependent and independent variables, then examined differences between groups. The correlation between dependent variables was found insufficient to conduct a multivariate analysis of variance using the change scores as dependent variables, therefore, univariate analyses of variance were conducted for each dependent variable, adjusting the alpha level to prevent the possibility of committing a Type I error.

Subject Characteristics

Information regarding the schools participating in this study are shown in Table 1. This information shows each school along with the available data for all Texas high schools as reference. All sites met state standards for academic programming. Enrollment ranged from 202 students at site two to 1599 enrolled at site four. Ethnicity in the school population varied, with site one being the least racially diverse, and site four showing the most racial diversity. The percentage of students classified as low SES was widely varied, and ranged from 33.3% at site three to 64.8% at site four.

Table 1

Descriptions of Schools Participating in Study

Characteristic	Site 1	Site 2	Site 3	Site 4	State
2015 Accountability Rating	Met Standard	Met Standard	Met Standard	Met Standard	--
Enrollment	606	202	1732	1599	--
Ethnic Distribution %					
African American	9.7	11.9	13.6	23.2	12.6
Hispanic	23.1	32.7	22.5	46.1	52.0
White	64.0	53.0	51.1	29.4	28.9
American Indian	0.3	0.0	0.3	0.1	0.4
Asian	0.2	0.0	8.6	0.3	3.9
Pacific Islander	0.0	0.0	0.0	0.1	0.1
Two or More Races	2.6	2.5	3.8	1.0	2.0
Low SES %	36.0	39.1	33.3	64.8	58.8
At-Risk %	46.7	37.6	30.4	35.2	51.2
Special Education Graduates %	14.1	20.0	4.2	7.5	--

Characteristics of subjects for each of the participants by site were also examined and listed in Table 2. Overall gender of participants was nearly equally split between males (51.2%) and females (48.8%). It is interesting to note similarities in ethnic distribution between school data and participants, all of whom were enrolled in agricultural education courses.

Table 2

Demographic Information of Participants

Characteristic	Site 1 *f*	Site 1 %	Site 2 *f*	Site 2 %	Site 3 *f*	Site 3 %	Site 4 *f*	Site 4 %	Total *f*	Total %
Gender										
Male	11	61.1	19	51.4	18	58.1	14	40.0	62	51.2
Female	7	38.9	18	48.6	13	41.9	21	60.0	59	48.8
Ethnic Distribution										
White-non-Hispanic	12	66.7	15	40.5	14	45.2	17	48.6	58	47.9
Hispanic	3	16.7	14	37.8	9	29.0	12	34.3	38	31.4
Black	3	16.7	6	16.2	8	25.8	5	14.3	22	18.2
Asian	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Native American	0	0.0	0	0.0	0	0.0	1	2.9	1	0.8
Pacific Islander	0	0.0	0	0.0	0	0.0	0	0	0	0.0
Two or More Races	0	0.0	2	5.4	0	0.0	0	0	2	1.7

Note: due to rounding, all values for a site may not equal 100%

Participant characteristics were also examined in relationship to the independent variables of interest in this study. Related to SES, *n* = 69 (57%) of participants were classified as low SES, while *n* = 52 (43%) were not classified with a low SES. There was a much higher proportion of students (*n* = 85) who showed a preference for grasping information through apprehension than those who preferred to grasp information through comprehension (*n* = 36). Independent variable frequencies and percentages are listed by site in Table 3

Table 3

Descriptions of Independent Variable Characteristics by Site

Characteristic	Site 1 *f*	Site 1 %	Site 2 *f*	Site 2 %	Site 3 *f*	Site 3 %	Site 4 *f*	Site 4 %	Total *f*	Total %
SES										
Low SES	6	33.3	18	48.6	8	25.8	20	57.1	52	43.0
Normal SES	12	66.7	19	51.4	23	74.2	15	42.9	69	57.0
Grasping Preference										
Apprehension (CE)	10	55.6	30	81.1	18	58.1	27	77.1	85	70.2
Comprehension (AC)	8	44.4	7	19.9	13	41.9	8	22.9	36	29.8

Findings

Findings in this study were directly related to meeting the objectives of this research. The first objective of this study was to describe the experiential learning preferences for students with low SES classification and those without. Information related to participant KLSI scores is shown in Table 4.

Table 4

KLSI Scores for Participants Based on SES Classification (n = 121)

Construct	Low SES (n = 52) *Min*	*Max*	*M*	*SD*	Not Low SES (n = 69) *Min*	*Max*	*M*	*SD*
Abstract Conceptualization	15	44	28	5	17	39	27	7
Concrete Experience	16	43	28	7	17	45	30	7
Active Experimentation	17	46	33	7	14	44	30	16
Reflective Observation	17	44	31	6	13	45	32	6
Grasping (AC-CE)	-18	21	2.08	8.59	-22	18	2.64	9.98
Transforming (AE-RO)	-18	22	3.69	10.35	-22	30	3.01	8.39

Note. Calculated scores can range from 12 – 48 on learning modes and -36 to +36 on dimensions. Equal balance between ends of the continuums for transforming and grasping experience dimensions is set at +7 (Kolb & Kolb, 2013).

Prior to analyzing the results related to interactions between SES, preference for grasping information, and sequence of instruction, data were analyzed to compare means between sites on the pretest measures. An ANOVA was used to determine if statistically significant differences existed in the four test sites on the pretest measures. No significant differences were found in the pretest water science assessment scores between students at the sites. In addition to the comparison of pretest assessments on the water science unit, pretest comparisons were calculated for the soil science unit. The ANOVA revealed differences in the means between sites on the soil science pretest assessment. Post hoc analysis revealed the differences between site three and four. The nature of this study allowed for an examination of change from pretest to posttest (Shadish, et. al., 2012), as such, differences in pretest scores were determined no threat to the analysis of findings related to the question of interest.

Following completion of both units of instruction, data were compared by site on the posttest measures for both the water science and soil science unit, to determine what differences existed based on site which may account for any error variance in the examination of the independent variables. The only differences found between sites on the posttest assessments were between site one and the other three sites. Site one served as the control, receiving no experimental treatments, and differences were expected. Of the three sites receiving treatment, no differences existed on posttest measures.

To examine interactions between the sequence of instruction, socioeconomic status, and learning preference, an ANOVA was performed for each of the units of instruction. Table 5 shows the descriptive statistics for both units of instruction, by independent variable category.

Table 5

Means and Standard Deviations of Change in Score for Water Science and Soil Science Units by Independent Variable Group

		Water Science Unit		Soil Science Unit	
Variable	Category	*n*	*M*(*SD*)	*n*	*M*(*SD*)
Grasping Preference	Apprehension	85	41.82(24.57)	85	47.69(26.62)
	Comprehension	36	30.53(28.93)	36	32.31(23.84)
Socioeconomic Status	Low SES	52	40.58(23.65)	52	49.06(27.64)
	Not Low SES	69	38.46(26.34)	69	38.64(25.21)
Sequence of Respective Unit	AC to CE	72	43.69(17.97)	31	33.81(16.87)
	CE to AC	31	48.45(31.04)	72	57.64(19.52)
	Control	18	0.33(3.24)	18	1.06(2.56)

Note: The crossover design allowed for students receiving the water science unit in the AC to CE sequence to receive the opposite treatment for the soil science unit, which accounts for the differences in *n* between sequences

An ANOVA was conducted to examine differences in scores between independent variables of sequencing instruction and preference for grasping information for non-control sites. Results of the ANOVA for the water science unit is shown in Table 6, and the soil science unit in Table 7.

Table 6

ANOVA Table for the Effect of Socioeconomic Status, Preference for Grasping Knowledge and Cognitive Sequence on Change in Pre and Posttest Scores on Water Science Unit Assessments

	SS	*df*	*MS*	*F*	*p*	η_p^2	1-β
Between Groups	22941.65	7	3213.09	10.23	0.00	0.43	1.00
Within Groups	118783.10	1	118783.10	378.00	0.00	0.80	1.00
Grasping	2711.90	1	2711.90	8.64	0.01	0.83	0.83
SES	20.60	1	20.60	0.07	0.79	0.07	0.06
Sequence	181.03	1	181.03	0.58	0.45	0.60	0.12
Grasping*SES	68.86	1	68.86	0.22	0.64	0.01	0.08
Grasping*Sequence	13233.29	1	13233.29	42.15	0.01	0.31	1.00
SES*Sequence	22.40	1	22.40	0.07	0.79	0.01	0.06
Error	29829.71	95	313.99				
Total	262068.00	103					

Note: Significant alpha level was determined *a priori* at an adjusted level of $p \leq 0.02$ to account for analysis of both units of instruction. Values are rounded to the nearest hundredth.

Table 7

ANOVA Table for the Effect of Socioeconomic Status, Preference for Grasping Knowledge and Cognitive Sequence on Change in Pre and Posttest Scores on Soil Science Unit Assessments

	SS	*df*	*MS*	*F*	*p*	η_p^2	1-β
Between Groups	22961.13	7	3280.16	12.49	0.00	0.48	1.00
Within Groups	98322.56	1	98322.56	374.58	0.00	0.80	1.00
Grasping	96.23	1	96.23	0.37	0.55	0.00	0.04
SES	404.37	1	404.37	1.54	0.22	0.02	0.14
Sequence	2762.32	1	2762.32	10.52	0.01	0.10	0.81
Grasping*SES	265.33	1	265.33	1.01	0.32	0.01	0.09
Grasping*Sequence	6856.59	1	6856.59	26.12	0.01	0.22	0.99
SES*Sequence	426.46	1	426.46	1.63	0.21	0.02	0.14
Error	24936.50	95					
Total	310220.00	103					

Note: Significant alpha level was determined *a priori* at an adjusted level of $p \leq 0.02$ to account for analysis of both units of instruction. Values are rounded to the nearest hundredth.

The ANOVA reveled a significant interaction between preference for grasping information and sequence of instruction for both the water science ($F(1, 103) = 42.15$, $p = 0.01$, $\eta_p^2 = 0.31$) and soil science units ($F(1, 103) = 26.12$, $p = 0.01$, $\eta_p^2 = 0.22$).

Conclusions/Implications/Recommendations

The interaction of sequence and preference for grasping information superseded variation in means for students with differing SES classifications. No interactions were found between scores on STEM based content assessments and the factors of socioeconomic status. As such, we can conclude that differences in student change scores occurred based on personal preference for grasping information and sequence of instruction for both of the units presented in the test curriculum.

It has long been established that both socioeconomic status (Hoover-Dempsey, et. al., 1987; Sirin, 2005; White, 1982) is a factor that plays a role in student learning. The results of decades of research were not substantiated in this quasi-experimental study. There are several potential explanations for this conclusion. First, many of the instructional assessments used to make claims as to the impact of SES are based on standardized testing results (Bradley & Corwin, 2002). The criterion-referenced assessments in this study relied on assessment of students based on their performance related to the unit objectives. While questions were presented at different cognitive-levels, both the content and format of the assessments in this study differed from the standardized tests used in general education analyses. The study design used for this quasi-experimental study included the use of crossover to account for individual differences in learning. In addition, comparisons were only made based on the changes in scores, rather than the pre and post test scores individually. The use of crossover and change scores in analysis has the potential to mask differences in groups which would be found if a repeated measures design were used (Tabachnick & Fidel, 2007).

Another possible explanation for the lack of differences based on SES in this study could be that while these groups differed from the rest of the population of their schools, there were not large enough differences in either the SES classification between these sites or collectively between all sites and the national population to realize significant findings. Although students classified as low SES were found at each of the sites, none of the sites were in communities which would be considered severely economically depressed. Differences based on SES classification may be found between groups if sites were selected in areas where the baseline poverty level were substantially lower than the sites in this study.

The lack of available information related to agricultural education students and SES highlighted the need to understand the makeup of SES within agricultural education. It is suggested that broad scale research be conducted to help determine the impact of SES on students in school-based agricultural education programs. By understanding the students who are enrolled in these courses, additional research can be conducted to assist in recruitment of underrepresented populations, and to develop methods to ensure agricultural education is effective in teaching students, regardless of their personal background.

The implications of this study highlight the importance of cognitively sequencing instruction based on student learning preferences. Students, regardless of SES classification, had higher change scores when the information was presented with their preferred method for grasping first. Could cognitive sequencing provide a way to even out differences in students? Although differences in SES classification would be expected between students, none were found in this examination. We recommend this concept be more fully examined as a result of this preliminary study.

A large knowledge gap exists related to the SES of agricultural education students. SES is a large factor in learning (Bradley & Corwyn, 2002; Sirin, 2005; White, 1982). The lack of available information related to agricultural education students and SES highlighted the continued need to understand the makeup of SES within agricultural education. We agree with Talbert and Larke (2005), and suggest broad scale research be conducted to help determine the impact of SES on students in school-based agricultural education programs. By understanding the students who are enrolled in these courses, additional research can be conducted to assist in recruitment of underrepresented populations, and to develop methods to ensure agricultural education is effective in teaching students, regardless of their personal background.

No differences were found between groups of students using purposefully created curriculum utilizing all components of ELT. Comparing student differences using curriculum not rigorously adhering to the principles of experiential learning theory may reveal differences in students based on their SES classification. We recommend continued examination of SES as a factor in STEM learning in agricultural education as teachers work to level the playing field between students of varying SES classifications with regard to STEM learning.

References

Baker, M. A. (2012). *The effect of Kolb's experiential learning model on successful secondary student intelligence and student motivation*. Doctoral dissertation. Oklahoma State University.

Baker, M. A., Brown, N. R., Blackburn, J. J., & Robinson, J. S. (2014). Determining the effects that the order of abstraction and type of reflection have on content knowledge when teaching experientially: An exploratory experiment. *Journal of Agricultural Education 55*(2), 106-119. doi:10.5032/jae.2014.02106

Berg, G. A. (2016). *Low-income students and the perpetuation of inequality: Higher education in America*. New York: NY: Routledge.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: Handbook I: Cognitive domain*. New York, NY: David McKay

Bornstein, M. H., & Bradley, R. H. (Eds.). (2014). *Socioeconomic status, parenting, and child development*. New York, NY: Routledge.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, *53*(1), 371-399. doi: 10.1146/annurev.psych.53.100901.135233

Bruner, J. S. (1966). *Toward a theory of instruction (Vol. 59).* Cambridge, MA: Harvard University Press.

Bumgarner, E., & Brooks-Gunn, J. (2013). Socioeconomic status and student achievement. In J. Hattie & E. Anderman (Eds.) *International guide to student achievement*, 92-94. New York, NY: Routledge.

Duncan, G. J., & Magnuson, K. A. (2003). Off with Hollingshead. In M. Bornstein & R. Bradley *Socioeconomic status, parenting, and child development*, (pp. 83-106). New York, NY: Routledge.

Frisbie, D. A. (1988). Reliability of scores from teacher-made tests. *Educational Measurement: Issues and Practice*, *7*(1), 25-35.

Harwell, M., & LeBeau, B. (2010). Student eligibility for a free lunch as an SES measure in education research. *Educational Researcher*, *39*(2), 120-131. doi: 10.3102/0013189X10362578

Hoover-Dempsey, K. V., Bassler, O. C., & Brissie, J. S. (1987). Parent involvement: Contributions of teacher efficacy, school socioeconomic status, and other school characteristics. *American Educational Research Journal*,*24*(3), 417-435.

Iceland, J., & Wilkes, R. (2006). Does socioeconomic status matter? Race, class, and residential segregation. *Social Problems, 53*(2), 248-273 doi: http://dx.doi.org/10.1525/sp.2006.53.2.248

Kolb D. (1984). *Experiential learning as the science of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd Ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Kolb, A. Y., & Kolb, D. A. (2005). *The Kolb Learning Style Inventory version 3.1 2005 technical specifications.* Philadelphia, PA: HayGroup. Retrieved from http://learningfromexperience.com/media/2010/08/tech_spec_lsi.pdf

Kolb, A. Y., & Kolb, D. A. (2013). *Kolb Learning Style Inventory workbook version 3.2.* Philadelphia, PA: HayGroup.

Landa, L. N. (1983). The algo-heuristic theory of instruction. In C. Reigueluth (Ed.). *Instructional-design theories and models: An overview of their current status*, 301-318. New York, NY: Routledge.

Maltese, A. V., Potvin, G., Lung, F. D., & Hochbein, C. D. (2014). STEM and STEM education in the United States. In B. Freeman, S. Marginson, & R, Tytler (Eds.) *Age of STEM: Educational policy and practice across the world in science, technology, engineering, and mathematics (pp. 102-133).* Florence, KY: Routledge.

Myers, B. E., & Osborne, E. W. (2005). *Conceptual model for strengthening academic learning through agricultural education research*. Department of Agricultural Education and Communication, University of Florida, Gainesville.

Neiss, M., & Rowe, D. C. (2000). Parental education and child's verbal IQ in adoptive and biological families in the National Longitudinal Study of Adolescent Health. *Behavior genetics*, *30*(6), 487-495.

Reardon, S. F., Baker, R., Kasman, M., Klasik, D., & Townsend, J. B. (2015). Can socioeconomic status substitute for race in affirmative action college admission policies? Evidence from a simulation model. *Educational Testing Service 45(*4), 234-45.

Reigeluth, C. M. (Ed.). (2013). *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 3). New York, NY: Routledge.

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education 47*(1). 17-29. doi: 10.5032/jae.2006.01017

Scandura, J. M. (1983). Instructional strategies based on the structural learning. In C. Reigueluth (Ed.). *Instructional-design theories and models: An overview of their current status*, 213-256. New York, NY: Routledge.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin Company.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417-453.

Skiba, R. J., Poloni-Staudinger, L., Simmons, A. B., Feggins-Azziz, L. R., & Chung, C. G. (2005). Unproven links: Can poverty explain ethnic disproportionality in special education? *The Journal of Special Education*, *39*, 130-144.

Stone III, J. R. (2007). *Report of the Academic Competitiveness Council*. Washington, DC: U.S. Department of Education. Retrieved from http://reports.weforum.org/global-competitiveness-2011-2012

Stone III, J. R. (2011, May). *Delivering STEM education through career and technical education schools and programs.* Paper presented at the National Research Council Workshop on Successful STEM Education in K-12 Schools. Retrieved from http://www7.nationalacademies.org/bose/STEM_Schools_Workshop_Paper_Stone.pdf.

Stone III, J. R., & Aliaga, O. (2005). Career & technical education and school-to-work at the end of the 20th century: Participation and outcomes. *Career and Technical Education Research*, *30*(2), 125-144.

Stripling, C., & Ricketts, J. (2016) in Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Tabachnick, B.G. and Fidell, L.S. (2007). *Using multivariate statistics* (5th ed.). New York: Allyn and Bacon.

Talbert, B. & Larke, A. (1995). Factors influencing minority and non-minority students to enroll in an introductory science course in Texas. *Journal of Agricultural Education*, *36*(1), 38-45. doi: 10.5032/jae.1995.01038

Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

White, K. R. (1982). The relation between socioeconomic status and academic achievement. *Psychological Bulletin*, *91*(3), 461-481. doi: 0033-2909/82/9103-0461S00.75

Socioeconomic Status, STEM Education, and Experiential Learning: An Examination of Sequencing Instruction

Discussant
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Once again Drs. Smith and Rayfield have presented a high-quality study! Socio-economic status of students has long been shown to impact student achievement. Research that could potentially break the connection between SES and achievement is very important. It appears we have a potential break in the connection.

The literature base and theoretical framework are well put together. They include a thorough discussion of SES and Experiential Learning Theory. The rationale for using Kolb as the framework is solid.

The methodology is justified and described well. Many would have used a repeated measure design, but the authors explain how the cross-over examination strengthens the potential outcomes. The results are enlightening. Researchers must understand the assumptions of all statistical operations, but very few report information on them. I commend the authors for informing us that an assumption has been violated, therefore a different operation must be used. The authors also addressed the potential of committing a Type I error and made adjustments as needed.

Conclusions are well done and do not stretch beyond the data. The design and data presented support conclusions about differences found. Recommendations are light in the paper and I believe there are many topics that could be discussed to impact future research, but more importantly, classrooms. While the study is not generalizable, further research will lead us to positively impact students through the differentiated use of the Experiential Learning Theory.

STEM Knowledge, Learning Disabilities and Experiential Learning: Influences of Sequencing Instruction

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Abstract

Career and technical education (CTE) courses, including agricultural education courses, are home to a disproportionately large number of students with learning disabilities. Agricultural education has been sought as a potential solution to teaching abstract STEM concepts through experiential learning methods. Abstract concepts are noted in the literature as particularly difficult for students with learning disabilities to grasp. This study was designed to describe the changes in pretest and posttest scores on STEM content tests for students when accounting for their preference for grasping information through experiential learning theory and their learning disability classification. When instruction was sequenced to match student learning preference, change scores for students with learning disabilities were increased. When instruction was opposite student preference, students with learning disabilities had lower change scores than those without a learning disability classification. Results highlight the importance of sequencing instruction for both students with and without learning disabilities. Examining students through experiential learning theory may provide a platform for mitigating the effects of learning disabilities on student achievement.

Introduction

All students are unique, each has an individual aptitude and capacity for bringing in, storing, and retaining information (Sousa, 2011). A universal concept found in almost all models of student learning is the level of each student's ability to process information (Bender, 2007). Accounting for individual learning ability in education is essential within an examination of how students learn. The concept of differentiated instruction, as examined by Tomlinson (2014) is based on the premise that each student is unique in their educational requirements and should therefore be instructed in a manner which best meets their individual needs.

In the United States, legislation exists providing accommodations and modifications to the instruction and assessment of students who are classified with a condition which inhibits their learning. The origin of learning disability classification can be traced to Public Law 94-142, The Education Act for All Handicapped Children Act of 1975 (EHA). This educational policy outlined the requirements for instruction related to students with learning disabilities, including: free appropriate public education for children three to 21 years old, protecting the rights of children with disabilities and their parents, Individualized Education Plans (IEPs), and providing a least restrictive environment for learning. EHA also provided provisions for federal funding to meet the aims of the new policy (Osborne & Russo, 2014). This legislation has been updated and revised to include more specific information related to how to ensure the needs of special education students in the country are met (Osborne & Russo, 2014).

The very definition of learning disability (LD) lends itself to the importance of using learning disability status as a factor in understanding student achievement. Bender (2008) defined a learning disability as "a condition giving rise to difficulties in acquiring knowledge and skills to the level

expected of those of the same age, especially when not associated with a physical handicap" (p. 18). Although there are large differences in the types of learning disabilities classified by federal legislation, researchers have found that collectively, students classified with a LD have lower test performance and GPA than those without learning disabilities, even when the accommodations of an IEP are in place (Hampton & Mason, 2003).
One of the most common manifestations of learning disabilities is difficulty converting abstract knowledge into applied knowledge (Bender, 2007). Abstract conversion is an important factor for STEM education, as many of the concepts are incredibly abstract when presented without context (Stone, 2011).

In STEM fields, there are known differences in the performance of students with learning disabilities on STEM assessments (Boaler, 1998; Kieran, 1992; Woodward & Montague, 2002). This examination has led researchers to conclude that there may be a large advantage to allowing students with learning disabilities to approach abstract concepts, like those in STEM education, through applied means (Furner & Kumar, 2007; Stone, 2011). Bender (2008) outlined the importance of ensuring educational researche'rs are mindful of the ways in which students with learning disabilities learn content and perform on assessments. Bender (2007) also shared the critical need to provide LD students with differentiated instruction that allows them to experience education in the teaching strategy most closely aligning with their capacity for learning. Cognitive sequencing is a way to differentiate instruction and provide assistance for students with learning disabilities, especially related to presenting information using the cognitive sequence students prefer to grasp information in first (Woodward & Montague, 2002).

CTE courses are home to a disproportionately large number of students with learning disabilities (Wagner, Newman, & Javitz, 2015). In a national study of more than 9,000 public high school students with learning disabilities, 96.0% had taken at least one CTE course during high school (Wagner, et. al., 2015). To further demonstrate the broad-scale involvement of LD students in CTE courses, they shared that CTE courses accounted for nearly one-fifth (19.7%) of all high school credits earned by learning disabled students (Wagner, et. al., 2015). By comparison, CTE courses only accounted for 12.8% of the total credits earned by all high school students combined (Wagner, et. al., 2015).The most accessible factor for classifying LD students is the presence of an IEP on file with the school (Bender, 2008). It is important to note that learning disabilities are varied, and that each level and type of LD has a different potential effect on student academic performance. The presence or absence of LD classification is not a perfect indicator of student academic ability, however, it can be useful in classifying students who typically need supplemental educational assistance, and therefore, have learning differences from their peers (Bender, 2007).

Individualizing learning is the goal of education for students both with and without classified learning disabilities (Tomlinson, 1999). Some researchers prescribe the classification of learning styles as a method through which to differentiate instruction (Brokaw & Merz, 2000; Claxton & Murrell, 1987; Coffield, Moseley, Hall, & Ecclestone, 2004a, 2004b; Duff, 2004; Dunn & Dunn, 1989; Felder & Silverman, 1988; Fleming, 2001; Gregorc, 1979; Kolb, 1984, 2015; Tomlinson, 1999). Sousa (2011) discussed the varying acceptance of learning styles within academia and neuroscience and concluded "there is little argument that people have various internal and external preferences when they are learning" (p. 59).

Sequence of information is another consideration that could impact learning (Reigeluth, 2013). Many theories of instruction do not include a preferred sequence for presentation of concepts, however, there are several that give specific outlines for the sequencing of information. The concepts of sequencing instruction are most commonly related to the sequencing of critical thinking skills or presenting information which builds from basic to more advanced concepts (Reigeluth, 2013). Several prominent theories include sequencing based on the complexity level of concepts. Most of these theories prescribe a movement through concepts from basic to advanced. Landa (1983) proposed an exception to the 'basic-first' learning theories, and promoted a theory of instruction in which students were first exposed to the highest order thinking skills, and then learned the abstract components which they were comprised of. An examination of current trends in instructional methods, including problem based learning, and inquiry-based learning reveal that sequencing instruction beginning with a concrete experience is gaining popularity in educational circles (Reigeluth, 2013).

Kolb's (1984) experiential learning theory (ELT) has four distinct modes of learning, organized around two dimensions of grasping and transforming information. Kolb (2015) explained the structural process of the learning cycle by describing the two adaptive dialects which are rooted in Piaget's (1970) aspects of thought and their eventual resolution. The abstract/concrete dimension deals with the grasping or "taking hold" of experience, through either reliance on abstract conceptualization (comprehension) or concrete experience (apprehension), both related to the dialectic of prehension (Kolb, 2015). In contrast, the active/reflective dimension is related to the transformation of experience, and can been seen as the conflict between active experimentation (extension) and reflective observation (intention). Combining both the prehension dialectic and the transformation dialectic results in building knowledge (Kolb, 2015).

Within the ELT framework, it may be easy to assume that Kolb suggested both a starting and ending point for the cycle. However, Kolb's view of the sequence for the four learning modes is not prescriptive. He states that the cycle may be entered at any point, and gives only a caution that the stages should be followed in sequence from wherever the learner begins (Kolb, 2015). Very rarely does the concept of a particular sequence related to the learning cycle appear in ELT literature. Cognitive sequencing in this study was an examination of the prehension dimension of grasping information. The experimental treatments in this research were based on the dual dialectics of apprehension, which is grasping through experience, and comprehension, which is grasping through abstraction (Kolb, 2015).

Of special note in this study were potential differences in cognitive stages of individuals with learning disabilities. Kolb shared that experiential learning only has learning implications for people who have the cognitive ability to relate learning to experience (Kolb, 1984, 2015). As a connection, Piaget (1972) put forth the stages of development related to the ability of a person to grasp abstractions, as shown in Table 1.

Table 1

Piaget's (1972) Stages of Cognitive Development

Stage	Age	Description
Sensorimotor	0-2 years	Exploration through direct sensory input and motor contact
Preoperational	2-6 years	Symbols may be used to represent objects, lack of logical reasoning
Concrete Operational	7-12 years	Logical though is present related to concrete objects
Formal Operational	12+ years	Abstract reasoning and hypothetical thinking are evident

Piaget (1972) suggested individuals age seven to twelve develop logical thoughts based on the relationship between concrete objects. Further, Piaget (1972) suggested that formal operational thinking, in which abstract reasoning and hypothetical thinking are evident, does not materialize in most people until after age twelve, and may not materialize at all in many individuals. Concrete and abstract concepts may not be clearly defined without targeted concrete examples for students with learning disabilities, and many will never reach the formal operational level of cognitive development (Bender, 2008).

Identifying preferences for grasping new experiences through apprehension as opposed to comprehension could provide important information about how cognitive sequencing of information might play a role in student learning, especially for LD students. It would stand to reason that students who have a preference for grasping information through apprehension could perform higher on units with STEM integration when the concrete experience was presented as the initial point in the learning cycle. By contrast, students who show a preference for grasping experience through comprehension may grasp STEM concepts more readily when the abstract conceptualization stimulus was presented as the beginning point for the learning cycle.

Theoretical/Conceptual Framework

Designing this study required us to draw from theories in two different areas. First, we needed to rely on a theoretical basis to help frame the factors which drive learning in individual students. Next, we relied on theory to assist in the development and process of sequencing instruction. A combination of foundational theories in both areas led us to develop the conceptual framework we used to guide this experiment.

One of the pioneers who suggested factors contributing to student learning was John Carroll, who outlined his model for school learning in 1963. Carroll (1963) proposed aptitude as the time needed for individual students to learn a specific task, and listed opportunity to learn, perseverance, quality of instruction, and ability to understand instruction as factors which would impact student achievement. Numerous scholars have contributed to this seminal model, adding factors including learning preferences, perseverance, motivation, home environment, and school climate (Darling-Hammond & Bransford, 2005; Silins & Mumford, 2002; Stringer, Christensen & Baldwin, 2009).

The model used to frame the sequencing portion of this study was Kolb's (1984, 2015) experiential learning theory. Kolb's model, is a "dynamic view of learning based on a learning cycle driven by the resolution of the dual dialectics of action/reflection and experience/abstraction" (Kolb, 2015, pp. 50-51). The cyclical process of learning as a relationship between the four modes of active experimentation (AE), concrete experience (CE), reflective observation (RO) and abstract conceptualization (AC) are shown in Figure 1 (Kolb, 1984, 2015). This study was developed using experiential learning theory to examine student preferences for grasping information and to purposefully sequence information as it was presented to students.

The resulting conceptual model for this study is shown in Figure 1. The model relies on Gagne's (1965) theory of instruction to guide instructional factors affecting learning. Experiential learning theory, as outlined by Kolb in 2015, was used as the theory guiding instruction for presenting the stimulus to students, with lessons accounting for all four of Kolb's learning modes.

Through this model, student performance was tested using experimental curricula developed to standardize the events of instruction as outlined by Gagne (1965), manipulating only the cognitive sequence with which information was presented based on Kolb's (1984) experiential learning model. Resulting changes in learning between dependent measures were examined in relation to student factors affecting learning or manipulation of cognitive sequence.

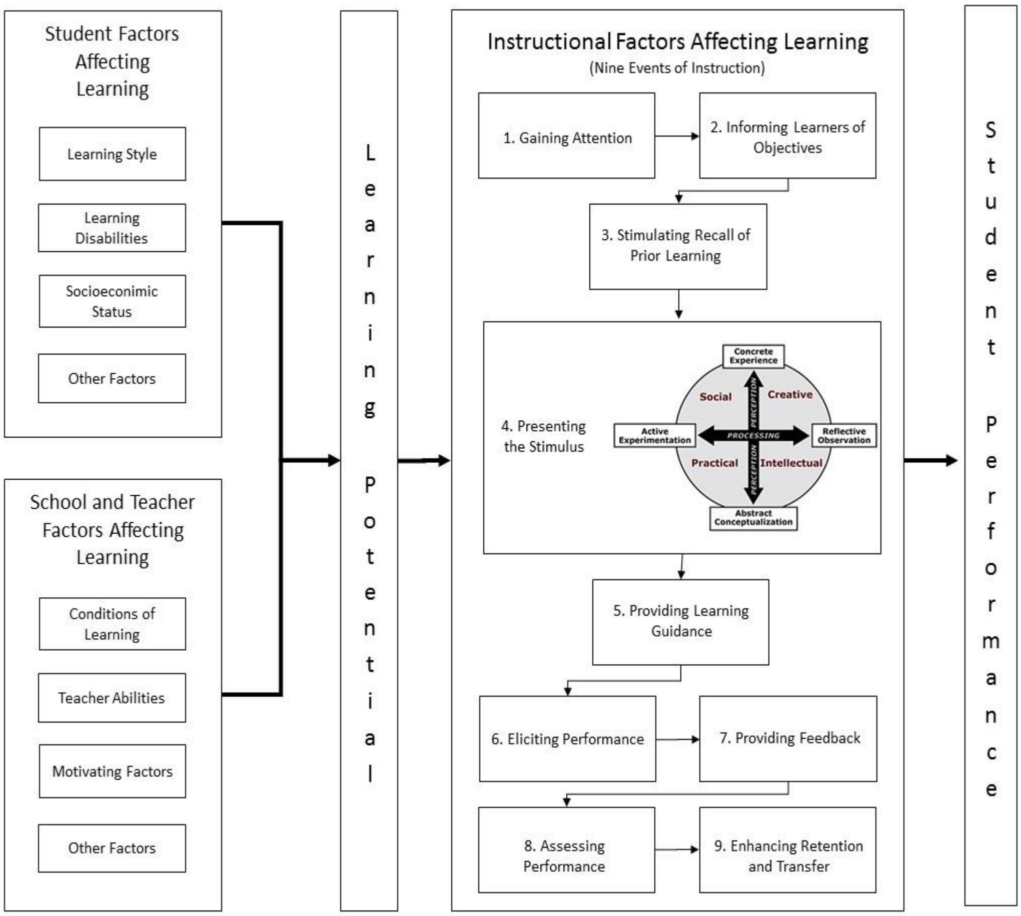

Figure 1. Conceptual model of student learning and sequencing instruction based and Kolb's (1984) experiential learning theory.

Purpose and Objectives

The purpose of this portion of a larger study was to examine learning disability classification status as a variable related to preference for grasping information through experiential learning theory. To accomplish this purpose, the following objectives were used to frame the examination:

1. Describe the *KLSI* scores for participants with and without learning disability classification.
2. Describe the pretest and posttest scores for students with and without learning disability classification.
3. Describe the change in pretest and posttest scores for students with and without learning disability classification when information is presented in a sequence matching student learning preference.

Methods

This study was conducted as a quasi-experimental cross-over examination of the factors related to student learning on STEM content assessments in agricultural education. The crossover design was chosen based on the ability of this design to provide an examination of the effects of two separate treatments on each participant, in an effort to decrease threats to external validity (Shadish, Cook, & Campbell, 2002). The dependent variables in this study were the change scores from pretest to posttest on two researcher-developed assessments for science-infused units of instruction. Independent variables of interest for this portion of the study included learning disability classification and preference for grasping information through either apprehension (CE) or comprehension (AC).

This study included participation from students enrolled in a freshman level introduction to agriculture course at four high schools (N = 121). A total of n = 111 students completed the consent and assent process. Two separate week-long units of instruction were created, one in water science and one in soil science. Each of the content area units were created with two cognitive sequences, one with lesson plans presenting each new concept through a concrete experience and moving to abstract conceptualization, and another complementary unit with lesson plans presenting each new concept first through abstract conceptualization and then progressing to a concrete experience activity. Each test unit (site) received both content areas, and sites were randomized as to which content area and cognitive sequence they would receive first. Site one was selected as the control and received no experimental treatments. Identical pre and post-test assessments were given to students for each content area, regardless of the cognitive sequence of instruction. A group of experts in agricultural education, experiential learning theory, and curriculum planning assisted in the preparation and development of the treatment curricula. Instructors at each school were trained in the utilization of the curriculum models provided and signed agreements of compliance to verify their instruction of the units exactly as presented in the trainings.

Unit assessments were developed to directly assess each of the unit objectives with exam questions at multiple levels of cognition. Reliability coefficients (*KR20*) were 0.75 for the water science pretest and 0.78 for the water science posttest. For the soil science tests, the resulting reliability coefficients (*KR20*) were 0.81 for the pretest and 0.86 for the posttest. Reliability coefficients derived from a *KR-20* analysis for teacher-made tests are considered to be acceptable at a level of 0.65 or higher (Frisbie, 1988), thus the reliability of both unit assessments were deemed acceptable for the intended purpose of this study. To determine the learning style preference for respondents in regard to grasping information, *KLSI v. 3.1* instrument was used.

Validity of the KLSI v. 3.1 has been widely established for use in the field of education (Kolb & Kolb, 2005). Validity was determined to be acceptable for the purposes of this study. Previous measures of reliability for the four learning modes included in the KLSI range from $\alpha = 0.77$ to $\alpha = 0.84$ (Kolb & Kolb, 2005). Post hoc reliability ranged from $\alpha = 0.81$ to $\alpha = 0.92$. As such, the reliability was determined to be suitable for use in this study.

To collect the information related to learning disability classification, teachers provided a verification of student LD based on the presence of an IEP requiring instructional modifications. In one site, LD classification was not readily available to teachers. We contacted school district personnel who were able to provide the data directly. Resulting data were analyzed using IBM

SPSS © version 23. Analyzed data were restricted to an examination of the descriptive statistics for each group, as group sizes were not large enough to warrant the use of inferential statistics.

Subject Characteristics

Information regarding the schools participating in this study are shown in Table 2. This information shows each school along with the available data for all Texas high schools as reference. All sites met state standards for academic programming. Enrollment ranged from 202 students at site two to 1599 enrolled at site four. Ethnicity in the school population varied, although the proportion of Hispanic students in each site was lower than the state average of 52%. The percentage of the graduating class at each site who were enrolled in special education programming is widely varied, from 4.2% of graduating seniors at site three, to 20.0% of graduating seniors at site two.

Table 2

Descriptions of Schools Participating in Study

Characteristic	Site 1	Site 2	Site 3	Site 4	State
2015 Accountability Rating	Met Standard	Met Standard	Met Standard	Met Standard	--
Enrollment	606	202	1732	1599	--
Ethnic Distribution %					
African American	9.7	11.9	13.6	23.2	12.6
Hispanic	23.1	32.7	22.5	46.1	52.0
White	64.0	53.0	51.1	29.4	28.9
American Indian	0.3	0.0	0.3	0.1	0.4
Asian	0.2	0.0	8.6	0.3	3.9
Pacific Islander	0.0	0.0	0.0	0.1	0.1
Two or More Races	2.6	2.5	3.8	1.0	2.0
Low SES %	36.0	39.1	33.3	64.8	58.8
At-Risk %	46.7	37.6	30.4	35.2	51.2
Special Education Graduates %	14.1	20.0	4.2	7.5	--

Characteristics of study participants by site were also examined and are listed in Table 3. Overall gender of participants was nearly equally split between males (51.2%) and females (48.8%). It is interesting to note similarities in ethnic distribution between school data and participants, all of whom were enrolled in agricultural education courses.

Table 3

Demographic Information of Participants

	Site 1		Site 2		Site 3		Site 4		Total	
Characteristic	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Gender										
Male	11	61.1	19	51.4	18	58.1	14	40.0	62	51.2
Female	7	38.9	18	48.6	13	41.9	21	60.0	59	48.8
Ethnic Distribution										
White-non-Hispanic	12	66.7	15	40.5	14	45.2	17	48.6	58	47.9
Hispanic	3	16.7	14	37.8	9	29.0	12	34.3	38	31.4
Black	3	16.7	6	16.2	8	25.8	5	14.3	22	18.2
Asian	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Native American	0	0.0	0	0.0	0	0.0	1	2.9	1	0.8
Pacific Islander	0	0.0	0	0.0	0	0.0	0	0	0	0.0

Two or More Races	0	0.0	2	5.4	0	0.0	0	0	2	1.7

Note: due to rounding, all values for a site may not equal 100%

Participant characteristics were also examined in relationship to the independent variables of interest in this study. Related to learning disability classification, *n* = 35 (28.9%) of participants were identified as having a learning-based IEP, while *n* = 86 (71.1%) were not classified with a learning-based IEP. There was a much higher proportion of students (*n* = 85) who showed a preference for grasping information through apprehension than those who preferred to grasp information through comprehension (*n* = 36). Independent variable frequencies and percentages are listed by site in Table 4.

Table 4

Descriptions of Independent Variable Characteristics by Site

	Site 1		Site 2		Site 3		Site 4		Total	
Characteristic	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Learning Disability										
IEP	5	27.8	7	18.9	13	41.9	10	28.6	35	28.9
No-IEP	13	72.2	30	81.1	18	58.2	25	71.4	86	71.1
Grasping Preference										
Apprehension (CE)	10	55.6	30	81.1	18	58.1	27	77.1	85	70.2
Comprehension (AC)	8	44.4	7	19.9	13	41.9	8	22.9	36	29.8

Findings

Site one served as the control in this experiment. This site did not receive the experimental treatments, therefore the site one students (*n* = 18) were not included in the analysis related to change scores for STEM unit assessments. The total results of the *KLSI* for participants receiving treatments, separated based on their learning disability classification, is shown in Table 5.

Table 5

KLSI Scores for Participants Based on Learning Disability Classification (n = 103)

	LD (n = 30)				*Not LD (n = 73)*			
Construct	*Min*	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*
Abstract Conceptualization	15	38	27.90	4.67	17	44	27.21	6.86
Concrete Experience	17	40	29.50	5.51	16	45	27.21	5.48
Active Experimentation	17	45	30.57	7.39	16	46	33.38	7.92
Reflective Observation	17	42	32.03	5.61	17	45	32.21	6.30
Grasping (AC-CE)	-18	17	2.37	7.81	-22	21	1.97	8.37
Transforming (AE-RO)	-13	25	2.50	9.76	-22	23	3.15	11.21

Note. Calculated scores can range from 12 – 48 on learning modes and -36 to +36 on dimensions. Equal balance between ends of the continuums for transforming and grasping experience dimensions is set at +7 (Kolb & Kolb, 2013).

Student preferences for learning based on apprehension or comprehension were similar for those with and without learning disability classification. Preferences for grasping information are shown in Table 6.

Table 6

Student Preferences for Grasping Through Apprehension (CE) or Comprehension (AC)

	Apprehension Preference	Comprehension Preference

LD Classification	*f*	*f*	%	*f*	%
LD	30	22	73.3	8	26.7
No LD	73	53	72.6	20	27.4
Total	103	75	72.8	28	27.2

Students with learning disabilities had lower scores on the pretest for both the water science and soil science units than those students without a learning disability. Pretest scores are shown in Table 7.

Table 7

Mean Pretest Scores for Water Science and Soil Science Units by Learning Disability Classification

LD Classification	*n*	Water Science Unit *M*(*SD*)	Soil Science Unit *M*(*SD*)
LD	30	17.*70(16.44)*	16.16*(14.58)*
No LD	73	23.*00(18.95)*	19.61*(14.61)*
Total	103	21.46*(18.42)*	19.04*(16.27)*

Changes in score from pretest to posttest were examined related to student learning disability classification and student preference for grasping information. Students with learning disabilities showed larger changes in scores when the information was presented in the sequence matching their learning preference. Results for change scores and sequence of unit are shown in Tables 8 and 9.

Table 8

Change Scores for Water Science Unit Based on Sequence of Unit, Match to Learning Preference, and Learning Disability classification

LD		Sequence of Unit		
Classification	*n*	Matched to Preference *M*(*SD*)	*n*	Opposite of Preference *M*(*SD*)
LD	13	63.38*(17.31)*	17	24.94*(19.95)*
No LD	20	63.65*(21.19)*	53	36.92*(17.46)*
Total	33	63.55*(19.75)*	80	31.44*(18.11)*

Table 9

Change Scores for Soil Science Unit Based on Sequence of Unit, Match to Learning Preference, and Learning Disability classification

LD		Sequence of Unit		
Classification	*n*	Matched to Preference *M*(*SD*)	*n*	Opposite of Preference *M*(*SD*)
LD	17	55.53*(18.54)*	13	28.00*(18.19)*
No LD	53	60.32*(17.68)*	20	34.65*(14.20)*
Total	80	59.16*(18.01)*	33	32.03*(16.32)*

For the water science unit, when instruction was matched to preference, student change scores were similar between students with and without an LD classification. When the water science unit was taught to students in the sequence opposite of their preference, change score means varied between groups. Change scores for all groups of students were larger when the sequence of the soil science unit matched their preference. Change scores were lower for this unit of instruction across all groups than in the water science unit.

Conclusions/Discussion/Implications

All students showed increases in change scores when the information was delivered in the sequence matching their learning preference. When units were presented in the sequence opposite student preferences, students with learning disabilities had change scores that did not match their peers without learning disabilities. Although the results of this exploratory study are limited to a descriptive analysis, several findings warrant further discussion.

More students had a preference for grasping information through apprehension than comprehension. This fact was especially true among students with learning disabilities. Students with learning disabilities likely benefit from enrollment in an agricultural education course that focuses on providing concrete experiences for grasping abstract concepts. By this token, it is promising that agricultural education courses are within the CTE area, which have increased proportions of students with learning disabilities (Wagner, et. al., 2015). Students in agricultural education are able to experience the experiential learning cycle as a foundational tenet of their instruction (Roberts, 2006). Of course, students can only fully realize the benefits found from cognitive sequencing through ELT in agricultural education if agricultural educators have the skills required to teach using a full ELT model. We recommend teacher educators ensure both preservice and in-service teachers are instructed on the proper integration and use of all four components of the ELT cycle through preservice instruction and professional development training.

Many of the concepts in STEM education are abstract in nature (Maltese, Potvin, Lung, & Hochbein, 2014), and the hands-on nature of agricultural education and other CTE courses have been seen as a platform for delivering these concepts (Stone, 2010). For students who prefer to grasp information through apprehension, the presentation of abstract concepts through abstract conceptualization may not provide the stimulus they need to transform the information. This is especially true for students with learning disabilities who prefer to grasp information through apprehension (Kolb, 2015). These students may be facing twice the challenge when STEM concepts are presented beginning with comprehension; they are developmentally unable to process abstractions, and they prefer to bring in information through concrete experience. Helping these students succeed requires not only attention to providing quality instruction with purposeful concrete experiences, but may also require differentiation of instruction to ensure students are presented information in a sequence which allows them to contextualize abstract concepts.

Sequencing instruction based on individual student preferences for grasping information has close ties to the literature related to differentiated instruction. Tomlinson (1999) points out the importance of tailoring educational practices to meet the needs of each student. The findings of this study give an example of just how critical differentiated instruction is when dealing with LD students who are tasked with learning STEM concepts in agricultural education classes.

Because all of the students in this study were enrolled in general education courses, it is likely that the students with learning disabilities in this study required only minor modifications to instruction. It is a limitation to this study that individuals with learning disabilities could not be identified based on their specific accommodation plans. Students with preferences for grasping through both apprehension and comprehension exist in an agricultural education classroom, so which of the cognitive sequences is better suited for development of curriculum materials? Perhaps rather than looking at the sequence as an either or concept, the answer would be to include both sequences within units in order to ensure the needs of all students are met. This small change to educational methods may have broad-reaching effects, not only for students without learning disabilities, but for all students in agricultural education classrooms.

The results of this study allow us to make several recommendations for school based agricultural educators. Careful attention should be paid during the design of instruction in agricultural education to ensure that students are receiving exposure to the complete learning cycle as defined through ELT. This has wide reaching implications for the field. In addition, vendors of curriculum materials should use the learning cycle as a model with which to build lessons and develop curricula. We also recommend using the *KLSI* or similar instrument to determine student preferences for grasping experience. Results of these assessments should be used to guide instructional procedures toward the specific needs of classes and/or students.

Additional recommendations exist for teacher educators and those involved in providing ongoing teacher support. Pre-service teachers should be made aware of the potential effects of cognitive sequencing on student learning. They should be given the opportunity to develop lessons which are not sequenced in a traditional AC to CE format. If preservice teachers are preparing to meet the needs of all their students, they should be prepared for students who prefer to grasp information beginning with a concrete experience. In this study, more students preferred grasping via apprehension over comprehension. Allowing preservice teachers the opportunity to familiarize themselves with how to present information which will best reach the majority of their students is critical in their preparation. In addition to helping preservice teachers develop their own cognitively sequenced units, they should also be instructed on methods for modifying the cognitive sequence of existing curriculum materials. Most available curricula are presented in an order which begins with abstract conceptualization (Reigeluth, 2013). In order to be effective, preservice teachers should learn the best method for taking existing curriculum materials and modifying the sequence, so that concrete experiences could be presented first.

Professional development should be created and presented to in-service teachers to highlight the effects of cognitive sequencing based on learning style. In-service should include instruction on how to present new concepts using both apprehension and comprehension beginning point. This will ensure that teachers are prepared to meet the individual needs of their students. Combining the knowledge of how to cognitively sequence instruction with an assessment of students in agricultural education courses could give teachers a prescriptive method for increasing student learning of STEM content.

The results of this study lead to additional areas for research related to the concepts of cognitive sequencing, learning disabilities, STEM education, and experiential learning theory in agricultural education. We recommend a replication of this study in a population large enough to analyze data through inferential statistics in order to examine potential interactions between the factors of cognitive sequence and learning disabilities. The differences in student learning should be examined using cognitive sequencing of the transformation dimension of ELT to determine if differences exist when transformation of knowledge begins through intention or extension for LD students.

The main goal of this research was not to build upon theory or substantiate the research of academics, though it would certainly be wonderful if these implications existed. The main goal of this research was to help those who spend every day working in the classroom. The importance of cognitive sequencing for in relation to STEM concepts, learning disabilities and experiential learning theory has been highlighted by this initial examination, and revealed the importance of sequencing instruction. A continuation of this line of inquiry may yield results that can help level the playing field for all students, especially those for whom the playing field is vastly tilted.

References

Bender, W. N. (Ed.). (2007). *Differentiating instruction for students with learning disabilities: Best teaching practices for general and special educators*. Thousand Oaks, CA: Corwin Press.

Bender, W. N. (2008). *Learning disabilities: Characteristics, identification, and teaching strategies*. Boston, MA: Allyn & Bacon.

Boaler, J. (1998). Open and closed mathematics: Student experiences and understandings. *Journal for Research in Mathematics Education, 29*(1), 41-62. doi: 10.2307/749717

Brokaw, A. J., & Merz, T. E. (2000). The effects of student behavior and preferred learning style on performance. *Journal of Business Education, 1*, 44–53.

Carroll, J. (1963). A model of school learning. *The Teachers College Record*, *64*(8), 723-723.

Claxton, C. S., & Murrell, P. H. (1987). *Learning styles*. Washington, DC: George Washington University.

Coffield, F. J., Moseley, D. V., Hall, E., & Ecclestone, K. (2004a). *Learning styles and pedagogy in post-16 learning: A systematic and critical review*. London: Learning and Skills Research Centre.

Coffield, F. J., Moseley, D. V., Hall, E., & Ecclestone, K. (2004b). *Learning styles: What research has to say to practice*. London: Learning and Skills Research Centre.

Darling-Hammond, L., & Bransford, J. (Eds.) (2007). *Preparing teachers for a changing world: What teachers should learn and be able to do.* San Francisco, CA: Jossey-Bass.

Duff, A. (2004). Approaches to learning: The revised approaches to studying inventory. *Active Learning in Higher Education, 5*(1), 56–72. doi: 10.1080/0963928042000306800

Dunn, R., & Dunn, K. (1989). *Learning style inventory*. Lawrence, KS: Price Systems.

Felder, R. M., & Silverman, L. K. (1988). Learning styles and teaching styles in engineering education. *Engineering Education, 78*(7), 674–681.

Fleming, N. D. (2001). *Teaching and learning styles: VARK strategies*. Christchurch, New Zealand: N.D. Fleming.

Frisbie, D. A. (1988). Reliability of scores from teacher-made tests. *Educational Measurement: Issues and Practice*, *7*(1), 25-35.

Furner, J. M., & Kumar, D. D. (2007). The mathematics and science integration argument: A stand for teacher education. *Eurasia Journal of Mathematics, Science & Technology Education*, *3*(3).

Gagne, R.M. (1965). *The conditions for learning*. New York, NY: Holt, Rinehart and Winston.

Gregorc, A. F. (1979). Learning/teaching styles: Their nature and effects. *NASSP Monograph*, 19–26.

Hampton, N. Z., & Mason, E. (2003). Learning disabilities, gender, sources of efficacy, self-efficacy beliefs, and academic achievement in high school students. *Journal of School Psychology*, *41*(2), 101-112

Kieran, C. (1992), The learning and teaching of school algebra. In D. A. Grouws (Ed.), *The handbook of research on mathematics teaching and learning* (pp. 390-419). New York, NY: Macmillan.

Kolb D. (1984). *Experiential learning as the science of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd Ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Kolb, A. Y., & Kolb, D. A. (2005). *The Kolb Learning Style Inventory version 3.1 2005 technical specifications.* Philadelphia, PA: HayGroup. Retrieved from http://learningfromexperience.com/media/2010/08/tech_spec_lsi.pdf

Landa, L. N. (1983). The algo-heuristic theory of instruction. In C. Reigueluth (Ed.). *Instructional-design theories and models: An overview of their current status*, 301-318. New York, NY: Routledge.

Maltese, A. V., Potvin, G., Lung, F. D., & Hochbein, C. D. (2014). STEM and STEM education in the United States. In B. Freeman, S. Marginson, & R, Tytler (Eds.) *Age of STEM: Educational policy and practice across the world in science, technology, engineering, and mathematics (pp. 102-133).* Florence, KY: Routledge.

Osborne Jr, A. G., & Russo, C. J. (2014). *Special education and the law: A guide for practitioners*. Thousand Oaks, CA: Corwin Press.

Piaget, J. (1970). *Structuralism*. New York, NY: Basic Books.

Piaget, J. (1972). Intellectual evolution from adolescence to adulthood. *Human Development, 15*(1), 1-12.

Reigeluth, C. M. (Ed.). (2013). *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 3). New York, NY: Routledge.

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education 47*(1). 17-29. doi: 10.5032/jae.2006.01017

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin Company.

Silins, H., & Mulford, B. (2002). Schools as learning organizations: The case for system, teacher and student learning. *Journal of Educational Administration*, *40*(5), 425-446.

Sousa, D. A. (2011). *How the brain learns*. Thousand Oaks, CA: Corwin Press.

Stone III, J. R. (2011, May). *Delivering STEM education through career and technical education schools and programs.* Paper presented at the National Research Council Workshop on Successful STEM Education in K-12 Schools. Retrieved from http://www7.nationalacademies.org/bose/STEM_Schools_Workshop_Paper_Stone.pdf.

Stringer, E. T., Christensen, L. M., & Baldwin, S. C. (2009). *Integrating teaching, learning, and action research: Enhancing instruction in the K-12 classroom*. Thousand Oaks, CA: Sage Publications.

Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

Wagner, M. M., Newman, L. A., & Javitz, H. S. (2015). The benefits of high school Career and Technical Education (CTE) for youth with learning disabilities. *Journal of Learning Disabilities*, 1-13. doi: 10.1177/0022219415574774

Woodward, J. & Montague, M. (2002). Meeting the challenge of mathematics reform for students with LD. *Journal of Special Education, 36*(2), 89-101.

STEM Knowledge, Learning Disabilities and Experiential Learning: Influences of Sequencing Instruction

Discussant Statement

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This is a very well written and designed study that adds to a growing body of knowledge. Drs. Smith and Rayfield developed a research project that capitalized on opportunities available in cooperating school systems. A critique of a study of this quality is a difficult task!

A strong rationale for the combining theories in to a conceptual model was developed. The only limitation of the description was the oversight of Gagne's (1965) theory of instruction. Though the rationale for using Gagne's theory was given and justified, no description of the model was provided. Obviously space became a limiting factor. I could understand why the model needed a theory of instruction, but a short description would have strengthened the section.

The authors designed a strong methodology to address their objectives. I only have two minor critiques that might be considered. As a reader moves through all of the sections of the paper, it becomes very confusing to constantly move between "apprehension and CE" and "comprehension and AC". While these terms are both used and referenced in Kolb's theory it became confusing to move between them. While the KLSI is a recognized instrument for determining a participant's learning style preference within the Kolb model, a description of the instrument would have been helpful. In fact, the name of the instrument was never given, only the acronym.

The conclusions/discussion/implications of the study were well done. Although at times, the discussion bordered on the edge of generalizing. While I believe the data indicates information should be shared, the lack of generalizability should be noted and I caution the authors to include statements that are broad reaching. Moreover, much was discussed about changing instruction to meet the needs of those who learn with apprehension as a preferred learning style. When in reality, we should not change, but include instruction using apprehension. While those who prefer comprehension are in the minority, we must still consider them when designing instruction. A short discussion of differentiated instruction was included in the introduction. Using both apprehension and comprehension to meet the needs of our students would fit nicely into the recommendations for differentiated instruction.

Overall this is a very fine paper and study. The highest compliment I can give is that it made me think about the implications, related to my own instruction. I look forward to learning more as Drs. Smith and Rayfield continue this line of inquiry.

Visualizing visual literacy: Using heat maps to illustrate potential differences in gaze behavior in agricultural communications students

Abstract

As information and its consumption become more visual in nature and technological advances support emerging biometric research and big data, agricultural communicators, researchers, and educators must employ data visualization tools to engage and inform the public. Visual literacy is a teachable and learnable skill set of emerging and lasting import to agricultural communications. In this study, we explored the potential for heat maps, or visual data of tracked eye movements, to illustrate potential differences in visual literacy between groups of agricultural communications students. We used a quasi-experimental two-group arrangement and eye-tracking technology to collect gaze behavior from students as they viewed internationally awarded photographs. We aggregated the data into four groups: Group A (treatment) included students in an agricultural photojournalism course collected at course outset; Group B (control) from students in a research methods course at course outset; Group C (treatment) collected at end of course, and Group D (control) collected at end of course. Comparing the heat maps, we observed differences between Group C and all other groups in at least five of the images. We conclude that although heat maps may not be ideal for inferential or explanatory decisions, they are a meaningful tool for visualizing gaze behavior.

Keywords: Eye-tracking, visual literacy, visual communication, agricultural communications, heat maps, biometrics

Introduction and Review of Literature

Technology continues to influence modern society and change the way individuals access, experience, and comprehend new information. Western cultures and societies are experiencing a major paradigmatic shift from text to images, from words to visuals. Therefore, communications and educational materials must adapt to meet the changing face of information dissemination (Metros, 2008). Although students historically adopted information presented largely in text format, contemporary students exist in a mixed-media world of education, where students are no longer solely forming knowledge (inherently word or verbally based) but forming *impressions* that are both verbal *and* visual (Lehtonen, 1988). After all, multimedia presentations can encourage learners to engage in active learning by forming mental representations of the materials in words and in pictures and, thus, independently form unique connections between the pictorial and verbal representations (Clark & Mayer, 2016).

Humans comprehend the world through visual input, but academic materials are increasingly conforming to various types of learners, and as a result increasingly employ multimedia approaches to information dissemination. Gaziano and McGrath (1986) noted that seeing is believing. Eye-tracking technology and, more specifically, the heat maps of tracked eye movements allow us to track gauge attention to visuals and create a timeline, perhaps even allowing measurements of thought processes in our agricultural communications students. The maps may allow us to verify that seeing is more than just believing: Seeing may truly be comprehending.

Visual Literacy

Visual literacy has been purported to influence individuals' ability to analyze images and graphic representations for directives, signs, and meanings (Bowen, 2017). Further, visual literacy may also influence an individual's capacity to critically analyze and interpret how visual representations communicate various meanings, and explain why viewers may read those representations differently across diverse domains and environments (Bowen, 2017). Visual literacy also involves the ability to then effectively relay applicable information in visual form as well. The ability to convey information in a visual manner is not new, but it is fundamentally more applicable to modern education than classical education, given the prevalence of computer-based learning in the 21st century. Therefore, its utility in academic scenarios is of critical importance, especially with regards to our understanding of how it impacts learning outcomes in agricultural communications, agriculture education practices, and beyond.

Can researchers use relatively new technology to show that visual comprehension is indeed a "more effective method?" Eye tracking technology may provide researchers with insight to what the eye does as it transmits information to the mind, and ironically do so in a pictorial format: Heat-maps of eye movements are themselves visual representations of cognitive processes that may prove visual behavior is linked to cognitive functions that end in visual literacy, or the ability to make meaning of seeing. Gaze tracking is a simple plot of the pupil's horizontal and vertical movements against time, and heat maps separate different levels of observation intensity better than fixation maps (Špakov & Miniotas, 2007). In either case, Hattwig, Bussert, Medaille, and Burgess (2013) noted visual literacy and digital technology intersect, which necessitates visual literacy as an essential component of 21st century learners, consumers, and contributors (2013). Furthermore, given the literacy skills necessary in the 21st century and the proliferation of availability of information, learners at all levels need specialized skills that will enable them to participate to a competitive level from where they will be able to compete within the knowledge economy (Demirci et. al., 2015). Kastman and Booker (1998) also indicated as much, noting that current education practice in agriculture (in particular) focuses on preparing students for the writing they will do in the workplace but seldom discusses areas other than writing that are important to professional communication, such as visual communication. Kastman and Booker (1998) continued to note that more attention is needed in these areas, but they did not suggest the means by which to assess visual literacy among agricultural communications students.

Statement of the problem

Although humans have used pictorial representation of concepts to share information since time immemorial, our ability to understand how the mind works while visually assessing information is extremely recent by comparison. Nugent (1982) argued that instructors are using visuals in classrooms alongside print and verbal messages to provide a more effective method distribution of information. Cekada (2012) argued that because individuals in the Generation Y/Millennial group are more visually literate, visual literacy training is needed to enhance the American workforce, including the fields of agriculture and communications. Furthermore, Mirra (2014) emphasized that it is essential for educators to adopt effective methodologies that promote learner engagement in literacy competence development. However, the means by which researchers and teachers assess whether and how visual interventions achieve their desired end of visual literacy among students currently lags behind the actual utility of visual teaching materials and visual communications in education of students. Researchers in agricultural communications and beyond must be able to measure diverse elements of the process of becoming visually literate to ensure effectiveness of materials in use with current and future generations of workforce employees, educators, and agriculturalists.

Modern technological advances allow us to biometrically assess the impact of visual interventions on agricultural communications students. However, we are only beginning to understand the meaning of these biometrics. Eye-tracking technologies present revolutionary methods of producing data for understanding how the mind behaves when responding to visual stimuli, and what level of comprehension may arise therefrom. The hypothesis behind eye-tracking suggests that a dynamic trace of where a person's *attention* is being directed can, in part, reveal the *amount* of visual processing taking place (Poole & Ball, 2006). Visual communications and education methods research using eye-tracking technology stand to impact the major research priorities set out in the *National Research Agenda for the American Association of Agricultural Educators* (AAAE) for 2016-2020, among many other fields of interdisciplinary visual research, including bench sciences. Peterson (2001) delineated the application of visual literacy to many disciplines but notably overlooked agriculture-related fields, agricultural communications not least among them. How then, can researchers explore and understand visual literacy, as well as measure and communicate its manifestation?

Theoretical Frameworks

This study was based on the strategies, standards, and models described by Hattwig et al. (2013) who articulated that visually literate students meet 7 standards:

1. "The visually literate student determines the nature and extent of the visual materials needed." (p. 75)
2. "The visually literate student finds and accesses needed images and visual media effectively and efficiently." (p. 76)
3. "The visually literate student interprets and analyzes the meanings of images and visual media." (p. 77)
4. "The visually literate student evaluates images and their sources." (p. 78)
5. "The visually literate student uses images and visual media effectively." (p. 80)
6. "The visually literate student designs and creates meaningful images and visual media." (p. 81)
7. "The visually literate student understands many of the ethical, legal, social and economic issues surrounding the creation and use of images and visual media, and accesses and uses visual materials ethically." (p. 82)

We specifically explored standards 2-6.

Arke and Primack (2009) looked to Bloom (1971) to contrive determinants of visual literacy. In following that vein, we conceptualized a model for this study, shown in Figure 1, that depicted an alignment of Bloom's revised taxonomy (Anderson & Krathwohl, 2001). Key components of visual literacy outlined by Stokes' (2002) included an ability to identify visual messages, accurately interpret visual messages, and create visual messages. The operationalized theoretical framework of this study was illustrated in figure 1.

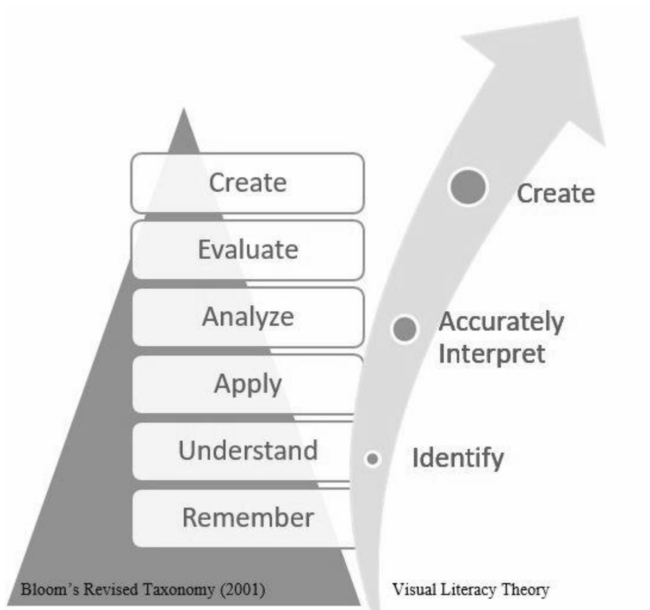

Figure 1. Alignment of Bloom's Revised Taxonomy with Visual Literacy

Biometrics, visual literacy, and data visualization

Scholars have been investigating visual literacy for thousands of years (Wallis & Bülthoff, 1999; Petterson, 2001) and developing measures of visual literacy is an innovative exercise in interdisciplinarity combining emerging neuroscience, philosophy, biology, and more. Eye-tracking and biometric measures are likely and worthy indicators of visual literacy, as there are problems with other data collection techniques. Ares et al. (2013) noted that self-reporting in gaze behavior studies may be inaccurate or invalid, and that eye-tracking should be utilized in research into measures of visual behavior. Poole and Ball (2006) noted the myriad implications of eye-tracking data on visual literacy concepts and cognition. They specifically note that longer gaze duration may indicate deeper cognitive processing.

As biometric technologies diffuse, tactics for visualizing the data generated by biometric collection—specifically heat maps from eye-tracking studies—are also increasing in frequency in the literature (Bokoj, 2009). Heat maps offer different tools for visualizing data from eye-tracking, including fixation count heat maps, fixed duration heat maps, and relative duration heat maps. Bokoj (2009) explained that heat maps are primarily valuable in visualization and illustration, and can indicate patterns in data, but cautioned against using them for explanatory or inferential purposes.

Ultimately, to understand visual literacy, researchers must understand indicators and measures of visual literacy, like gaze behavior and eye-tracking technology. Heat maps may be a key tool in visualizing these indicators. In this study, we explored data visualization and changes in visual literacy in students' who completed an agricultural photojournalism course.

The purpose of this study was to explore heat maps as a tool to visualize differences in gaze behavior in agricultural communications students. To meet that purpose, our objectives were:

1. Use relative duration heat maps to visualize student's gaze behavior; and

2. Determine if observable differences existed in gaze behavior between students in a photojournalism course and students in a control group.

Methods

In this case study, we employed a quasi-experimental, two-group design with repeated measures, and used observational and descriptive analysis of data visualization to investigate student gaze behavior. The results of this study are not generalizable nor transferable, but they do provide insight about the potential variability of visual literacy, the potential to use eye-tracking to measure visual literacy, and the potential to use heat maps as a tool for data visualization.

Participant Characteristics

The treatment group in this study included students enrolled in an agricultural photojournalism course ($n = 17$). The control group included agricultural communications students enrolled in a research methods course (n = 18). In total, 36 students participated in the study. These courses were purposefully chosen. The treatment group was selected because the photojournalism course includes instruction and practice in foundational areas of visual literacy including visual language, visual perception, visual learning, and visual communication (Avgerinou & Pettersson, 2011). The control group was chosen because they had comparable demographics but were not currently engaged in a course that included visual literacy components.

Data for the initial measure were collected in the first two weeks of courses. For the second measure, data were collected in the final two weeks of coursework. Most students were female (n = 31, 88.57%) but four males were included (n = 4, 11.43%), with graduate and undergraduate students participating. The agricultural photojournalism course was an undergraduate course but two graduate students were enrolled. The agricultural communications research course was a course that included both graduate and undergraduate students. No participants were incentivized to participate, and all had corrected to normal or normal vision.

Stimuli

A goal of this study was to explore if data visualizations of gaze behavior may be indicative of visual literacy, and primary component of visual literacy is to make meaning of visual messages (Avgerinou & Petterson, 2011). Therefore, we selected images that had noted visual messages—In this case, 2017 World Press Photo Prize (WPPP) winning photos. Images in the WPPP collection have been recognized as the most impactful and effective instances of photojournalism and storytelling by an international non-profit organization (World Press Photo Foundation, 2017). Images in the WPPP collection were recognized for being among the best photos in the world in in seven categories: daily life, contemporary issues, spot news, sports, people, nature, and general news. Each study participant was shown a random sample of images at each point of data collection, thereby, minimizing testing fatigue and time commitment of respondents. We used a Latin square method to ensure that no participant saw any image more than once, and that every image was shown to an equal number of participants. Images were randomly assigned a coded number from 1-21 for identification purposes.

Data collection

Our data collection tools included a Tobii Pro X2-60 screen-based eye-tracking system that used Tobii Pro Studio software, Version 3.4.8, for collection and analysis. The Tobii Pro X2-60 has a 60 hz sampling frequency, tracks both eyes (binocular measurement) and uses both dark and bright pupil tracking techniques for optimized tracking (Tobii Technology, 2017a). After obtaining each participant's consent, we followed the procedures noted in the Tobii Pro X2-60 manual to calibrate the Tobii equipment for each participant. We began calibration procedures by asking participants to look at a red circle displayed on the screen, and to follow it with their eyes as it moved to different locations. The Tobii system measures geometric characteristics of each person's eye, based on the way light reflects on a participant's eye in different positions. The Tobii system then tests each participant's geometric characteristics against the software's internal 3-D model to maintain precise and accurate data collection (Tobii Technology, 2017b). Once we confirmed a successful calibration, data collection commenced by displaying prompts on screen to guide participants to use the space bar to progress through images in the study. We instructed participants to consider the message each image connoted, and that there was no time limit for viewing. Between images, we collected self-reported responses for part of a larger study.

Accuracy and precision are important determinants of quality of eye tracking and are measured in degrees; smaller numbers indicate more accuracy and precision (Holmqvist, Nyström, & Mulvey, 2012). When a participant is seated 60cm from the screen, the Tobii Pro X260 returns an average accuracy of .4° and an average precision of .34° (Tobii Technology, 2013), both measures are acceptable by industry standards. Therefore, we ensured participants were seated 60 cm from the screen during the calibration process to ensure correct distance. The Tobii system uses an infrared camera mounted on the computer monitor to capture eye movements. The camera focuses on eye movement, eye fixations, and performance accuracy dependent on visualization, task, and domain (Gegenfurtner et al., 2011). We minimized distractions and maintained consistent and appropriate lighting for every participant.

Data analysis

For this study, we explored data visualization for the potential to illustrate differences in visual literacy. For each of the 21 stimuli, we aggregated data into four groups: participants from the treatment group collected at the beginning of the study (Group A), participants from the control group collected at the beginning of the study (Group B), participants from the treatment group collected at the end of the study (Group C), and treatments from the control group at the end of the study (Group D). Number of participants in each group ranged from three to six. We generated a relative duration heat map using a consistent threshold of five seconds. A relative duration heat map "shows the accumulated time each participant spent fixating at the different areas of the stimulus relative to the total time the participant spent looking at the stimulus." (Bojko, 2009). Bojko (2009) also explained that relative duration heat maps are ideal when participants spent unequal amounts of time looking at an image, as was the case in this study. We then arranged heat maps in a four-pane window arrangement to allow for systematic comparison. We looked for observable differences in the concentrations and spread of heat map patterns to illustrate potential differences in the data. Our research team drew from our visual communication expertise as professors of agricultural communications (one with a specialty in photojournalism, one with a specialty in graphic design, and one with a specialty in research methods), and two agricultural communications graduate students (one master's and one Ph.D. student, both with some experience in commercial photography and videography), to review the heat maps to determine if they illustrated any potential for difference in visual literacy after the treatment. If the group reached consensus about observable differences on an arrangement, we considered that arrangement an exemplar that illustrated potential for changed gaze behavior.

Findings and Results

Relative to objective one, we generated heat maps to visualize gaze behaviors for each group and image. We believe these visualizations exhibited clear indications of the central tendency gaze behavior in each group, and highlighted specific elements and features of each stimuli that created increased cognitive load or processing in participants. Relative to objective two, we determined there was evidence of variability in gaze behavior in all of the arrangements. Although no heat map is the same, and we reached consensus that five of the 21 images (images 1, 2, 4, 7, and 11) illustrated observable differences between group C (treatment group collected at the end of the study) and all other groups. For the purposes of this paper and respecting space limitations, we identified three of them as being most notable (images 1, 7, and 11). In the following sections, we describe the context of images 1, 7, and 11, and the nature of observable differences that our panel identified.

Image 1 was a photograph by Noel Celis, commissioned by Agence France-Presse (WPP, 2017) called “The Philippine’s Most Overcrowded Jail.” The image depicted prisoners sleeping on a staircase in a jail in Manila, Philippines. The image was awarded third prize in the general news category by WPP (2017). We observed differences in the heat maps generated for group C from all other groups. Heat maps for groups A, B, and D had deepest concentration on one prisoner’s face (left side, third from the top of the frame) with additional concentration on a prisoner’s face on the bottom-right hand side of the frame, and all three groups showed wide dispersion beyond that. Group C did not feature deep concentration on either of the two prisoner’s and instead seemed to focus more on details like an elbow and a foot near the center of the frame, and showed less dispersion throughout the frame. Figure 2 includes the arrangement of heat maps for Image 1.

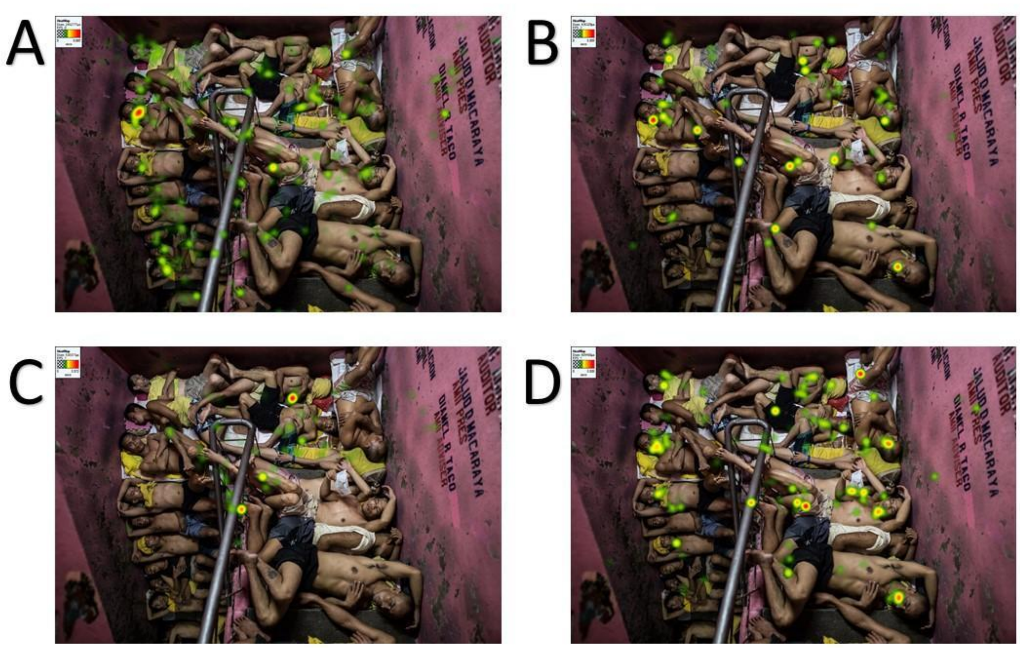

Figure 2. Aggregated heat maps for image 1.

Image 7 was a photograph by Matthieu Paley, commissioned by National Geographic, called "China's Wild West." (WPP, 2017). The image depicted two individuals seated on a train on a line called 'The Old Silk Road.' The photographer identified one of the individuals as belonging to a remote religious and ethnic group, called Uyghur. In the image, the Uyghur woman was carrying money in her stocking while traveling by train. Heat maps for this image showed that participants in groups A, B, and D focused primarily on the woman's left foot—a dominant feature in the foreground of the image—and had wide dispersions of secondary concentration. Group C appeared to pay less attention to the foot in the foreground and primarily focused on a textural anomaly on the woman's stocking, near the spot where her money is kept. Although other groups also focused on the money, there appeared to be fewer concentrated groupings in the heat map for group C, which was an indication they had a relatively more concentrated gaze pattern. Heat maps for image 7 were included in figure 3.

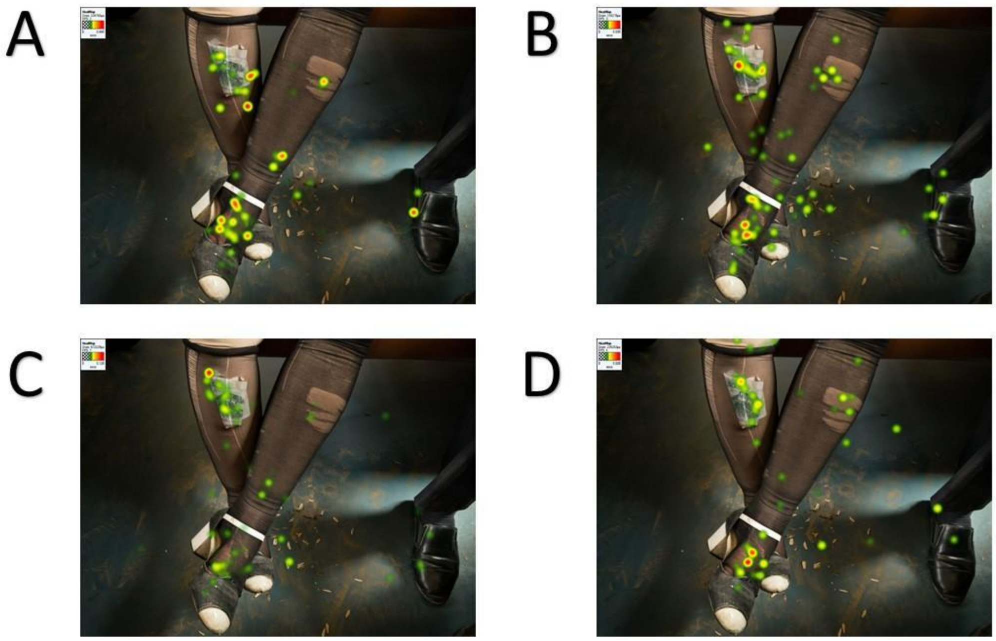

Figure 3. Aggregated heat maps for Image 7.

Image 4, photographed by Burhan Ozbilici, is called "An Assassination in Turkey" and was awarded the 2017 World Press Photo Prize for Photo of the Year in 2017 (WPP 2017). The photo was taken on December 19, 2016, moments after Russian Ambassador Andrey Karlov was shot by Mevlüt Mert Altıntaş in an art gallery. The image depicted the gunman raising his finger in the air and shouting as he stands over the body of the ambassador. Heat maps showed that groups A, B, and D focused with most concentration on the gunman's face. The greatest concentration in the heat map generated for Group C was on the ambassador's glasses lying on the floor in the background of the photo, behind the gunman, with their secondary focus being on the gunman's face. Heat maps for Image 11 were included in figure 4.

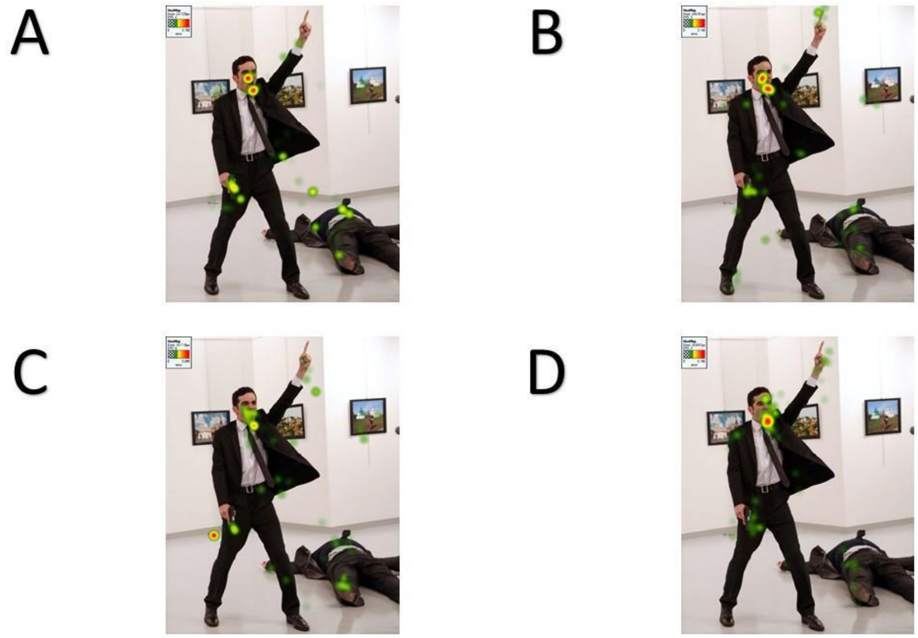

Figure 4. Aggregated heat maps for Image 11.

Conclusions, Recommendations, and Implications

Wallis and Bülthoff (1999) and Kundel et al. (2007) explained that *where* an individual looks within an image has potential to be a measure of visual communication expertise. In this study, we found that heat maps showed notable variability in *where* individuals looked. Therefore, we concluded that heat maps are powerful visualization tools that can illustrate visual literacy data. Bojko (2009) stressed that heat maps should be used as a tool for visualization, and that although they may illustrate the manifestation of data, there are problems with capturing the exactness of differences. Our findings supported Bojko's (2009) assertion. We observed differences in all heat maps, but—even in the most notable cases—we cannot articulate any degree of significance of those differences based solely on the data visualizations. Therefore, stress that our conclusions are not explanatory nor inferential. We do, however, believe that heat maps offer evidence that visual literacy and gaze behavior should continue to be researched. Stokes (2002) asserted that visual literacy is teachable and learnable, and the fact that data visualizations in this study show variability in gaze behavior, and that variability in some instances may be associated with a course that was designed to teach a visual communication skill may support the notion that visual literacy can be both taught and learned.

In the selected images we described in the findings, we noted how a group of students who had completed an agricultural photojournalism course had observable differences in gaze behavior from groups of students at the beginning of an agricultural photojournalism course and a group of students at the beginning and end of a research course. We concluded that this evidence warrants further research to investigate whether or not the photojournalism course impacted visual literacy, or if a causal relationship exists between the curriculum and gaze behavior. Future research should also consider whether psychographic or demographic variables correlate to gaze behavior and visual literacy.

Quantitative data should be analyzed concerning variables including number of fixations and fixation duration, to allow for inferential statistical analysis. However, as an exploratory descriptive study, we found the data presented in these heat maps to support the potential for biometrics and eye tracking in examining visual literacy.

Agricultural communicators and educators should be cognizant of differing levels of visual literacy and of different gaze behaviors in agricultural communications students, as well as in consumers. Researchers in agricultural communications should also continue to explore the value of data visualizations like heat maps to compliment quantitative and biometric data analysis. Metros (2008) called for a paradigmatic shift in the creation and consumption of communication. Agricultural educators and communicators must meet this call to better prepare a modern and effective agricultural workforce, which supports the AAAE National Research Agenda (Roberts, Harder, & Brashears, 2016), and helps contribute to a more informed and engaged citizenry.

References

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York, NY: Longman.

Ares, G., Giménez, A., Bruzzone, F., Vidal, L., Antúnez, L., & Maiche, A. (2013). Consumer visual processing of food labels: Results from an eye-tracking study. *Journal of Sensory Studies*, *28*(2), 138-153.

Arke, E. T., & Primack, B. A. (2009). Quantifying media literacy: Development, reliability, and validity of a new measure. *Educational Media International*, *46*(1), 53-65. doi:10.1080/09523980902780958

Aufderheide, P., & Firestone, C. (1993). *Media literacy: A report of the national leadership conference on media literacy.* Queenstown, MD: Aspen Institute.

Avgerinou, M. D., & Pettersson, R. (2011). Toward a cohesive theory of visual literacy. *Journal of Visual Literacy*, *30*(2), 1-19.

Bloom, B. S., Hastings, J. T., & Madaus, G. F. (1971). *Handbook on formative and summative evaluation of student learning.* New York, NY: McGraw-Hill.

Bojko, A. A. (2009, July). Informative or misleading? Heatmaps deconstructed. In *International Conference on Human-Computer Interaction* (pp. 30-39). Springer, Berlin, Heidelberg.

Bowen, T. (2017). Assessing visual Literacy**:** A case study of developing a rubric for identifying and applying criteria to undergraduate student learning. *Teaching in Higher Education, 22(6),* 705-719.

Cekada, T. L. (2012). Training a multigenerational workforce: Understanding key needs & learning styles. *Professional Safety*, *57*(3), 40-44.

Clark, R. C. & Mayer, R. E. (2016). e-Learning and the Science of Instruction: proven guidelines for consumers and designers of multimedia learning. Hoboken, N. J.: Wiley.

Demirci, H., Gobert, M., & Gitsaki, C. (2015). Current issues in reading, writing and visual literacy: Research and practice. Newcastle upon Tyne: Cambridge Scholars Publishing.

Ernst, J. V., & Clark, A. C. (2007). Scientific and technical visualization in technology education: The need for America's students to develop a deeper knowledge of the nature, creation, and potentials of technology and its symbiotic role in human society, as well as develop a

broader range of technological skills, is progressively more important. *The Technology Teacher*, *66*(8), 16-21.
Frazier, B. J., & Cheek, W. K. (2016). An industry view of competencies for entry-level merchandising jobs: Application of the ITAA meta-goals. *Clothing and Textiles Research Journal*, *34*(2), 79-93. doi: 10.1177/0887302X15622003
Gaziano, C., & McGrath, K. (1986). Measuring the concept of credibility. *Journalism Quarterly*, *63*(3), 451-462.
Gegenfurtner, A., Lehtinen, E., & Säljö, R. (2011). Expertise differences in the comprehension of visualizations: A meta-analysis of eye-tracking research in professional domains. *Educational Psychology Review*, *23*(4), 523-552. doi:10.1007/s10648-011-9174-7
Glöckner, A., & Herbold, A. K. (2011). An eye tracking study on information processing in risky decisions: Evidence for compensatory strategies based on automatic processes. *Journal of Behavioral Decision Making*, *24*(1), 71-98. doi.org/10.1016/j.edurev.2013.10.001
Hattwig, D., Bussert, K., Medaille, A., & Burgess, J. (2013). Visual literacy standards in higher education: New opportunities for libraries and student learning. *Portal: Libraries and the Academy*, *13*(1), 61-89. doi:10.1353/pla.2013.0008
Holmqvist, K., Nyström, M., & Mulvey, F. (2012). Eye tracker data quality: What it is and how to measure it. In *Proceedings of the symposium on eye tracking research and applications* (pp. 45-52). ACM.
Kastman, L. M., & Booker, S. L. (1998). Writing across the disciplines in agriculture. *Language and Learning across the Disciplines*, *2*(3), 36-43.
Kundel, H. L., Nodine, C. F., Conant, E. F., & Weinstein, S. P. (2007). Holistic component of image perception in mammogram interpretation: Gaze-tracking study. *Radiology*, *242*(2), 396-402. doi:10.1148/radiol.2422051997
Lai, M. L., Tsai, M. J., Yang, F. Y., Hsu, C. Y., Liu, T. C., Lee, S. W. Y., & Tsai, C. C. (2013). A review of using eye-tracking technology in exploring learning from 2000 to 2012. *Educational Research Review*, *10*, 90-115. doi:10.1016/j.edurev.2013.10.001
Lasley, E. A., & Haas, L. E. (2017). Visual literacy, academic standards, and critical thinking: Using wordless picture books as an instructional tool. *California Reader*, *50*(2).
Lehtonen, J. (1988). The information society and the new competence. *American Behavioral Scientist*, *32*(2), 104-111. 10.1177/0002764288032002003
Matusitz, J. M. (2005). The current condition of visual communication in colleges and universities of the United States. *Journal of Visual Literacy*, *25*(1), 97-112.
Metros, S. E. (2008). The educator's role in preparing visually literate learners. *Theory into Practice*, *47*(2), 102-109. doi:10.1080/00405840801992264
Mirra, N. (2014). What is the purpose of literacy instruction in the 21st-century classroom? Listening to the voices of high school English teachers. *California English*, *20*(1), 9-11.
Nugent, G. C. (1982). Pictures, audio, and print: Symbolic representation and effect on learning. *Educational Technology Research and Development*, *30*(3), 163-174.
Pettersson, R. (2001). Visual literacy in message design. Visual literacy in message design. IVLA book of selected readings, 11-26.
Poole, A., & Ball, L. J. (2006). Eye tracking in HCI and usability research. *Encyclopedia of human computer interaction*, *1*, 211-219.
Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Špakov, O. & Miniotas, D. (2007). Visualization of eye gaze data using heat maps. *Electronics and Electrical Engineering*, *2*(74), 55-58.

Stokes, S. (2002). Visual literacy in teaching and learning: A literature perspective. *Electronic Journal for the Integration of technology in Education*, *1*(1), 10-19.

Sutton, R. E. (1992). *Information literacy meets media literacy and visual literacy.* Presentation at the 29th annual conference of the International Visual Literacy Association, Pittsburgh, Sept. 30-October 4. In Braden, R., Clark-Baca, J., & Beauchamp, D. G., (Eds.) 1993: *Art, Science, and Visual Literacy, Selected Readings from the 29th Annual Conference of the International Visual Literacy Association.* International Visual Literacy Association: Blacksburg, VA.

Tobii Technology (2013). *Accuracy and precision test report: X2-60*. Retrieved from https://www.tobiipro.com/siteassets/tobii-pro/accuracy-and-precision-tests/tobii-x2-60-eye-tracker-accuracy-and-precision-test-report.pdf/?v=1.0

Tobii Technology (2017a). *X2-60 specifications.* Retrieved from https://www.tobiipro.com/product-listing/tobii-pro-x2-60/#Specifications

Tobii Technology (2017b). *What happens during the eye tracker calibration*. Retrieved from https://www.tobiipro.com/learn-and-support/learn/eye-tracking-essentials/what-happens-during-the-eye-tracker-calibration/

Wallis, G., & Bülthoff, H. (1999). Learning to recognize objects. *Trends in Cognitive Sciences*, *3*(1), 22-31.

Visualizing visual literacy: Using heat maps to illustrate potential differences in gaze behavior in agricultural communications students.

Discussant
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This study is both innovative and intriguing. Eye tracking research is in its early stages in agricultural communications. As such, the directly linked literature is limited. The authors did a nice job of connecting the current technology to existing theories.

The authors do an adequate job of outlining visual literacy, however it is very difficult to see how eye tracking, or gaze behavior, could lead us to determine if someone is visually literate. The seven standards on page 3 are predominately cognitive operations or skills. Either way, to understand if a person is visually literate, one would have to communicate to the person, have them complete tasks or answer questions. The findings of the study do indicate there is a difference in data from the treatment group and that was collected after the treatment, but to extrapolate this to visual literacy education could be difficult. The authors are correct when they state that more research is needed.

The methodology is thorough and descriptive although the two-group design became confusing when the data was discussed as groups and participants. The description of the data collection device and analysis was well done and informative.

Heat maps are in their early use in data collection/research. The authors state there was “notable variability in where individuals looked.” While it is true that there was a difference of where people looked, it is hard to state if it was notable or just noticeable. They also state that “heat maps are powerful visualization tools that can illustrate visual literacy data.” This may be an overly strong statement. Heat maps appear to be a tool to illustrate differences in what people are observing in visuals, but the leap to illustrating visual literacy (based on the seven standards) is a large one to make. The authors are correct when they recommend further exploration. If heat maps could be measured with another variable that is already connected to visual literacy, then the connection between heat maps and visual literacy could be made.

I do not want to diminish the exploratory work that was done in this study, it is good work and well done, but some of the connections that were made and/or suggested or too early in the exploration. I look forward to what may come of gaze behavior and heat maps.

Assessing the Effects of the Smartphone as a Learning Tool on the Academic Achievement of School-Based Agricultural Education Student in Louisiana

Abstract

The purpose of this preexperimental study was to determine the effects of a blended learning environment on school-based agricultural education students' ability to identify 30 species of trees by leaves. Louisiana agriculture teachers were recruited based on district policy regarding whether students could use smartphones for learning in the classroom. The treatment group utilized smartphone technology to aid in the identification of tree species, while the comparison group utilized traditional, printed materials. All students were taught via guided inquiry and engaged in multiple formative assessments during the course of the research study. No statistically significant differences were found between the groups on the posttest tree leaf identification. It is recommended that future research be conducted over a longer duration of time to better measure long-term performance and learning gains. Further, more research should be conducted to determine if motivational differences exist based on utilizing smartphones for learning. Teachers who desire to incorporate the smartphone into blended learning environments can do so without diminishing student achievement.

Introduction and Literature Review

In 2009, United States Secretary of Education, Arne Duncan, addressed members of Congress and called for "applying the advanced technologies used in our daily personal and professional lives to the entire education system to improve student learning" (U.S. Department of Education, 2010, p. v). The device that has been most often used in American personal and professional life is the smartphone. Smartphones have become the leading device for information and communication technology among American teenagers (Pew Research Center, 2017) because in one small device they can talk, text, email, record video, send pictures, check social media, play games, and watch movies (Smith, 2011). Smartphones are so intertwined in our culture that an overwhelming majority of Americans reported their smartphone as being indispensable (Chen & Katz, 2009). With this in mind, it is not surprising that the most current data show that 92% of Americans between the ages of 18 and 29 own a smartphone (Pew Research Center, 2017).

With the rapid development of the technology, some educators feel intimidated to incorporate applications they do not fully understand (Laskin & Avena, 2015). People born after 1980 are designated as digital natives because they have used technology their entire lives, while digital immigrants did not grow up immersed in technology (Laskin & Avena 2015; Prensky, 2001). Digital native college students drove the adoption of smartphones in higher education, convinced that technology improved learning (Gikas & Grant, 2013). Most high school students share the same argument; one exploratory study found 60% of students believed mobile devices influenced their academic success positively (Gikas & Grant, 2013). However, not all students used their phones for learning (McCoy, 2013). Despite the popularity of smartphones, there are often restrictions on their use in secondary education (Laskin & Avena, 2015).

Smartphones are often viewed as a classroom distraction, an opportunity for heinous behavior, or simply a mode of entertainment (Laskin & Avena, 2015). Approximately 69% of school districts in the U.S. ban mobile phones in the classroom (Commonsense Media, 2010), while university policies have typically allowed student use at the instructor's discretion (McCoy, 2013). Research has reported students spend between 20% and 40% of class time on their phones for purposes unrelated to the lesson (Laskin & Avena, 2015; McCoy, 2013). In secondary education, academic dishonesty has been a concern, as 35% of students reported using their phones for cheating (Commonsense, 2010; Thomas & Muñoz, 2016). Unsurprisingly, the typical secondary education administrations' response to mobile devices in the classroom is to ban them (Keengwe, Schnellert, & Jonas, 2014; Laskin,& Avena, 2015). However, O'Bannon and Thomas (2014) found teachers' attitude towards smartphones in the classroom has shifted. As a growing number of digital natives become classroom teachers, the willingness to incorporate smartphones for learning on the rise (O'Bannon & Thomas, 2014). The goal of educators should be to use students' passion towards smartphones to improve learning (Laskin & Avena, 2015).

Despite the popularity of smartphones, studies measuring achievement gains when comparing teaching with smartphones to traditional methods vary (Liu & Huang, 2015; Liu, Scordino, Renata, Navarrete, Yujung, & Lim, 2015; Su & Cheng, 2015). Thomas & Muñoz (2016) conducted a study that identified which popular smartphone technologies were being most utilized by teachers and students. They reported basic applications such as accessing the internet, calculator, clock, and calendar were most often used within the classroom (Thomas & Muñoz, 2016) while only a very small portion of students used more advanced functions of their smartphones for developing 21st century skills such as creating content, posting content online, or recording audio/video (Bennett, Maton, & Kervin, 2008; Ertmer & Otterbein-Leftwich, 2010; Thomas & O'Bannon, 2015). However, research has indicated when more advanced applications of smartphones are applied in teaching and learning, achievement gains are significant (Liu et al., 2015; Su & Cheng, 2015).

The use of advanced technology in agricultural education programs is related to the development of 21st century skills (Ertmer & Otterbein-Leftwich, 2010). Several important studies have described how educational technology has been implemented into secondary agricultural education. One study sampled 203 Louisiana agriculture teachers using the Kotrlik-Redmann Technology Integration Model (Kotrlik, Redmann & Douglas, 2003). Results of the study indicated that agriculture teachers in Louisiana were successfully employing basic technology such as email, but were not fully incorporating more advanced technology into their curriculum. Significant predictors of technology integration were the teachers' belief in their teaching effectiveness, computer anxiety, and teachers' perceived barriers to technology integration. Five years later, a follow-up study by Kotrlik and Redmann (2009) reported that far more technology integration had taken place in Louisiana agriscience programs. Computer anxiety scores among the agriculture teachers collectively had decreased, Internet availability had increased, and perceived barriers were smaller. Williams, Warner, Flowers, and Croom (2014) found that North Carolina secondary agriculture teachers used projectors, laptops, and desktop computer hardware most frequently. The software used most frequently by agriscience teachers were internet browsers, word processors, grading/attendance software, and presentation software (Coley, Warner, Stair, Flowers, & Croom, 2015; Williams et al., 2014;). Notably, more advanced hardware like student response clickers and iPads for teaching and learning were reported as not readily available (Coley et al., 2015; Williams et al., 2014). Similarly, Williams et al., (2014) described student use of multimedia software and technology such as contributing to blogs, using social media, creating movies, art and webcasts were rarely used in the classroom.

Teachers who blend the use of smartphone technology into their classrooms may see gains in student achievement. Blended learning is a general term utilized to describe the simultaneous use of multiple instructional delivery methods to improve learning by satisfying multiple learning styles at once (Lothridge, Fox, & Fynan, 2013). Often blended learning environments are those infused with technology (Francis & Shannon, 2013; Olapiriyakul & Scher, 2006; Lothridge et al., 2013; Vacik, Wolfslehner, Spörk, & Kortschak, 2006; Wasoh, 2016). Blended learning environments can be particularly successful when teachers employ guided inquiry and formative assessment (Kuhlthau, Maniotes & Caspari, 2015; Moskal, Dzuban, & Hartman, 2013). Guided inquiry requires the learner to discover solutions for authentic problems and can help students develop deeper meaning of the content to be learned (Traxler, 2007; Kuhlthau et al., 2015).

Theoretical Framework

The focus on the interaction between learners and technology is often described as being a complex process. The Theory of Learning for the Mobile Age (TLMA) (Sharples, Taylor, & Vavoula, 2007) is based on the notion that learning is a process of acquiring knowledge through communication across continuously shifting contexts (Taylor, Sharples, O'Malley, Vavoula & Waycott, 2006). Further, Sharples et al. (2007) produced the Task Model for Mobile Learners (TMLL) that was modified from Engeström's (2009) expansive activity model. The TMLL divided learning into semiotic and technological activity (Sharples et al., 2007). The semiotic layer represents learner actions moderated by culture, environment, and meaningful signals. This layer represents an abstract domain inside the mind where personal language events such as previous conversations, lectures, and private thoughts are synthesized (Taylor et al., 2006). The technological layer represents a physical domain that has helped explain smartphones as a tool for "creating a human-technology system" that enables learning (Sharples et al., 2007, p. 11). Sharples et al. (2007) insisted that the semiotic and technological layers can be separated to provide a more semiotic or technological model or combined for a more holistic model. The purpose of the theory and model was to move research forward in the investigation of mobile learning (ML) (Sharples et al., 2007).

The TMLL can be used to illustrate cognition through smartphone technologies in a traditional classroom, distance education environment, or an informal learning context (Sharples et al., 2007; see Figure 1). In the triangular TMLL, all factors (i.e., Object, Tool, Subject, Control, Context and Communication) are interconnected, representing the complex relationship and dependency of the factors within the model (Taylor et al., 2007). The intertwined, yet flexible, structure of the model allows technologically enhanced learning experiences of many kinds to be examined (Sharples et al., 2007). An object is the material or problem which learning effected and has often been the dependent variable in experimental designs (Sharples et al., 2007). Tools are determined to be any device that serves the purpose of inquiry, and subjects are learners or technological devices and may be considered one in the same (Sharples et al., 2007). Control of learning may depend on a teacher, be distributed to learners, or may pass between learners and smartphones (Sharples et al., 2007). Context embraced multiple formats including but not limited to (a) classrooms, (b) social media, (c) text messaging, and (d) interpersonal conversation (Sharples et al., 2007). Communication also embraced traditional and technological means of people sending and receiving messages (Sharples et al., 2007).

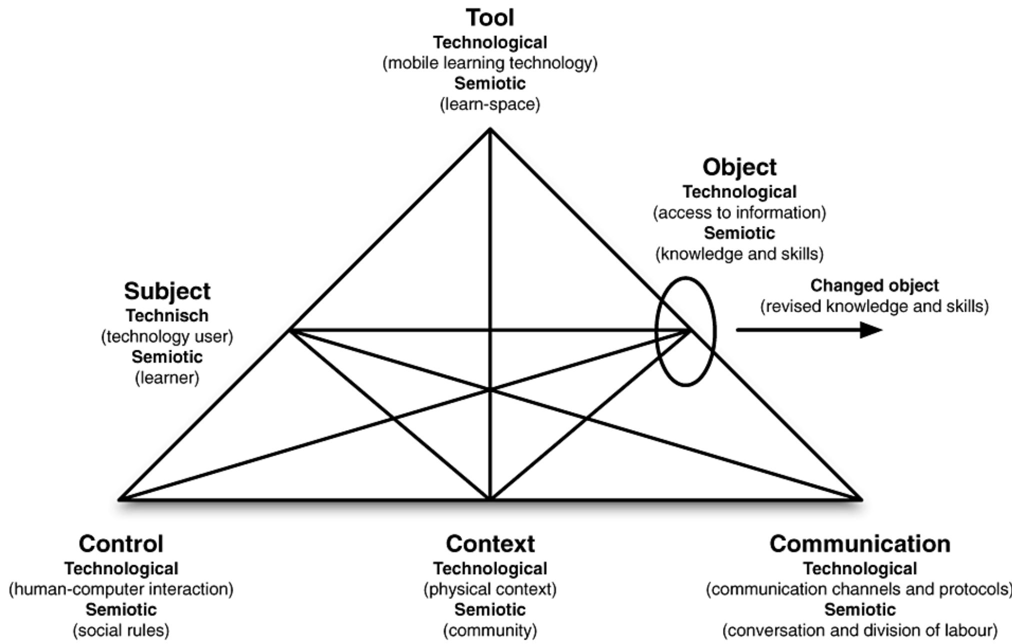

Figure 1. Task Model for Mobile Learners (Sharples et al., 2007).

There is little in the agricultural education literature pertaining to smartphone enhanced learning among secondary agriculture students. No research has focused on the use of smartphone applications in forestry education at the secondary level. Furthermore, little is known about how teaching a forestry curriculum with advanced smartphone tools would affect student achievement in leaf identification. Therefore, the principle question that arose from the literature was what effect does smartphone enhanced teaching have on Louisiana high school agriculture student achievement in a leaf identification unit? This research aligns with the American Association for Agricultural Education's National Research Agenda Research Priority 4: Meaningful, Engaged Learning in All Environments. Specifically, this study helps to provide answers to Research Priority Question One: "How do digital technologies impact learning in face-to-face and online learning environments?" (Edgar, Retallick, & Jones, 2016, p.39).

Purpose and Objectives

The purpose of this study was to compare the achievement of students in a forestry curriculum based on learning through smartphone technology or traditional, printed materials. The following research questions guided the study:

1. What are the personal and educational characteristics of students enrolled in agriculture courses offering a forestry curriculum in Louisiana?
2. What difference existed in posttest leaf ID scores between students learning through smartphone technology and students learning through printed materials?

The following null hypothesis guided the statistical analysis of the study:

1. There were no statistically significant differences in leaf ID posttest scores between students learning through smartphones and students learning through printed materials.

Methods and Procedures

Research Design

A preexperimental design utilizing nonequivalent comparison groups was employed for this study (Campbell & Stanley, 1963; Shadish, Cook, & Campbell, 2002). Agriculture teachers were recruited for this study based on whether or not their school district allowed smartphones to be utilized for learning in the classroom. In all, seven teachers were assigned to the treatment group and completed all parts of the study fully. A total of six teachers were in the comparison and completed all parts of the study. Overall, the treatment group was comprised of n=128 students and n=135 students were in the comparison group. These students were enrolled in either Agriscience I or Agriscience II, the two courses in Louisiana where introduction to forestry is commonly taught. Table 1 lists student personal characteristics. Overall, most students were male (73.4%), 15 & 16 years old (60.5%), and White/Caucasian (71.5%). Regarding high school classification, seniors (9.1%) made up the smallest portion of the sample.

Table 1

Personal Characteristics of Louisiana Students Enrolled in Secondary Agriculture Classes Offering a Forestry Curriculum in the Fall of 2016 (n = 263)

Variable		*f*	%
Gender			
	Male	193	73.4
	Female	70	26.6
Age			
	13	10	3.8
	14	37	14.1
	15	77	29.3
	16	82	31.2
	17	44	16.7
	18	12	4.6
	19	1	0.4
Ethnicity			
	Caucasian	188	71.5
	African-American	51	19.5
	Asian	3	1.1
	American Indian	3	1.1
	Hispanic	9	3.4
	Other	9	3.4

Random sampling and random assignment were not feasible due to the small number of school districts that allowed smartphones for learning in the classroom. Smith, Stair, Blackburn, and Easley (2018) reported that roughly 30% of districts in Louisiana allowed smartphones for learning in the classroom. Due to the inability to employ randomization, pretreatment equivalence was not assumed. However, a pretest was administered to the students prior to any instruction in leaf identification and no statistically significant differences were found between the treatment (M = 16.48) and comparison (M = 17.01) groups on the 30-item pretest.

Participant Recruitment and Training

Agriculture teachers were invited to participate in the treatment group if they met the following criteria: (a) volunteer to participate; (b) taught high school level courses; (c) taught 50 minute periods, and (d) taught in a district that allowed the use of smartphones for learning. Teachers in the comparison group also met these criteria, minus the district permitting smartphones for learning. Initially, 16 teachers were identified for the treatment group and 14 for the comparisons group. These 30 teachers were invited to attend a professional development workshop during the 2016 Louisiana agriculture teachers' summer conference and 22 attended.

The focus of the workshop was basic leaf identification (i.e., leaf parts, leaf arrangements on a stem, leaf margins, and leaf types) for all teachers. The teachers were then separated by treatment group (n=10) and comparison group (n=12) to learn how to utilize leaf identification resources. The treatment group teachers were instructed on utilizing smartphone applications (e.g., LeafSnap and V-tree) to teach leaf identification and to identify the 30 tree species chosen for this study. This group was also taught how to utilize Quizlet® to formatively assess student learning. The comparison group teachers were taught how to utilize printed resources to teach leaf identification as well as to identify the 30 tree species utilized in the study. This group was provided paper-based flash cards to formatively assess student learning The groups were then brought back together and taught how to employ Test Generator (TG) Web© to assess their students' leaf identification knowledge for the purposes of the pretest and post-test.

A second workshop was scheduled for the late summer of 2016 on the campus of Louisiana University. However, this workshop was cancelled due to [natural disaster] effecting a large portion of Louisiana. To replace this workshop, small group and individual training sessions were scheduled at each teacher's convenience. The focus of this training session was (a) how to follow the study protocol, (b) use of the smartphone applications (treatment group) or printed materials (comparison group) to identify the 30 leaf samples utilized in the study, and (c) employing guided inquiry. In all, teachers received between two and three hours of professional development. At the end of the individual training sessions each teacher was provided a binder that outlined procedures for each day of the study. To ensure fidelity of the treatment, teachers completed daily logs located in the binder and returned them to the researcher.

Data Collection

Data collection for this study began on September 19, 2016 and was completed on September 27, 2016, encompassing seven instructional days. Table 2 outlines procedures utilized by both the treatment and comparison group teachers. Students in the treatment group utilized smartphone applications to identify tree species and engaged in formative assessments via Quizlet. Comparison group students utilized printed resources (i.e., field guides) to identify tree species and were formatively assessed using paper flash cards.

Table 2
Instructional Procedures Utilized by the Treatment and Comparison Groups

Instructional Day	Specific Tasks Completed
1	Pre-test of tree leaf identification; download applications
2	Lesson on the Importance of Forestry and Leaf Identification Terminology
3	Identification of tree leaf samples; formative assessment

4	Identification of tree leaf samples; formative assessment
5	Identification of tree leaf samples; formative assessment
6	Identification of tree leaf samples; formative assessment
7	Post-Test of tree leaf identification

Note. Treatment group utilized smartphone applications while comparison group utilized printed resources to aid in the identification of tree species

Instrumentation

The instrument used to collect leaf identification data for this study consisted of a criterion-referenced pretest and posttest delivered electronically with TG Web testing software donated by Fain and Company®. Both the pretest and posttest consisted of 30 items–15 multiple choice questions, 10 fill in the blank questions, and five true/false questions. TG Web provided the students with a picture of a leaf in a pop-up window. The student then closed the window and answered the identification question that followed. The student could recall the photo at any time during the question attempt as well as scroll back and forth through the questions. The 30 leaf samples resting on solid backgrounds were photographed by the researcher and uploaded into TG Web®. The authentic photos were chosen by the researcher based on experience in the subject of tree identification. Furthermore, the 30 species were chosen because they could be found in all of the learning materials given to each group of student participants in the study. A panel of three tree identification experts, consisting of two secondary agriculture instructors and an assistant professor of Forestry Extension and Natural Resources at Louisiana State University, reviewed the exam for content validity. All photos chosen for the instrument were deemed to be of high quality, distinguishable, and correct in species identification.

There are eight reliability components that should be addressed by those who create criterion-referenced examinations (Wiersma & Jurs, 1990). These components include (a) homogenous items, (b) discriminating items, (c) quantity of items, (d) high quality test, (e) clear directions, (f) controlled environment, (g) participant motivation, and (h) scorer directions. These items were carefully considered when the researcher created the 30-item criterion referenced test. To ensure fidelity of the treatment, binders were created for both teacher groups that detailed step-by-step instructions for each instructional period. The binders contained a lesson plan and daily agenda that teachers were to check off as they progressed through the lessons. Also included in the agenda was a notes section where teachers could document any major changes or disruptions experienced during the instructional periods. These daily agendas and notes sections were mailed back to the researcher upon completion of the lessons. To ensure students received the same amount of instruction, there was a testing window created for the posttest that allowed students who missed instructional days due to illness, sports, or other excused absences to take the posttest upon completion of five days of instruction.

Data Analysis

The research question asked if differences existed in pretest and posttest leaf identification scores between students who learned with smartphones and students who learned with printed materials. The treatment and comparison groups comprised a nested data set, therefore could not be considered statistically independent (Raudenbush & Byrk, 1986; 2002). Therefore, a two-level hierarchical linear model (HLM) with fixed effects was employed. This statistical method has advantages over tests that assume independence of groups because it accounts for variance in the dependent variable (DV) by students across the school level. However, not all nested data sets warrant HLM (Peugh, 2010). An intraclass correlation coefficient (ICC) was calculated to ensure HLM was the proper statistical procedure. Essentially, ICC is an effect size calculation similar to R^2 for regression and eta-squared for ANOVA (Peugh, 2010) that helped determine if sufficient variance existed across students within schools to warrant HLM (McGraw & Wong, 1996). ICC calculated for this data was 9.4%, indicating sufficient variance existed to warrant the use of HLM (Muthén, 1994; Raudenbush & Bryk, 2002; Peugh, 2010). The independent variable (IV) in the model that predicted achievement was group (i.e., treatment or comparison). The DV was posttest score on the leaf identification test. The covariate was the pretest (centered). Grand mean centering is most often preferred when models will involve level one and level two predictors (Peugh, 2010; Wu & Wooldridge, 2005). Centering scores means rescaling them in a way that a researcher can determine if a relationship existed between the predictor and the outcome based on school level factors (Peugh, 2010; Wu, & Wooldridge, 2005). Therefore, grand mean centering was performed on the covariate in SPSS by subtracting the individual students pretest score from the sample mean.

An ICC calculation that equals zero implies no variation in posttest scores exists across schools, and that all variation exists between students. If this were the case, then traditional techniques like ANOVA are warranted. However, as ICC increased, statistical evidence supported the variation of scores occur across schools and the assumption of independence is violated. In order to determine the ICC for the DV, an unconditional model (i.e., one-way random effects ANOVA) was utilized (Castro, 2002). An unconditional model for posttest by school was calculated using the mixed model command in SPSS (Peugh & Enders, 2005). Schools accounted for 9.4% of the variance in posttest scores. After calculating the ICC from the unconditional model, the HLM technique had three steps. The first step produced the level one model that measured student differences in achievement between groups as a function of school. The second step produced the full model that measured group level outcomes on achievement as a function of school while controlling for prior knowledge. The third step utilized likelihood ratio testing to determine if adding a school level variable improved the model. This model building process was necessary to determine if adding school level effects improved the model. Most importantly, step two (full model) specifically addressed research question number two.

Findings

The research question of this study sought to determine if differences existed in achievement between students who learned with smartphones and those who learned with printed materials. A 30-item pretest was employed to assess prior knowledge and used as a covariate (centered) in the HLM analysis. The same 30 items constituted the posttest and were used to measure achievement differences. The final analysis conducted consisted of a treatment group and a comparison group that completed the pretest, the learning interventions, and the posttest. The pretest and posttest consisted of 30 items and scores ranged from 0–100%. Pretest mean for the treatment group was 16.5% (SD = 8.29). Pretest mean for the comparison group was 17.0% (SD = 6.05). Therefore, groups had equivalent prior knowledge before the intervention. The posttest mean for the treatment group (n = 128) was 46.0% (SD = 19.6) and the posttest mean for the comparison (n = 135) was 42.8% (SD = 20.7).

Achievement Level One Model

The level one predictor for Achievement was the grouping variable (i.e. treatment or comparison). The intercept in this model is based on fixed effects and is the treatment group mean (M = 46.0). No statistically significant difference (p > .05) was found in Achievement between the treatment and comparison group at level one (γ_{00} = -3.26, SE = 2.48, t = –1.31, df = 263, F = 1.73 and p = .190) (see Table 3).

Table 3

Level One Model for Achievement Between Treatment and Comparison Group After Accounting for Individual Student Differences as a Function of School

Fixed effects	Coefficient (*SE*)	*t* (*df*)	*F (p)*
Level one model			
Intercept ($_{1j}$ mean)	46.0 (1.78)	25.9 (263)	1281.3 (.000)
Group ($_{0j}$) variance nested in school (γ_{00})	–3.26 (2.48)	(–1.31) (263)	1.73 (.190)

Note: Deviance (maximum likelihood) X^2 = 2325.1; 3 estimated parameters.

Achievement Full Model

The full model analyzed achievement between groups as a function of school while controlling for prior knowledge. Prior knowledge is controlled for in the full model by adding a centered covariate (i.e., pretest). The new intercept estimate (45.8) is the mean for the treatment group adjusted for individual differences by school. There was no statistically significant difference (p > .05) in Achievement (γ_{00} = .56, SE = .35, t = 1.62, df = 262, F = 2.63 and p = .106) between the treatment and comparison groups nested in schools. Therefore, the null hypothesis was not rejected (see Table 4). The critical value for X^2 (df = 3) was 11.34 (p < .01). The -2LL ratio test between the level 1 and full models yielded a statistically significant difference (p < .01) when the variance due to group is confounded with the variance due to school (X^2 = 22.1, df = 3 p < .01). This result revealed the full model improved accuracy for the level 1 model to detect effects. The full model accounted for school level and individual student level differences in all posttest scores while controlling for prior knowledge.

Table 4

Full model for Achievement Between Treatment and Comparison Group as a Function of School While Controlling for Prior Knowledge

Fixed effects	Coefficient (*SE*)	*t* (*df*)	*F (p)*
Full model			
Intercept (adjusted β_{1j} mean)[a]	45.8 (2.89)	15.8 (14.3)	446.9 (.000)
Grouping ($_{0j}$) variance nested in school (γ_{00})	–3.68 (4.16)	–.844 (13.2)	.782 (.392)
Group * Pretest (β_{0j})	.56 (.35)	1.62 (262)	2.63 (.106)

Note: Deviance (maximum likelihood) X^2 = 2303.0; six estimated parameters.
fixed effects = group (IV) and random effects = school (subject)

Conclusions and Implications

There were no statistically significant differences in leaf identification ability between students who utilized smartphones and those who learned through the use of printed materials. As such, the researchers failed to reject the null hypothesis. This finding refutes research that suggests when students use more advanced functions on their phones for learning, achievement gains are noticeable (Bennett et al., 2008; Liu & Huang, 2015; Liu et al., 2015; Su & Cheng, 2015; Thomas & Muñoz, 2016). Furthermore, this finding is inconsistent with research that suggests formative assessment executed on mobile platforms increases knowledge gains (Aldon & Dempsey, 2016; Buchanon, 2000; Lu, 2008; Sly, 1999; Wang, 2007). However, results from this study did support the notion that smartphones are not superior to traditional materials for learning in a student-centered approach (Traxler, 2007; Vacik et al., 2006; Yuping, Xibin, & Juan, 2015). This study supports the Theory of Learning for the Mobile Age (TLMA) which suggested that all cognitive factors are interconnected (Sharples et al., 2007), and consequently neglecting some factors (i.e. Communication, & Control) may have negative effects on other factors.

The results of this study indicate using smartphones in the context of tree identification does not affect achievement. However, posttest scores for the treatment group were nearly four points higher than the comparison group. It may be that the short nature of this study's intervention (e.g., one week) was not long enough to produce statistically significant differences. Perhaps more time spent utilizing technology to identify tree species would have increased the score difference between groups. It could also be possible that instructional time was lost due to the treatment group spending the first day of the study downloading and becoming familiar with the applications. Treatment group students were able to take formative tests 24 hours a day on their phones while the comparison group was limited to formative quizzes during class. It was not clear if the treatment group accessed the tests outside of class time, but this could have been a factor in student achievement. It is also possible that while the treatment group employed advanced smartphone functions (Liu et al., 2015; Thomas & Muñoz, 2016) the problems and tasks were not meaningful enough to spark student interest and inspire them to inquire deeper understanding (Kuhlthau et al., 2015; Leslie, 2014; Padeste et al., 2015;). Perhaps, as in previous research, the students needed more interaction and communication with one another through their mobile devices to solidify learning (Thomas & Muñoz, 2016; Su & Cheng 2015).

Students in both groups engaged in formative assessments that were designed to provide as many repetitions of identifying the leaf samples as possible. The only difference in the assessment was paper index cards with names printed on them for the comparison group versus the touch screen of a smartphone for the treatment group. Increased student interaction thought the development of their own electronic study materials could possibly have lead to higher achievement in the experimental group (Hwang & Chang, 2011; Jiao, 2015). Lastly, the teachers were facilitators of the groups but were not tree identification experts. The recruitment process for this study eliminated teachers who were experts at teaching tree identification. It is possible, that the previous educational experiences of the treatment group students had not adequately prepared them for a student-centered classroom approach that focused on self-directed learning more than teaching (Kuhlthau et al., 2015).

Recommendations

Through this research, several questions emerged regarding the methods of teaching and if the time spent on learning tree identification could have possibly contributed to smaller learning gains. It is recommended that future research should utilize a longer duration of smartphone use spread across multiple technical agriculture fields to determine if the utilization of smartphones can enhance learning in long-term studies. A delayed posttest should also be administered to determine if one group retained leaf identification knowledge better than the other. Further, this study only focused on educational post-test gains. Future studies should determine if student motivation differs between groups who utilize instructional technology versus traditional materials. This research study, as analyzed through the Theory of Learning for the Mobile Age (TLMA) focused more abundantly on the interaction between Objects, Tools, Subjects, and Technology (Sharples et al., 2007) and less on the factors Communication, Context, and Control. Sharples et al. (2007). The framework suggest that all of the factors are interconnected. This study however, operated in the technology layer, not the more abstract domain of the semiotic layer that attempts to understand metacognition in mobile learning research. Therefore, future studies in agricultural education that employ mobile learning should investigate the interconnected factors and the more abstract constructs of the semiotic layer offered by TLMA.

Additional research should focus on the ubiquitous nature of smartphones in the context of agricultural education to determine if students spent time outside of class learning on their own and how this affects achievement. The foremost challenge in information age schools is to prepare students to thrive in a technologically saturated environment (Kuhlthau et al., 2015). Future research in agricultural education should go beyond foundational knowledge achievement and incorporate smartphone applications used for 21st century skills such as creating electronic portfolios or posting demonstration videos online. Student collaboration was encouraged by the researcher, but was not required nor measured in this study. In the future, a mobile collaborative element needs to be added to the research design that encourages students to discuss what is being taught outside of the formal classroom and how that collaboration may result in other educational gains.

This research indicated that the use of smartphones for learning did not diminish student achievement. Therefore, agricultural educators can implement smartphones in their teaching (as policy permits) with confidence that learning should not be impeded. Teacher educators should consider adding student-centered smartphone applications into methods coursework. Modern students in America are digital natives who prefer a student-centered approach to self-directed learning that incorporates current technology. Though millennial students may be perceived as superior to some of their teachers in terms of technological savvy, they still adopt their teachers' attitudes and mimic their actions (Thomas & Muñoz, 2016). Most teachers prefer to learn from others who have already mastered the nuances of an innovation (Rogers, 2003). The same holds true for agricultural educators and smartphone applications. Educational leaders should be strategic in creating opportunities for agricultural educators to learn about smartphone applications from one another. Communities of best practices for agricultural teachers in Louisiana could be implemented at events that provide large gatherings of agricultural teachers. These events include FFA career development events, leadership camps, Louisiana Agriscience Teachers Association conference, State FFA convention, and National FFA convention.

References

Aldon, G., & Dempsey, M. (2016). Role of technology in promoting formative assessment practices in science classes. In *International Conference: New Perspectives in Science Education* (pp. 376–380). Pixel Libreria Universitaria.

Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. *British Journal of Educational Technology, 39*(5), 775–786. doi: 10.1111/j.1467-8535.2007.00793

Buchanan, T. (2000). The efficacy of a world-wide web mediated formative assessment. *Journal of Computer Assisted Learning, 16*, 193–200. doi: 10.1046/j.1365-2729.2000.00132.x

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental design for research.* Chicago, IL: Rand McNally & Company.

Castro, S. (2002). Data analytic methods for the analysis of multilevel questions: A comparison of intraclass correlation coefficients, $r_{wg(j)}$, hierarchical linear modeling, within- and between-analysis, and random group resampling. *The Leadership Quarterly, 13*(1), 69–93. doi: 10.1016/S1048-9843(01)00105-9

Chen, Y., & Katz, J. E. (2009). Extending family to school life: College students' use of the mobile phone. *International Journal of Human Computer Studies, 67*(2), 179–191. doi: 10.1016/j.ijhcs.2008.09.002

Coley, M. D., Warner, W. J., Stair, K. S., Flowers, J. L., & Croom, D.B. (2015) Technology usage of Tennessee agriculture teachers. *Journal of Agricultural Education 56*(3), 35–51. doi: 10.5032/jae.2015.03035

CommonSense Media. (2010). *Hi-tech cheating: Mobile phones and cheating in schools: A national poll.* Retrieved from https://www.commonsensemedia.org/blog/cheating-goes-hi-tech

Edgar, D. W., Retallick, M. S., & Jones, D. (2016). Research priority 4: Meaningful, engaged learning in all environments. In T. Roberts, A. Harder, & M. Brashears (Eds.), *American Association for Agricultural Education National Research Agenda* (pp. 37–40). Retrieved from http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf

Engeström, Y. (2009). The future of activity theory: A rough draft. In A. Sannino, H. Daniels, & K. D. Gutiérrez (Eds.), *Learning and expanding with activity theory* (pp. 303–328). Cambridge, UK: Cambridge University Press.

Ertmer, P. A., & Orrenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research and Technology in Education*, *42*(3), 255-284. doi: 10.1080/15391523.10782551

Francis, R., & Shannon, S. J. (2013). Engaging with blended learning to improve students' learning outcomes. *European Journal of Engineering Education*, *38*(4), 359–369. doi:10.1080/03043797.2013.766679

Gikas, J., & Grant, M. M. (2013). Mobile computing devises in higher education: Student perspectives on learning with cellphones, smartphones & social media. *Internet and Higher Education, 19,* 18–26. doi: 10.1016/j.iheduc.2013.06.002

Hwang, G., & Chang, H. (2011). A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students. *Computers & Education, 56*(4), 1023–1031. doi: 10.1016/j.compedu.2010.12

Jiao, H. (2015). Enhancing students' engagement in learning through a formative e-assessment tool that motivates students to take action on feedback. *Australasian Journal of Engineering Education, 20*(1), 9–18. doi:10.7158/D13-002.2015.20.1

Keengwe, J., Schnellert, G., & Jonas, D. (2014). Mobile phones in education: Challenges and opportunities for learning. *Education and Information Technologies*, *19*(2), 441–450. doi: 10.1007/s10639-012-9235-7

Kotrlik, J. K., & Redmann, D. H. (2009). A trend study: Technology adoption in the teaching-learning process by secondary agriscience teachers-2002 and 2007. *Journal of Agricultural Education, 50*(2), 62–74. doi: 10.5032/jae.2009.02062

Kotrlik, J. K., Redmann, D. H., & Douglas, B. B. (2003). Technology integration by agriscience teachers in the teaching/learning process. *Journal of Agricultural Education 44*(3), 78–90. doi: 10.5032/jae.2003.03078

Kuhlthau, C., Maniotes, L., & Caspari, A. (2015). *Guided inquiry: Learning in the 21st Century*. Westport, CT: Libraries Unlimited, Inc.

Laskin, A. V., & Avena, J. (2015). Introduction of mobile media into formal classroom learning environments. *Journalism & Mass Communication Educator, 70*(3), 276–285. doi:10.1177/1077695815601170

Leslie, I. (2014). *Curious: The desire to know and why your future depends on it*. New York, NY: Basic Books.

Liu, M. C., & Huang, Y. M. (2015). Collaborative experience sharing with the support of M-Learning 2.0: A fundamental framework, a case study and research issues. *International Journal of Mobile Learning and Organisation, 9*(1), 21–37. doi: 10.1504/ijmlo.2015.069711

Liu, M., Scordino, R., Renata, G., Navarrete, C., Yujung, K., & Lim, M. (2015). A look at research on mobile learning in K-12 education from 2007 to the present. *Journal of Research on Technology in Education*, *46*(4), 325–372. doi: 10.1080/15391523.2014.925681

Lothridge, K., Fox, J., & Fynan, E. (2013). Blended learning: Efficient, timely and cost effective. *Australian Journal of Forensic Sciences*, *45*(4), 407–416. doi:10.1080/00450618.2013.767375

Lu, M. (2008). Effectiveness of vocabulary learning via mobile phone. *Journal of Computer Assisted Learning*, *24*(6), 515–525. doi:10.1111/j.1365-2729.2008.00289.x

McCoy, B. (2013). Digital distractions in the classroom: Student classroom use of digital devices for non-class related purposes. *Journal of Media Education*, *4*(4), 5–14. Retrieved from http://digitalcommons.unl.edu/journalismfacpub/71/

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods*, *1*(1), 30–34. doi: 10.1037/1082-989x.1.1.30

Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *Internet and Higher Education*, *18*, 15–23. doi: 10.1016/j.iheduc.20.12.12.001

Muthén, B. O. (1994). Multilevel covariance structure analysis. *Sociological Methods and Research, 22*(3), 376–398. doi: 10.1177/0049124190022003006

O'Bannon, B. W., & Thomas, K. (2014). Teacher perceptions of using mobile phones in the classroom: Age matters! *Computers & Education, 74*, 15–25. doi:10.1016/jcompedu.2014.01.006

Olapiriyakul, K., & Scher, J. M. (2006). A guide to establishing hybrid learning courses: Employing information technology to create a new learning experience, and a case study. *Internet & Higher Education*, *9*(4), 287–301. doi:10.1016/j.iheduc.2006.08.001

Pedaste, M., Mäeots, M., Siiman, L. A., de Jong, T., van Riesen, S. A. N, Kamp, E. T., Constantinos, C. M., Sacharaia, Z. C. & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review, 14*, 47–61. doi: 10.1016/j.edurev.2015.02.003

Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology, 48*(1), 85–112. doi:10.1016/j.jsp.2009.09.002

Peugh, J. L., & Enders, C. K. (2005). Using the SPSS mixed procedure to fit cross-sectional and longitudinal multilevel models. *Educational and Psychological Measurement*, *65*(5), 717–741. doi: 10.1177/0013164405278558

Pew Research Center. (2017). *Who owns cell phones and smartphones?* Washington, DC. Retrieved from http://www.pewinternet.org/chart/who-owns-cellphones-and-smartphones/

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon 9*(5), 1–6. doi: 10.1108/10748120110424816

Raudenbush, S., & Bryk, A. A. (1986). A hierarchical model for studying school effects. *Sociology of Education*, *59*(1), 1–17. doi: 10.2307/2112482

Raudenbush, S., & Bryk, A. (2002). *Hierarchical linear models: Applications and data analysis methods*. Chicago, IL: Sage Publications Ltd.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton, Mifflin and Company.

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In R. Andrews & C. Haythornthwaite (Eds.), *The SAGE handbook of e-learning research* (pp. 221–247). London: Sage Publications Ltd.

Sly, L. (1999). Practice tests as formative assessment improve student performance on computer-managed learning assessments. *Assessment and Evaluation in Higher Education*, *24*(3), 339–343. Retrieved from: http://srhe.tandfonline.com/doi/abs/10.1080/0260293990240307

Smith, A. (2011). *Americans and their cell phones*. Retrieved from http://pewinternet.org/Reports/2011/Cell-Phones.aspx

Smith, H. E., Stair, K. S., **Blackburn, J. J.**, & Easley, M. (2018). Is there an app for that? Describing smartphone availability and educational technology adoption level of Louisiana school-based agricultural educators. *Journal of Agricultural Education*, *59*(1), 238–254. doi: 10.5032/jae.2018.10238

Su, C., & Cheng, C. (2015). A mobile gamification learning system for improving the learning motivation and achievements. *Journal of Computer Assisted Learning*, *31*(3), 268–286. doi:10.1111/jcal.12088

Taylor, J. Sharples, M., O'Malley, C., Vavoula, G., & Waycott, J. (2006). Towards a task model for mobile learning: A dialectical approach. *International Journal of Learning Technology, 2*(2-3), 138–158. doi: 10.1504/ijlt.2006.010616

Thomas, K., & Muñoz, M. A. (2016). Hold the phone! High school students' perceptions of mobile phone integration in the classroom. *American Secondary Education*, *44*(3), 19–37. Retrieved from http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?sid=bf89607f-cfa8-4db4-8dc6-2f894d47e42f%40sessionmgr120&vid=2&hid=114

Thomas, K., & O'Bannon, B. (2015). Looking across the new digital divide: A comparison of inservice and preservice teacher perceptions of mobile phone integration. *Journal of Technology and Teacher Education*, *23*(4), 561–581. Retrieved from http://www.learntechlib.org/p/149026

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having written. *International Review of Research in Open and Distance Learning, 8*(2). doi: 10.19173/irrodl.v8i2.346

U.S. Department of Education. (2010) *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: USDE Office of

Planning, Evaluation and Policy Development. Retrieved from http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Vacik, H., Wolfslehner, B., Spörk, J., & Kortschak, E. (2006). The use of COCOON in teaching silviculture. *Computers & Education*, *47*(3), 245–259. doi:10.1016/j.compedu.2004.10.009

Wang, T. H. (2007). What strategies are effective for formative assessment in an e-learning environment? *Journal of Computer Assisted Learning*, *23*, 171–186. doi**:** 10.1111/j.1365-2729.2006.00211.x

Wasoh, F. (2016). Exploring the roles of blended learning as an approach to improve teaching and learning English. *Proceedings of the Multidisciplinary Academic Conference*, 165–171.

Wiersma, W., & Jurs, S. G. (1990). *Educational measurement and testing.* Needham Heights, MA: Allyn and Bacon

Williams, M. R., Warner, W. J., Flowers, J. L., & Croom, D. B. (2014). Accessibility and usage of technology by North Carolina agriculture teachers. *Journal of Agricultural Education* (55)4, 191–205. doi: 10.5032/jae.2014.04191

Wu, Y. W. B., & Wooldridge, P. J. (2005). The impact of centering first-level predictors on individual and contextual effects in multilevel data analysis. *Nursing Research, 54*(3), 212–216. doi: 10.1097/00006199-200505000-00009

Yuping, W., Xibin, H., & Juan, Y. (2015). Revisiting the blended learning literature: Using a complex adaptive systems framework. *Journal of Educational Technology & Society, 18*(2), 380–393.

Assessing the Effects of the Smartphone as a Learning Tool on the Academic Achievement of School-based Agricultural Education Student in Louisiana

Discussant
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As technology has continued to evolve and schools have not embraced the potential impact on education, it is our duty to gather evidence of impact. In the history of education, the smartphone is relatively young, but has quickly become an issue. To use or to ban? The authors developed a strong literature review and theoretical framework, with a couple of minor issues. As most of the literature is about the inclusion of smartphones in the classroom I was surprised to see a 2003 article cited about technology use in schools. This was surprising because the first iPhone was introduced in 2004. While I am confident that the authors were trying to show how technology inclusion in classrooms changed quickly, it seemed to imply that smartphones had not been adopted in 2003, which is correct because they were not widely used. The other issue that jumped out was in the theoretical framework. It was stated that Shaples produced the Task Model for Mobile Learners from Engeström, unfortunately the Shaples et. al article predated the Engeström article that was cited. I am confident that both of these were minor mistakes, I know that they do not take away from the quality of the research.

The methodology is complex, especially regarding the data analysis. I commend the authors for trying to bring analyses to our profession that are often overlooked or avoided. They did a very good job of educating the reader of the processes and considerations. The one piece of information I would have appreciated was related to having three models. The authors did a nice job of walking us through the three models. However, when the ratio was found to be statistically significant, that was never properly explained in the resulting discussion. Being new to this type of analysis, I would have appreciated more explanation of that process.

The conclusions, implications, and recommendations represented the findings. The authors did not stretch the data further than it could go. They do a very good job of identifying potential confounding variables. Many of the potential variables are used in potential explanations and some are identified in recommendations for further research. Additionally, many of the potential variables will be difficult to control and/or measure, but the foundation of this study will help future studies build this body of knowledge. As more and more schools are turning to one-to-one technology, it would also be prudent to not just focus on personal technology, but larger devices supplied by the school system.

Discussant – Donna Westfall-Rudd; Timekeeper - Tyler D'Angelo

Agricultural Communications
Eat this because: An evaluation of persuasion strategies used in commodity magazine advertising *Cassandra Dietrich, Dr. Annie Specht, Dr. Emily Buck*
Exploring the impact of Ohio agricultural organizations' social media use on traditional media coverage of agriculture *Leigha Haller, Dr. Annie Specht, Dr. Emily Buck*
Taking Pulse: Consumers' Attitudes Toward Agriculture and Information Sources *Cassaundra Dietrich, Dr. Emily Buck, Dr. Annie Specht*
Examining Rural Community Planning: A Community Viability Indicator (CVI) Model *Sarah Bush, Dr. Rick Rudd*

Eat this because: An evaluation of persuasion strategies used in commodity magazine advertising

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Emily B. Buck, The Ohio State University

Abstract

As consumers look for more transparency in food production and farmers call for commodity groups to help share that message, there is a need to understand how current commodity advertising helps bridge this gap. Food and lifestyle magazines are as popular as ever and an ideal place for advertisers to spend marketing dollars to reach very targeted audiences. According to the Elaboration Likelihood Mode, following a peripheral route in advertising is not as effective in long-term purchasing and consumer awareness. This content analysis of top food magazines analyzed all commodity advertisements for their marketing approaches and use of transparency. Of the 167 advertisements in 15 magazines titles, zero incorporated information about producers, production methods, or processing. While some (43.1%) did include attribute information, it was usually vague and nutrition-related. Such information is already readily available on food product labels; therefore, it is unlikely to increase the consumer's awareness of food production and processing methods. In addition, nearly all of the advertisements employed the peripheral route of persuasion. Future commodity promotions programs need to consider employing more centrally persuasive advertising in their campaigns to ensure consumer loyalty and drive purchases.

Introduction

Today, consumers live in a world where advertisers seem determined to fill every blank space available. From sides of buildings to city buses, consumers are confronted by advertising every time they look up. In 2007, Yankelovich, a market research firm, estimated that a person living in a city viewed up to 5,000 ad messages per day, more than double the 2,000 ad messages viewed per day 30 years ago (Story, 2007). Reaching this many people is not a cheap endeavor for advertisers: Spending on paid media in the U.S. was predicted to reach $205 billion in 2017 (eMarketer, 2017) and is expected to increase over the next few years. Of the more than $100 billion spent on advertising, tens of billions are spent promoting the one product category every consumer is guaranteed to purchase on a routine and consistent basis: food. According to Texas A&M marketing professor James McNeal, advertising and marketing expenditures directed at children alone totaled at least $15 billion in 2002 (Salinsky, 2006). While this figure does not include any marketing to consumers over the age of 18, it demonstrates the magnitude of food advertising. Like other products, food ads can be found around every corner.

In the food industry, two types of advertising are utilized to persuade consumers to purchase products: brand and generic. Brand advertising consists of marketing and promotional campaigns paid for and produced by private-label corporations and businesses, such as Kraft, Kellogg, and Tyson. Brand advertising is intended to increase the market share of a firm through product differentiation (Kaiser and Liu, 1998). Generic advertising, on the other hand, includes the marketing of a product without differentiation. Such advertising avoids references to a specific producer, brand name, or manufacturer. In the area of agriculture, generic paid advertising is the most common promotional tool. Because "individual producers of homogeneous agricultural commodities cannot easily convince consumers to choose one egg or orange or a single cut of beef over another, they join together in commodity promotion programs to use generic advertising to expand total demand for the commodity, thereby helping their own sales as well" (Morrison, 1984, p. 1). Funding for commodity promotion programs, also known as checkoffs, comes from mandatory assessments collected from commodity suppliers (Sabet, 2010). Assessments are typically based on a unit and are usually calculated to be approximately one-percent of the value of the commodity unit (Sabet, 2010). In agriculture, these assessments are commonly called "checkoff dollars." Currently, 22 checkoff programs are authorized at the national level in the United States. Additional assessment programs are authorized exclusively by state law, such as the Ohio Corn Marketing Program and the Ohio Beef Council. Popular checkoff-funded promotions include the "Beef, It's What's for Dinner" and "Got Milk?" campaigns (Varian, 2006). Such advertising is intended to expand both domestic and export demand and induce consumer loyalty by focusing on the intrinsic values of the product.

A number of research studies have evaluated whether advertising collectively benefits an organization. A study of brand and generic advertising found that a market utilizing both types of advertising is most effective in increasing demand and sales (Carey and Bolton, 1996). The researchers used Lancaster's characteristics model of consumer theory to show that an advertising choice combining brand and generic advertising is most useful because generic advertising can effectively induce a consumer to purchase a product when brand advertising lacks information about a product's characteristics (Carey and Bolton, 1996). These study results demonstrate that consumers use generic commodity advertising as a resource for attribute information regarding commodity products; therefore, it is useful to evaluate how generic commodity advertising characterizes food products, food production, and consumption. We may also gain insight by investigating how generic commodity advertising incorporates transparency in campaigns, as consumers conflate transparent food production methods with a quality, trustworthy product (Center for Food Integrity, 2015a).

As concerns rise about the conventional food system, consumers desire more information about their food, evident by shoppers' careful evaluation of labels at the supermarket and cautious consideration of how food products are raised and harvested. According to market researcher and consumer strategist Gabe Trionfi (2009), consumers want transparency more than ever. "They want to know where their food ingredients originated. Are they natural? And by the way, what does 'natural' actually mean? They want to know about everything, from Energy Star ratings to the plastic used to make their children's toys and the backgrounds of their elected officials" (Trionfi, 2009, p. 1). Marketing teams should purposefully acknowledge the craving for transparency, because research shows transparency improves trust, which positively correlates to demand. "Transparency works," said Charlie Arnot, CFI CEO, who unveiled the findings at the 2015 Food Integrity Summit in New Orleans where leaders gathered to discuss transparency. "We have statistical data to show that increasing transparency in farming, food production, and processing will increase consumer trust" (Center for Food Integrity, 2015b). Because commodities are spending producer dollars on advertising, it is crucial to determine if current generic commodity advertisements are giving consumers the information they need and desire.

Theoretical Framework

Advertising is brand-sponsored, paid communication (Dahlen & Rosengren, 2016). Advertising has four main purposes: to attract attention to a product, to inform consumers about a product, to persuade consumers to purchase a product, and to remind consumers of the product's attributes and availability (Koekemoer, 2004). Ultimately, the objective of advertising is to influence consumers' behavior. In doing so, two strategies are commonly employed: affective and cognitive (Heath & Nairn, 2005). Affective strategies attempt to influence consumers' emotions, moods, or feelings, while cognitive strategies attempt to influence consumers' knowledge, evaluations, and beliefs.

These two strategies come together under Petty and Cacioppo's (1986) elaboration likelihood model (ELM) of persuasion. The ELM aims to explain two distinct ways of processing stimuli and arriving at persuasion: centrally and peripherally. When the receiver is motivated to think about the message and has the ability and opportunity to do so with minimal distraction, the route to persuasion is central. This route is a cognitive approach because it relies on the receiver forming an opinion based on central cues, such as facts, hard evidence, and examples. On the other hand, if the message is ambiguous or the receiver is unable or not motivated to listen to the message, the route to persuasion is peripheral. This route is an affective approach because it requires little thought, low effort, and relies on the receiver forming an opinion based on peripheral cues, such source attractiveness, positive association, expert appeal, or message length (Putrevu & Lord, 1994). The ELM can be used to guide marketers as they target advertising to specific audiences. If the audience is motivated and able to elaborate on the message and there are compelling arguments to use, then the central route to persuasion is ideal. However, if the audience is unlikely to elaborate the message or if the available arguments are weak, then the peripheral route to persuasion is ideal.

Food shopping is often assumed to be a low-involvement activity in which consumers do not search extensively for information or evaluate product characteristics (Tarkiainan and Sundqvist, 2009). As a result, food product advertising commonly relies on peripheral cues, such as celebrity endorsement and emotional appeal. However, given that current research shows that consumers desire more information than less when it comes to food (Trionfi, 2009), a move toward the central route of persuasion may be more effective. While many studies have evaluated how brand advertising influences consumer behavior, including how food marketers target youth and adolescents (Boyland, Harrold, Kirkham, & Halford, 2014), only a few studies have been directed at checkoff-funded advertising. Of these studies, most have focused on comparing the effectiveness of generic and brand advertising in influencing behavior (Bass, Krishnamoorthy, Prasad, & Sethi, 2005). This study aims instead to analyze the content of generic commodity advertising to determine how it is or is not addressing consumers' need for food product attribute information and transparency.

Purpose and Objectives

The purpose of this study was to evaluate the content of generic commodity print advertising as published in 15 different magazines over the course of one year. This study was driven by the following research objectives:

1. To quantify generic commodity advertisements published in the top-15 food and beverage magazines (by total circulation) in 2015;
2. To identify which commodity groups advertised in which magazines and how often the advertisements were published; and
3. To describe the content of the generic commodity advertisements identified, including whether the advertisements used central or peripheral routes to persuasion and whether transparency was incorporated.

Methods

Sampling
For the purpose of this descriptive study, magazines were selected as the medium because of their accessibility in the public library and because print media is still commonly used as a channel for advertising (due to its affordability and reach). In 2015, the consumer magazine advertising market in the U.S. was valued at $16.8 billion (U.S. Online, 2015). When we selected the magazine titles for this study, the amount of food-dedicated content and total paid and non-paid circulation were considered. Because food advertising, brand or generic, likely targets those interested in eating and cooking, magazines with a considerable amount of food and beverage related content were deemed ideal. Currently, more than 100 magazines are in circulation that are wholly or partially dedicated to food and beverage content. To narrow the sample size, we established multiple criteria for the magazines to be included in this study: First, the magazine must feature food-related content as one of its main tenets; second, the magazine must have a total paid and non-paid circulation of 1 million or more; third, the magazine cannot have a health and wellness focus; and fourth, the magazine must be published as a 12-month subscription (no bimonthly or quarterly subscriptions). Table 1 displays the 15 magazines which met the criteria and were included in the study sample.

Table 1.

Magazine titles used for content analysis

Magazine Title	**Total Paid and Non-Paid Circulation***	**Publisher**
Better Homes and Gardens	7,615,581	Meredith Corporation
Good Housekeeping	4,348,641	Hearst Magazines
Family Circle	4,092,525	Meredith Corporation
Woman's Day	3,311,803	Hearst Magazines
Taste of Home	3,249,148	Reader's Digest Association
Southern Living	2,815,523	Time Inc.
O, The Oprah Magazine	2,386,601	Hearst Magazines
Martha Stewart Living	2,107,677	Martha Stewart Living Omnimedia
Real Simple	2,001,146	Time Inc.
Cooking Light	1,809,234	Time Inc.
EveryDay with Rachel Ray	1,728,955	Meredith Corporation
Country Living	1,621,448	Hearst Magazines
Food Network Magazine	1,725,723	Hearst Magazines

Bon Appetit	1,521,180	Conde Nast Publications
Sunset	1,273,870	Time Inc.

**Based on data published in 2013 by the Alliance for Audited Media*

Data Collection and Analysis
After magazine titles were selected, we narrowed the sample to the calendar year 2015 for manageability. Over the course of one month, we spent time reviewing each of the 166 issues included in the sample, labeling all advertisements funded by U.S. commodity promotions programs (both state and federal) along the way. After identifying the advertisements, we went back through the magazines and individually addressed the following questions for each advertisement:

1. What commodity promotion program funded the advertisement?
2. What is the size of the advertisement (i.e., full page, half page, column, multi-page, etc.)?
3. Does the advertisement contain human subjects? If so, describe.
4. Does the advertisement provide product attributes?
5. Does the advertisement incorporate transparency in regard to how the food is produced, processed, or distributed?
6. What route of persuasion (central or peripheral) does the advertisement employ?

These data were entered into a coding spreadsheet by the two researchers who conducted the quantitative content analysis. After individually accessing the advertisements, the researchers came back together and compared their findings to ensure validity and reliability of the analysis. The coders reached percent agreement on all advertisements studies. Once the coding was complete and the results compiled, frequencies were analyzed according to the study objectives using Microsoft Excel.

Results

Objective 1: To Quantify Generic Commodity Advertisements Published in The Top-15 Food and Beverage Magazines (By Total Circulation) in 2015
The content for analysis was sampled from 167 advertisements identified in 166 magazine issues. While all of the magazine titles included in the sample were monthly publications, some titles combined two months of issues into one publication. This explains why only 166 magazines were reviewed (instead of 180, as expected).
Objective 2: To Identify Which Commodity Groups Advertised in Which Magazines and How Often the Advertisements Were Published
Fourteen commodity groups were identified as having funded at least one print advertisement in the content sample. They were the California Walnut Board; Alaska Seafood Marketing Institute; National Pork Board; Almond Board of California; American Egg Board; Pear Bureau Northwest; Wisconsin Milk Marketing Board; United States Potato Board; National Honey Board; National Peanut Board; California Table Grape Commission; California Avocado Commission; Paper and Packaging Board; and the American Pistachio Growers. Of these commodities, six are part of the federal research and promotions program, meaning they are monitored by the Agricultural Marketing Service and authorized by Congress: National Pork Board, American Egg Board, United States Potato Board, National Honey Board, National Peanut Board, and Paper and Packaging Board. Two of the groups, Pear Bureau Northwest and American Pistachio Growers, are regional, and the remainder are state-affiliated. The California Walnut Board topped the list of

advertisements reviewed at 32; the American Pistachio Growers were last with two. Table 2 indicates the number of advertisements by commodity group.

Table 2.

Frequency of advertisements analyzed by commodity group

Commodity Group	***n***
California Walnut Board	32
Alaska Seafood Marketing Institute	28
National Pork Board	21
Almond Board of California	15
American Egg Board	13
Pear Bureau Northwest	11
Wisconsin Milk Marketing Board	11
United States Potato Board	7
National Honey Board	7
National Peanut Board	6
California Table Grape Commission	6
California Avocado Commission	4
Paper and Packaging Board	4
American Pistachio Growers	2

We also determined how many advertisements were in each title. *Cooking Light* had the most at 24 and both *Women's Day* and *Country Living* had none. Table 3 indicates the number of advertisements analyzed by magazine title.

Table 3.

Frequency of advertisements analyzed by magazine title

Magazine Title	***n***
Cooking Light	24
Food Network Magazine	24
Sunset	23

Real Simple	18
Every Day with Rachel Ray	17
Family Circle	14
Good Housekeeping	12
Bon Appetit	9
Better Homes and Gardens	9
Southern Living	5
Martha Stewart Living	5
Taste of Home	4
Oprah	3
Woman's Day	0
Country Living	0

Food Network Magazine and *Every Day with Rachel Ray* had the most variety with regard to which commodity groups advertised in their publication (eight and seven respectively). December, May, June and November issues of magazines contained the largest number of commodity advertisements. October, February, and August contained the fewest advertisements.

Objective 3: To Describe the Content of Generic Commodity Advertisements

In terms of size, 140 (83.8%) of the print advertisements were one full page. Twelve (7.1%) were placed on the inside back cover (considered a premium spot in magazine advertising). One advertisement was limited to a single column, while 23 (13.6%) were one full page plus a column. Three advertisements, all funded by the California Table Grape Commission, were spread over three full consecutive pages.

Most of the advertisements consisted of visuals of prepared and/or ready-to-eat food products. Only 33 (19.7%) ads featured human subjects. Of the 41 human subjects presented, 23 (56%) were male and 18 (43.9%) were female. All of the human subjects were exhibited as everyday Americans who are fit and active in appearance. The advertisements usually implied that the food product helped them to provide energy or endurance. The one exception was the use of actor Kevin Bacon as a celebrity endorser in the American Egg Board campaign "Wake up to eggs with bacon." Bacon appeared in all 13 of the American Egg Board advertisements reviewed.

Seventy-two (43.1%) of the advertisements included at least one product attribute. In all cases, the product attribute was health-related, such as "heart healthy," "low calorie," and "6 grams of protein." In most cases, the number of attributes listed in the advertisements ranged from one to three, depending on the product. However, the three advertisements funded by the California Table Grape Commission, which were spread over three full consecutive pages, included a considerable amount of product information. The advertisements explained how to store grapes, what to look for when purchasing grapes, and what kinds of meals to cook with grapes.

None of the 167 advertisements analyzed incorporated transparency as defined by the research team. There were no mentions of how, where, when, or by whom the food products were produced, processed, or distributed. Instead, the advertisements solely focused on marketing the preparation and consumption of the product.

Of the 167 total advertisements, 163 (97.6%) were coded as using the peripheral route to persuasion. The advertisements relied heavily on the physical attractiveness of the food product, presentation of packaging, and positive association to draw in consumers. The three California Table Grape Commission spreads were the one exception to this finding. Because they included a considerable amount of message content and knowledge, the researchers deemed them to be centrally persuasive in nature.

Conclusions and Recommendations

This content analysis unveiled a number of interesting results we used to draw and support multiple conclusions. First, the number of state commodity programs advertising in food and beverage magazines matched the number of national programs at six each. Two state commodities, the California Walnut Board and the Alaska Seafood Marketing Institute, funded more than one-third of the advertisements analyzed. These results may be due in large part to a recent market emphasis on locally grown and American-made products (Gorham, Rumble, & Holt, 2015). Furthermore, 111 (66%) of the advertisements were for the "protein foods" of nuts, pork, and eggs. This is notable, since two of the most recognized commodity advertisement campaigns ("Beef, It's What's for Dinner" and "Got Milk?") came from the California Milk Processor Board and the Cattlemen's Beef Promotion and Research Board; neither of which were observed as having published print advertisements in the magazines sampled. It is possible that nut, pork, and egg producers are working to increase demand in a market where dairy and beef products have already secured a large portion of the share. An additional reason why nut, pork, and egg products are at the forefront of such advertising may be because they offer healthy sources of protein during what could be considered a current fitness and wellness trend in the U.S.

Considering all the data collected in this study, it is evident that print advertising is not addressing consumers' need for attribute information and product transparency. Unfortunately, none of the 167 advertisements incorporated information about producers, production methods, or processing. While some (43.1%) did include attribute information, it was usually vague and nutrition-related. Such information is already readily available on food product labels; therefore, it is unlikely to increase the consumer's awareness of food production and processing methods. In addition, nearly all of the advertisements employed the peripheral route of persuasion. Because this route to persuasion is less likely to result in a long-lasting, sustained agreement, it is possible that such advertising is not actually effective in influencing consumers' behaviors. Research has established that decisions reached using the central route to persuasion are generally more satisfying and beneficial to marketers in the long run. Therefore, we recommended that commodity promotions programs consider employing more centrally persuasive advertising in their campaigns to ensure consumer loyalty and drive purchases.

Furthermore, because consumers attach transparent food production methods with a high-quality, trustworthy product, we find it reasonable to assume that consumers may attach a lack of transparency to perceptions of poor quality or deceit. In other words, consumers may view the lack of transparency in commodity advertising as a “hidden agenda,” wherein commodity groups do not wish to share the true origins of food products. Such an assumption works in direct opposition to the various actors in agriculture who are currently trying to develop greater awareness and understanding between producers and consumers by urging those involved in agriculture to become advocates for the industry and to tell their side of the story (Goodwin, 2011). As a result of this movement, many of those involved in agriculture are developing more effective ways to communicate with the general public.

Despite the many avenues being used for building trust and familiarity between food producers and consumers, one platform has yet to be explored: commodity advertising. In fact, commodity print advertising in food and beverage magazines appears to have shied away from communicating about anything beyond the purchased product (i.e., nuts, pork chops, eggs, or potatoes). While this is likely due to the fact that the editorial content of the sampled magazines is focused on food preparation, it does not necessarily mean that it fulfills the commodity programs’ objective of increasing transparency and expanding total demand for their respective food products. Furthermore, it is interesting to consider how repeatedly confronting consumers with advertising that only focuses on the ready-to-eat food product affects their ability (or lack of) to think about what processes or activities took place before food arrived at their table. It is possible that not addressing food production and processing methods in advertising encourages consumers’ feelings of intimidation in regard to the agricultural industry.

In conclusion, we have several recommendations for future research. The first to expand commodity advertisement content analysis to include multiple forms of marketing, including television, digital, and social media. While print advertising does not currently incorporate transparency, other forms of commodity marketing campaigns might. The second recommendation is to conduct an exploratory study on commodity group marketing teams to better understand how they develop and implement their campaign objectives. Finally, it is recommended that an experimental study be designed with the aim to determine not only which type (central or peripheral) of food product advertising consumers prefer, but also which type might increase their familiarity with production processes and trust in American producers.

References

Bass, F., Krishnamoorthy, A., Prasad, A., & Sethi, S. (2005). Generic and brand advertising strategies in a dynamic duopoly. *Marketing Science, 24*(4), 556-568. Retrieved from http://www.jstor.org/stable/40056985

Boyland E. J., Harrold J. A., Kirkham T. C., & Halford J. C. G. (2014) "Commercial food promotion to children." In Blades M., Oates C., Blumberg F., Gunter B. (eds), *Advertising to children*. Palgrave Macmillan, London.

Carey, C., and D. L. Bolton. (1996). Brand versus generic advertising and the decision to advertise collectively. Review of Industrial Organization 11, 93-105.

Center for Food Integrity (2015a). New transparency research reveals what consumers want from food and ag to earn their trust. Retrieved from http://www.foodintegrity.org/2015/11/new-transparency-research-reveals-what-consumers-want-from-food-and-ag-to-earn-their-trust/

Center for Food Integrity (2015b). A clear view of transparency and how it builds trust. Retrieved from http://www.foodintegrity.org/research/consumer-trust-research/current-research/

Dahlen, M., & Rosengren, S. (2016). If advertising won't die, what will it be? Toward a working definition of advertising. *Journal of Advertising, 45*(3), 334-345. https://doi.org/10.1080/00913367.2016.1172387

eMarketer. (2017, October 13). Worldwide ad spending: eMarketer's updated estimates and forecast for 2016–2021. Retrieved from https://www.emarketer.com/Report/Worldwide-Ad-Spending-eMarketers-Updated-Estimates-Forecast-20162021/2002145

Goodwin, J. N., Chiarelli, C., & Irani, T. (2011). Is perception reality? Improving agricultural messages by discovering how consumers perceive messages. *Journal of Applied Communications, 95*(3), 21-33.

Gorham, L. M., Rumble, J. N., & Holt, J. (2015). The impact of local: Exploring availability and location in food buying decisions. *Journal of Applied Communications, 99*(2), https://doi.org/10.4148/1051-0834.1046

Heath, R., & Nairn, A. (2005). Measuring affective advertising: Implications of low attention processing on recall. *Journal of Advertising Research, 45*(2), 269-281. doi:10.1017/S0021849905050282

Kaiser, H.M. and Liu, D. (1998) The effectiveness of generic versus brand advertising: The case of U.S. dairy promotion. *Review of Agricultural Economics. 20*, 69-79

Koekemoer, L. (2004). *Marketing communications*. South Africa: Juta and Company, Ltd.
Morrison, R.M. (1984) Generic advertising of farm products. Economic Research Service: 481, 1.

Petrevu, S., & Lord, K. R. (1994). Comparative and noncomparative advertising: Attitudinal effects under cognitive and affective involvement conditions. *Journal of Advertising*, *23*(2), 77-91.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advances in Experimental Social Psychology, 19*, 123-192.

Sabet, M. (2010). Understanding the federal commodity checkoff program. Retrieved December 16, 2015 from https://pennstatelaw.psu.edu/_file/aglawFederal_Commodity_Checkoff_Program_Michael_Sabet.pdf

Salinsky, E. (2006) Effects of food marketing to kids: I'm loving it? *NHPF Issue Brief* 2006, 814:1-16.

Story, L. (2007). Anywhere the eye can see, it's likely to see an ad. Retrieved from http://www.nytimes.com/2007/01/15/business/media/15everywhere.html?_r=0

Tarkiainen, A., & Sundqvist, S. (2009). Product involvement in organic food consumption: Does ideology meet practice? *Psychology & Marketing*, *26*, 844-863. doi: 10.1002/mar.20302

Trionfi, G (2009). Transparency made meaningful. *Patterns.* Retrieved December 16, 2015 from http://patterns.ideo.com/images/uploads/pdf/PATTERNS_transparency_vol2.pdf

U.S. Online and Traditional Media Advertising Outlook, 2015-2019. (2015, June 16). Retrieved January 29, 2016, from http://www.marketingcharts.com/traditional/us-online-and-traditional-media-advertising-outlook-2015-2019-55869/

Varian, H. R. (2006, June 1). Advertising commodities can be tricky, but it does pay off. *New York Times*. Retrieved from http://www.nytimes.com/2006/06/01/business/media/01scene.html

Eat this because: An evaluation of persuasion strategies used in commodity magazine advertising

Discussant Remarks
Donna Westfall-Rudd

Theoretical Framework

The elaboration likelihood model (ELM) of persuasion theory organizes and guides the research process in a manner that appears to be very appropriate for the study purpose and objectives. The researchers provide an excellent description of the theory and how the theory can be used to examine the differences in how consumers interact with marketing messages.

Methodology

The researchers provided a very good description of the selection criteria of the print media (food and beverage magazines) included in the study. It would be interesting and helpful to the reader to understand why these particular six evaluation questions were used to code the advertising. Where did these items come from?

Conclusions

This discussant strongly agrees with the researchers in that community marketing needs to expand its practice to include a stronger, “television, digital, and social media” presents. The recommendation to, “determine not only which type (central or peripheral) of food product advertising consumers prefer, but also which type might increase their familiarity with production processes and trust in American producers” appears to be particularly necessary if the food industry is serious about educating the general public. Overall, this is a valuable preliminary analysis of print media agricultural advertising that clearly illustrates it is not surprising to have an agriculturally illiterate society when so little information is provided in locations were consumers could be more likely to encounter it on a regular basis.

Exploring the impact of Ohio agricultural organizations' social media use on traditional media coverage of agriculture

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Abstract

One of the nation's most important industries, agriculture has adopted social media to communicate with consumers and the public. At the same time, traditional news media remain important to the industry because most individuals receive information about agriculture from sources such as newspapers and television. Little literature explores how social media are used as a media relations tool. The purpose of this study is to examine how agricultural organizations in Ohio communicate via social media and how the messages impact central Ohio traditional media outlets' coverage of agricultural issues. The study is grounded in agenda-setting theory, uses and gratifications theory, and previous social media studies. Data were collected from seven Ohio agricultural organizations' Facebook pages and four central Ohio news outlets open coding analysis was used to determine emerging themes. We found that Ohio agricultural commodity organizations use social media, but not to communicate with the news media. The industry receives limited news coverage, and we were unable to discern a relationship between social media and news media coverage. By communicating the results of this study with agricultural organizations and researchers, effective social media strategies can be developed to guide the future of social media as a media relations tool.

Introduction

Although 98 percent of Americans are not involved in the agricultural industry, agriculture is the groundwork of civilization (Grant, 2010; University of Rhode Island, 2001). Although agriculture is often only associated with the food supply and production, it affects, and is a component of, industries including health care, manufacturing, education, personal care, and construction (University of Rhode Island, 2001). Due to the far-reaching influence of the agricultural industry, it is important for society to receive truthful and accurate information about agriculture.

While news distribution has shifted from print to digital, consumers still receive information about the agricultural industry through traditional media, such as television and newspapers (Tweeten, 2014). Traditional media, or any form of media that was present before the Internet, have served as a source of information, entertainment, and education to society while evolving to meet new consumer needs. The growth of technology has led to Americans consuming more media than ever before, thus presenting an opportunity for agricultural communicators to reach the public with agriculture-friendly messages via old media and new media (Waldman, 2011).

Media coverage of the agricultural industry flourished in early newspapers and magazines, but in recent years, the industry has received limited interaction and coverage from news media sources. The decline in agricultural media coverage can be attributed to the distance between agriculture and society, the challenges of cost and accessibility, and limited agricultural knowledge by the news media staff (New Agriculturalist, 2009; Stringer & Thomson, 1999; Treise & Weigold, 2002). It is important that farmers and agricultural communicators develop connections with traditional media outlets, because the media play a role in influencing decision makers and communicating the needs and concerns of the industry (New Agriculturalist, 2009).

Social media are a great value for the agricultural industry because they can be used for marketing, branding, agricultural news, combating of myths and bad publicity, monitoring public opinion, and crisis and risk communication (Wagler & Cannon, 2015; Payn-Kopner, 2009). Farmers and agricultural communicators are now able to reach audiences that would not have received their messages in the past (Knutson, 2011; Meyers et al., 2011). The ability to distribute information in a faster and more direct manner enables agricultural communicators to distribute information that may help consumers and the public gain a better understanding of the industry (Allen, Abrams, Meyers & Shultz, 2014).

Social media have not only benefited agricultural organizations by enabling them to reach out to their publics and consumers but have also provided a way to strengthen media relations (Eyrich, Padman, & Swester, 2008). Traditionally, organizations performed media relations and public relations tasks through press releases, advertising, and press conferences, but the adoption of social media enables those organizations to have direct and immediate contact with potential media outlets and journalists across many platforms (Boyd, 2013).

Due to the decline in media seeking out the agricultural industry, agricultural communicators need to find a new and innovative way to reach out and communicate with the mass media to get their stories told. Therefore, the emergence of social media has provided agriculturalists with a new communication channel and potential media relations tools that can further impact the news media's coverage of the agricultural industry.

Ohio Agricultural Organizations

Agriculture is not only important to the U.S. as a whole, but also specifically to the state of Ohio. It is Ohio's largest industry, contributing over $105 billion to the state's economy each year (Ohio Farm Bureau Federation, 2015). Ohio has more than 13 million acres in farmland and over 75,000 farms (2012 Census of Agriculture, 2014). The total number of farms accounts for all agricultural commodity farms. Ohio's top agricultural commodities include corn, cattle, soybeans, dairy products, and swine (United States Department of Agriculture Economic Research Service, 2014).

Throughout the state, various agricultural and commodity-specific organizations promote and seek support for the agricultural industry. One of the largest agricultural organizations in Ohio is the Ohio Farm Bureau Federation. This organization, along with others including the Ohio Beef Council, Ohio Cattlemen's Association, Ohio Corn and Wheat Growers Association, Ohio Dairy Producers Association, Ohio Pork Producers, and Ohio Soybean Association, promote the agricultural industry and its specific commodities through political and educational actions. By uniting to promote and generate awareness about issues and products, these organizations are able to make an impact on public awareness of agriculture.

Theoretical Framework

Agenda setting. This study incorporates agenda setting theory and uses and gratifications theory as its theoretical underpinnings. Walter Lippman developed the foundation for the agenda-setting hypothesis when he hypothesized that the world around us is too vast for us to understand, and that we rely on the media to inform us, in turn shaping how individuals perceive the world

(Sheafer & Weimann, 2005). The agenda-setting theory outlined by McCombs and Shaw (1972) examined and attempted to explain the relationship between the mass media and public opinion and "how issues reported in the media can become important among the public" (Meriliainen & Vos, 2011, p. 296). The integration of the agenda-setting theory into mass communication studies changed how media researchers approached media studies. Assumptions shifted from the media telling people what to think to telling people what topics or issues they should think about (Cohen, 1963). Defleur and Ball-Rokeach (1989) also supported this notion, saying that there is a strong connection between the amount of coverage an issue receives by the news media and the rank of importance by the audience. Therefore, "what the media reports, people at large may see as more important" (Merilainen & Vos, 2011, p. 296).

The rise of the Internet and online communication has contributed to the change in who participates in the agenda-setting function. "Online has become the new mass medium" and individuals are now directly going to online sources to retrieve their news instead of traditional media outlets (Merilainen & Vos, 2011, p. 296). Organizations now have a greater opportunity to participate in agenda-setting functions because online communication enables them to directly interact with their publics (Merilainen & Vos, 2011).

Uses and gratifications theory. The theory of uses and gratifications (U&G) is founded in psychological and communication research. It explains how individuals use the mass media and why individuals select a particular medium to fulfill their needs (Papacharissi, 2008). Within the theory of U&G, the audience is considered active and consciously selects the media and content (Papacharissi, 2008). Most of contemporary U&G research falls under six main categories, including, "(1) gratifications and media consumption; (2) social and psychological origins of gratifications; (3) gratifications and media effects; (4) gratifications sought and obtained; (5) expectancy-value approaches to uses and gratifications; and (6) audience activity" (Papacharissi, 2008, p. 139).

Not only has U&G been beneficial to understanding uses on the Internet, it has also been used to understand why individuals do or do not use social networking sites (Raacke & Bonds-Raacke, 2008). Social media has become a topic of interest in U&G research because of the interpersonal nature of the medium (Chen, 2011). To understand what type of gratifications individuals were experiencing from social networking sites, Raacke and Bonds-Raacke (2008) explored the gratifications of college students who used MySpace and Facebook. The study found that the most common gratification was the ability to connect with old friends and seek out information on new friends.

Agricultural communication research has also employed the theory of U&G to determine what media agricultural communicators use to communicate and why. Ruth-McSwain (2008) found that agricultural communicators are familiar with and use agricultural media and print sources as the primary means of communication. The study also found that agricultural communicators used the agricultural media sources because they are friendly and convenient, and there is less of a chance that facts will be skewed by agriculture-illiterate media reporters (Ruth-McSwain, 2008). Agricultural communicators were also choosing print media because it provided more in-depth coverage and they are comfortable with the effectiveness of the medium (Ruth-McSwain, 2008). Although the study supported the traditional assumptions of U&G, it also suggested that agricultural communicators need to use a mixed methods media relations strategy to select the proper medium to reach the target audience (Ruth-McSwain, 2008).

Organizations are changing their methods of public relations because journalists are changing how they retrieve information. According to Jung and Hyun (2014), the use of the Internet by newsroom staff to seek out information and communicate with sources is becoming more popular. Journalists are now participating in social media discussions, therefore creating a new channel of communication for public relations professionals to communicate with the news media (Yoo & Kim, 2013). According to the TEK Group (2012), 26 percent of journalists use Facebook to retrieve basic information about a source, 34 percent like receiving newsworthy information via a timely tweet, and 90 percent believe that blogging is the most valuable tool in developing news stories. The increase in social media as a media relations tool has caused a call for research to understand this trend.

Purpose and Objectives

Facebook is the most popular social networking site used among agricultural organizations because it is well-known among the target audience and has received the most scholarly attention (Tweeten, 2014). Agriculturalists are using Facebook to "agvocate," tell their stories, and communicate with consumers and the public (White, et al, 2014). Although Facebook has been an effective social media platform, agriculturalists believe it is important to build interconnectivity between different types of social media in order to be more successful (Meyers, Irlbeck, Graybill-Leonard, & Doerfert, 2011). Agriculturalists have been satisfied with their adoption and use of social media and plan to continue forward with social media as a communication tool (White et al., 2014).

The purpose of this study was to examine how agricultural organizations in Ohio communicate via social media and how the messages communicated via social media impact central Ohio (traditional) print and broadcast media sources. The following research objectives were used for this study:

1. To describe Ohio agricultural organizations' use of Facebook to promote current agricultural issues;
2. To describe central Ohio's media coverage of agricultural issues through newspapers and television content; and
3. To determine the impact of Ohio agricultural organizations' social media messages on central Ohio media outlets, including newspapers and television content.

This study also supports the 2016-2020 American Association for Agricultural Education (AAAE) National Research Agenda Priority 1: Public and Policy Maker Understanding of Agriculture and Natural Resources (Enns, Martin, & Spielmaker, 2016). "Providing the public and policymakers with accurate information about agricultural and natural resource concepts has been an ongoing effort…for more than 25 years" (Enns et al., 2016, p. 14), and the results of this study may suggest one technique – the use of social media – for bridging the gap between agricultural organizations and media gatekeepers.

Methods

This study used a mixed-methods approach with an emphasis on the qualitative results. The design for this study included quantitative and qualitative content analyses of Ohio agricultural organizations' Facebook posts and central Ohio news media stories and articles. Content analysis was selected for this study due to the text- and image-heavy nature of the content. It was crucial in meeting the research objectives because themes could be identified and analyzed to determine if there is a relationship between the Ohio's agricultural organization's Facebook posts and news stories distributed by central Ohio's traditional news media.

Population and Sampling

The study population included agricultural commodity or advocacy organizations in Ohio and news outlets in central Ohio. The organizations included in the study are the Ohio Beef Council, Ohio Cattlemen's Association, Ohio Corn and Wheat Growers Association, Ohio Dairy Producers Association, Ohio Farm Bureau, Ohio Pork Producers, and Ohio Soybean Association. These organizations were selected because they represent the top agricultural interests of the state of Ohio. The second target group for this study was the major news media outlets of central Ohio. These outlets included the *Columbus Dispatch*, WBNS 10 TV News (CBS), WCMHTV NBC 4, and WSYX ABC 6. These outlets were selected for the study because they are the largest news media distributers in the area and are all located in Ohio's capital, therefore reaching a large audience.

Data Collection and Instrumentation

Data were collected from September 8, 2014 to October 6, 2014. The collection occurred during a major agricultural event in Ohio, the Farm Science Review. The time period was selected because the Farm Science Review often features topics that are relevant to audiences outside of the agricultural industry, therefore making it into the news media.

Separate coding sheets were developed for the social media analysis and news media analysis. The social media analysis coding sheet recorded the date, time, publisher, likes, and shares of the social media post. The text from the post and an image or video, if available, were also recorded in the coding sheet. During daily social-media coding, the researcher visited each organization's Facebook page and took screenshots of new posts, which were both printed and stored in digital format.

The news media analysis-coding sheet recorded the date, media outlet, author, author type, article or story classification, tone of the article or story, and the type of article or story. The coding sheet was also used to record all text, images, and video for each story. News story coding was performed daily. The data was collected from online subscriptions and from the central Ohio's news media outlets' websites. The researcher visited the websites daily, reviewed all posted news stories, and collected those that contained any mention of agricultural topics in the title, byline, or copy. Stories were collected via screenshots and stored in a digital file on the researcher's laptop. After coding was completed, all coding sheets and screen shots were printed for analysis. The decision to capture online stories from the broadcast outlets versus coding the actual broadcast was made after thorough investigation confirmed they highlighted their broadcasted stories on the homepages of their websites.

Data Analysis

After data collection, the researcher performed qualitative and quantitative content analyses. Emerging themes were determined for the social media and news media analysis via open coding. Open coding in content analysis is the act of examining the text and images collected from the data and then selecting identifiers, such key words, to distinguish codes or themes (Hsieh & Shannon, 2005). The text, images, and videos from the posts and articles were used to determine the emerging themes.

A quantitative analysis was also performed to determine the means and frequencies of likes, shares, photos, links, and videos from the social media coding sheets. The quantitative data was organized and reported according to the qualitative themes. Frequencies of the sources used, agricultural organizations mentioned, links, images, and videos from the news media coding sheets were also determined. After the emerging themes were established, common themes between the social media and news media analysis were further analyzed. The researcher examined the dates and themes to determine if a relationship existed between the social media posts and news media coverage. The sources cited in the news articles were also analyzed: Impact by social media content would be assumed if stories cited a social media profile or post.

According to Colorado State University (n.d.), “the validity of categories… is achieved by utilizing multiple classifiers to arrive at an agreed upon definition of the category” (para. 3). To increase the validity of the categories for this study, the researcher used multiple keywords and visual identifiers. For example, in the news article analysis, key words such as “runoff,” “fertilizer,” “drinking water,” and “water quality” were used to develop the *water quality* theme. To measure the reliability of this study, two coders – the researcher and an individual trained in social-scientific research methods – performed inter-coder reliability test using a 10% sample of the social media and news media samples. Coder agreement was calculated at 97.6 percent and was deemed acceptable.

Findings

Objective 1: Ohio Agricultural Organizations’ Use of Facebook to Promote Current Agricultural Issues

Seven Ohio agricultural organizations’ Facebook pages were monitored during the one-month data collection period, and 140 Facebook posts were collected. The emerging themes of the Facebook posts included *recipes and food*, *farm and agricultural stories*, *events*, *education and programs*, *general agricultural promotion*, *leadership and professional development*, *awards and recognition*, *job and internship posting*, *politics*, and *water quality* (Table 1).

Table 1.

Frequencies and means of social media content themes posted by Ohio agricultural organizations

	Posts (*n*)	**Average Likes[1]**	**Average Shares[1]**
Recipes and food	31	556	430
Farm and agricultural stories	30	83	10
Events	21	18	4
Education and programs	13	11	1

General agricultural promotion	12	646	133
Leadership and professional development	11	12	1
Awards and recognition	7	14	1
Job and internship postings	6	3	1
Politics	5	12	0
Water quality	4	7	1

[1]Values reported per post

The most common theme was *recipes and food*. A post was categorized under this theme if it contained text or images that were affiliated with recipes, food knowledge and education, or other general food promotion. The *recipes and food* theme had 31 Facebook posts. Ohio Pork Producers were the top contributor with 14 posts and Ohio Beef Council was the second with seven posts. Images were common (*n*=30) on *food and recipe* posts. Four types of images emerged: pictures of food, food events, text and image combinations, and images without food. The text that accompanied the images was closely associated with the images. Links (*n*=22) and videos (*n*=1) were also included. The links connected posts to external websites that contained full recipes, information about food related events, or other food information.

The second most common theme of Facebook posts was *farm and agricultural stories*, which contained text or images of farmers sharing their personal experiences or general agricultural stories that did not fall under another major theme. This theme comprised 30 Facebook posts. The Ohio Dairy Farmers were the top contributor with 10 posts and Ohio Pork Producers second with six posts. Images of farmers, families, farms, and animals, were included in 19 posts. Videos of farmers, families, and individuals from the agricultural industry telling their stories were found in 11 posts. Most of the videos were linked via YouTube. External links to other sites were included in 25 posts.

Facebook posts categorized under the *events* theme (*n*=21) contained text or images that promoted an event, were posted from an event, or contained information about an event. Ohio Farm Bureau was the top contributor (*n*=9), and Ohio Corn and Wheat Growers Association was second (*n*=4). Posts with images were common (*n*=19), but no videos were included. Eight posts contained external links, and two posts were shared from another Facebook page or external website.

Thirteen posts were identified as related to *education and programs*, meaning they contained text or images that were affiliated with the education of farmers or individuals, disseminating new knowledge, or promotion of an education program offered through the organization. Ohio Farm Bureau again contributed the most (*n*=5), followed by Ohio Beef Council (*n*=3). The majority of the posts contained images (*n*=11), mostly images of farming or educational events; 1 post contained a video; and nine included an external link.

The *general agricultural promotion theme* served as a catch-all category for 12 Facebook posts that did not qualify under another theme. Examples included organization members participating in events, swine industry promotions, and membership activities. Eight posts by the Ohio Pork

Producers were categorized as general agricultural promotion, along with three posts by Ohio Beef Council. All posts contained an image, none included a video, and three linked to other sources.

A Facebook post qualified under the *leadership and professional development* theme if it contained text or images that were affiliated with leadership or professional development events and programs. This theme comprised 11 posts, nine from Ohio Farm Bureau and one each from the Ohio Cattlemen's Association and Ohio Corn and Wheat Association. All of the posts included one or more images of professional development meetings, groups, or advertisements. No posts contained videos, but 10 featured external links to stories about professional development events or groups on the organizations' websites.

The remaining themes each comprised fewer than 10 posts. The *awards and recognition* theme included seven posts that contained text or images affiliated with recognizing an individual or group for an award or service. Ohio Beef Council created three such posts. All seven included images of the people or groups being recognized, and five contained an external link; none included video. Only five posts dealt with *politics* – political discussions, issues, or visits – and all were posted by Ohio Farm Bureau. Three posts contained an image; one, a video; and four, an external link. *Water quality* was addressed in four Facebook posts, three courtesy of Ohio Farm Bureau and one by Ohio Cattlemen's Association. All of the posts included external links, three included an image, and one included a video. Images depicted events, graphic illustrations, and water. The video showed a speech filmed at the 2014 Farm Science Review.

Objective 2: Central Ohio's Media Coverage of Agricultural Issues Through Newspapers and Television Content

Four central Ohio news media outlets were monitored and 18 stories collected during the one-month data collection period. Outlets included the *Columbus Dispatch* newspaper, the WBNS 10 TV news site, the WCMH-TV NBC 4 news site, and the WSYX ABC 6 news site. The themes that emerged from the news outlets included *water quality*, *organic food and food products*, *animal welfare and animal safety*, *agriculture and science*, *disaster and tragedy*, and *non-direct mention of agriculture*. (Frequencies for each theme by outlet are reported in Table 2.)

Table 2.

Frequencies and means of traditional media content themes posted by central Ohio news media outlets.

	Columbus Dispatch	**WBNS 10 TV**	**ABC 6**	**NBC 4**	**Total**
Water quality	5	0	1	1	**7**
Organic food and food products	0	1	1	1	**3**
Animal welfare and animal safety	0	2	1	0	**3**
Agriculture and science	0	1	1	0	**2**

Disaster and tragedy	0	1	1	0	**2**
Non-direct mention of agriculture	1	0	0	0	**1**
Total	**6**	**5**	**5**	**2**	**18**

The *water quality* theme included content that covered water quality issues or policy. The seven stories averaged three sources per story, and a range of 0-3 agricultural organizations were cited as sources. Five provided an image and two included a video. The common images among the *water quality* stories were maps and farm images. Examples of article titles include "EPA: Officials Must Target Algae Triggers" and "Farm Science Review Tackles Algae Threat" from the *Columbus Dispatch*; and "New Reservoir Will Help Protect Columbus's Water Supply" from ABC 6. Key words used to describe this theme include "water," "algae," "agriculture," "drinking water," and "EPA."

Three stories covering organic food, food issues, or food safety were categorized under the *organic food and food products* theme. WBNS 10 TV, ABC 6, and NBC 4 each contributed one article. The stories averaged 2.33 sources apiece, and each mentioned at least one agricultural organization (range = 1-4). One story provided an external link, two provided an image, and two provided a video. The images included pictures of food or food products. An example of an article title is "Buying Organic? How to Find Best Prices in Central Ohio" from the *Columbus Dispatch.*

Stories covering animal welfare issues, animal abuse, or other agricultural animal concerns were categorized under the *animal welfare and animal safety* theme. Three stories were collected: two from WBNS 10 TV and one from ABC 6. Each story included one or two sources, none of which were agricultural organizations. None of the stories provided external links, all provided one or more images, and one of three provided a video.

The subjects of images shown were farm animals and farms. Most of the stories were negative in their coverage of the agricultural industry in reaction to animal-abuse scandals. Examples of article titles include "Phoenix Cow Dies After Being Pelted with Softballs" from ABC 6 and "Four People Arrested in Slaughter at California Chicken Ranch" from 10 TV News.

Stories affiliated with the application of science to agriculture and the use of agriculture in a scientific context included in the *agriculture and science* theme. Two stories were collected: one each from ABC 6 and WBNS 10 TV. No sources were cited and no agricultural organizations mentioned in the stories collected. Neither provided links or images, and only one provided a video. The title of the video story from NBC 4 was "Corn, Soybeans and Weather Folklore." The title of the text-only article from 10 TV News was "Using Pork to Stop Nosebleeds a Winning Discovery."

Disasters and tragedies that had an indirect relation to the agricultural industry were mentioned in two, one each from ABC 6 and WBNS 10 TV. The average number of sources used was 1.5 (range=0-3), none of which were agricultural organizations. None of the stories provided links, one provided an image, and one provided a video. A single article from the *Columbus Dispatch* was categorized as a *non-direct mention of agriculture* because it was related to the industry but not presented in an agricultural context. The story included an image of a Holstein calf with a marking resembling a number 7 on its head; the text noted the calf was named in honor of a professional football player who wears 7 on his jersey.

Objective 3: The Impact Of Ohio Agricultural Organizations' Social Media Messages on Central Ohio Media Outlets

Only one theme emerged as consistent between agricultural organizations' social media posts and news media outlets: *water quality*. Seven news articles discussed water quality, five from the *Columbus Dispatch*, one from ABC 6, and one from NBC 4. Four social media posts pertained to water quality, three from Ohio Farm Bureau and one from Ohio Cattlemen's Association. Common keywords among the posts and articles included "water quality," "farmland," "agriculture," runoff," "farming," and "algae blooms." Common sources among the posts and articles included the Ohio Environmental Protection Agency (EPA), the United States EPA, Ohio Farm Bureau, and the Ohio State University College of Food, Agricultural, and Environmental Sciences.

The Facebook posts and news articles were both reacting to current water quality issues in Ohio and throughout the U.S. The Facebook posts were positively skewed, showing how the agricultural industry was responding to water quality concerns and ensuring future safe agricultural practices. The news media was a mixture of positive and negative reactive messages, including stories about the human health effects of poor water quality.

Citations of social media posts or profiles were to be used to determine if the social media content had an impact on the news media articles. No evident direct relationship between the Facebook posts and the news articles was found, but one story occurred in both the social media and news media analysis: the luncheon speech at Farm Science Review on September 16, 2014. The Ohio Farm Bureau covered the story on Facebook on Sept. 19, 2014. The *Columbus Dispatch* covered the story on Sept. 18, 2014. The title of the story was "Seeds of ideas may stem runoff." Common sources used in both the Facebook post and the news story include the dean of Ohio State University's College of Food, Agricultural, and Environmental Sciences and the president of Ohio Farm Bureau Federation. Both stories were presented in a positive frame and showed how the agricultural industry is making positive steps to improve Ohio's water quality issues.

Discussion

Uses and gratifications theory was used as one of the theoretical foundations for this study. The findings from analysis of Ohio agricultural organizations' Facebook pages support previous research that "communicators traditionally group their activities around their preferred medium" (Academy for Educational Development, 1985, p. 6). The Ohio agricultural commodity organizations studied all possessed Facebook pages at the time of data collection. Because the Facebook pages had already been in existence and had a significant number of likes per page (range=795-186,544), we can infer that the organizations' communication managers use Facebook as their chosen social medium because it fulfills an existing or desired future gratification. Considering the large number of themes and posts that focus on individuals in the agricultural industry, to promote the stories of successes of organizations and their members, and advertise programs and opportunities, it seems that Facebook serves primarily as a tool to communicate *within* industry circles.

Despite its economic prominence in Ohio, agriculture received relatively little news media coverage in the data-collection period. The limited coverage of agricultural topics by central Ohio news outlets supports previous findings of shrinking agricultural media attention (Stringer & Thomson, 1999). Although the articles collected were classified as agricultural, more often than not, the theme of the article was not directly related to production agriculture. For example, the most common theme among the news articles was *water quality*. These articles were collected and the theme was determined because the stories contained keywords, such as “runoff” and “fertilizer,” that are often associated with the agriculture and farming communities by the public. However, many of the articles cited government agencies like the state and federal Environmental Protection Agency that are adjacent to, but not part of, the agricultural industry, and other articles cited no agricultural sources at all.

The findings of this study also support existing literature that states that news reports surrounding agriculture are of a sensational nature, with bursts of attentions followed by little or no follow-up (Cannon & Irani, 2011; Nelson, 1995). The *animal welfare and safety* and *disaster and tragedy* themes are perfect fodder for sensational news coverage. For example, a farm fire instigated three stories, all from different outlets, on the same day, but the same outlets did not report on the fire’s aftermath. This finding of sensational, short-term reporting highlights a problem for the agricultural industry in that the industry is not receiving consistent and frequent coverage by the media. Considering that the public receives most of its agricultural information from traditional media outlets, the decline of consumer knowledge of agriculture comes as little surprise.

Researchers often apply agenda-setting theory to discussions of traditional news media. Agenda setting examines and explains the relationship between the mass media and public opinion and “how issues reported in the media can become important among the public” (Meriliainen & Vos, 2011, p. 296) More recent agenda-setting research, incorporating new media technologies, posits that agenda setting can also be audience-driven. The relatively large amount of *water quality* coverage may have been the result of Ohio citizens’ fears that algae contamination in Lake Erie and the resulting water-use bans in northern Ohio could spread to other communities.

The news articles seemed to be framed neutrally or negatively toward agriculture, which could be attributed to the lack of agricultural knowledge by reporters or the decreasing number of individuals involved or aware of the agricultural industry (Ruth-McSwain, 2008). The majority of the sources used for the articles were organizations that are traditionally opposed to some agricultural practices, such as the EPA. This negative frame on the agricultural industry surrounding water quality has a potential impact on the public’s perception of the agricultural industry because the news media is reaching a large, ag-illiterate audience.

Based on the interaction – or lack thereof – between agricultural organizations’ Facebook pages and central Ohio news media, we can assume that these organizations are not using social media as a means to communicate with media outlets. In the one theme that overlapped both social media and news media analysis, *water quality*, organizations posted in reaction to the aforementioned water-quality crises – in some cases up to a month afterward – while news media outlets posted breaking news updates on the same topic. If agriculture organizations want to take an active role in setting the news-media agenda with regard to the industry, they must post about agricultural issues as they happen, rather than waiting to respond in the aftermath.

Implications and Recommendations

This study provides a foundation for researchers to continue to examine how agricultural organizations are using Facebook and what steps need to be taken to improve the agricultural industry's media relations practices. According to Ruth-McSwain (2008), more media coverage of the agricultural industry can be achieved through effective media relations strategies. The one common news article and Facebook post suggest that if the proper information is distributed to news media personnel, then the agricultural industry may be more likely to receive positive media coverage. Therefore, researchers need to continue to examine and research cases where media relations in the agricultural industry have been effective in order to replicate that same results in the future.

Qualitative methods should be used to determine how and where journalists retrieve their agricultural information. Since the agricultural industry receives limited coverage by the news media, understanding how and where journalists research information about the industry can help agricultural communicators tailor their future practices and behaviors to effectively reach journalists, in turn increasing news media coverage of the agricultural industry.

References

2012 Census of Agriculture. (2014, May). Ohio State and County Data. Retrieved from http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Ohio/ohv1.pdf

Academy for Educational Development. (1985). Beyond the flipchart: Three decades of development communication. Washington, DC: AED.

Allen, K., Abrams, K., Meyers, C., & Shultz, A. (2010). A little birdie told me about agriculture: Best practices and future uses of Twitter in agricultural communications. (Professional Development). *Journal of Applied Communications*, *94*(3). https://doi.org/10.4148/1051-0834.1189

Boyd, M. (2013, August 16). Social media's role in modern public relations. Retrieved from http://www.prdaily.com/Main/Articles/Social_medias_role_in_modern_public_relations_15017.aspx

Cannon, K. J., & Irani, T. A. (2011). Fear and Loathing in Britain: A Framing Analysis of News Coverage During Foot and Mouth Disease Outbreaks in United Kingdom. *Journal of Applied Communications*, *95*(1). https://doi.org/10.4148/1051-0834.1171

Chen, G. M. (2011). Tweet this: A uses and gratifications perspective on how active Twitter use gratifies a need to connect with others. *Computers in Human Behavior, 27*(2), 755-762.

Cohen, B. (1963). *The Press and Foreign Policy*. Princeton, N.J.: Princeton University Press.

Colorado State University. (n.d.). Issues of Reliability and Validity. Retrieved from http://writing.colostate.edu/guides/page.cfm?pageid=1317&guideid=61

Defleur, M.L. & Ball-Rokeach, S.J. (1989). *Theories of Mass Communication*. Longman, New York, NY.

Enns, K., Martin, M., & Spielmaker, D. (2016). "Research Priority 1: Public and Policy Maker Understanding of Agriculture and Natural Resources." In T. G. Roberts, A. Harder, & M. T. Brashears (Eds), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 13-18). Gainesville, FL: Department of Agricultural Education and Communication.

Eyrich, N., Padman, M. L., & Sweetser, K. D. (November 01, 2008). PR practitioners' use of social media tools and communication technology. *Public Relations Review, 34*(4), 412-414.

Grant, D. (2010, June 17). Stallman: farmers must connect with consumers. *Farm Week Now*. Retrieved from http://www.farmweeknow.com/story.aspx?s=39250&c=1&pv=1

Hsieh, H. F., & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, *15*(9). https://doi.org/10.1177/1049732305276687

Jung, M. S., & Hyun, K. D. (2014). Online Media Relations as an Information Subsidy: Quality of Fortune 500 Companies' Websites and Relationships to Media Salience. *Mass Communication and Society, 17(*2), 258-273.

McCombs, M., and Shaw, D. (1972). The agenda-setting function of mass media. *Public Opinion Quarterly, 36*(2). pp. 176-87.

Meriläinen, N., & Vos, M. (2011, Oct. 11). Human rights organizations and online agenda setting. *Corporate Communications: An International Journal, 16*(4), 293-310.

Meyers, C., Irlbeck, E., Graybill-Leonard, M., & Doerfert, D. (2011). Advocacy in Agricultural Social Movements: Exploring Facebook as a Public Relations Communications Tool. *Journal of Applied Communication, 95*(3), 68-81.

Nelkin, D. (1995). *Selling science: How the press covers science and technology*. New York: Freeman.

New Agriculturalist. (2009 Nov.). Role of the Media in Agricultural Development. Retrieved from http://www.new-ag.info/en/pov/views.php?a=1031

Ohio Farm Bureau Federation. (2015). Agricultural FAQ. Retrieved from http://ofbf.org/education-and-reference/faq/

Papacharissi, Z. (2008). *Uses and Gratifications. An Integrated Approach to Communication Theory and Research*. Michael Salwen, Don Stacks (Eds.), Lawrence Erlbaum.

Payn-Knoper, M. (2009, June 10). Twitter's business value to agriculture. Message posted to http://causematters.wordpress.com/2009/06/10/twitters-business-valueto-agriculture

Raacke, J., & Bonds-Raacke, J. (2008). MySpace and Facebook: Applying the uses and gratifications theory to exploring friend-networking sites. *Cyberpsychology & behavior, 11*(2), 169-174.

Ruth-McSwain, A. (2008). Penchant for Print: Media Strategies in Communicating Agricultural Information. *Journal of Applied Communications, 92*(3). https://doi.org/10.4148/1051-0834.1210

Sheafer, T., & Weimann, G. (2005). Agenda building, agenda setting, priming, individual voting intentions, and the aggregate results: An analysis of four Israeli elections. *Journal of Communication, 55*(2). Doi:10.1111/j.1460-2466.2005.tb02676.x

Stringer, S., & Thomson, J. (1999, June). Defining agricultural issues: Daily newspapers editors' perspectives. Paper presented at the meeting of Agricultural Communicators in Education/National Extension Technology Conference, Knoxville, TN.

TEK Group. (2012). Online newsroom survey report. Retrieved from http://www.tekgroup.com/onlinenewsroomsurvey/

Treise, D., & Weigold, M. F. (2002). Advancing science communication: A survey of science communicators. *Science Communication, 23*(3), 310-322.

Tweeten, J. F. (2014). Perceptions Regarding Importance and Frequency of Use of Selected Communication Tools by Iowa Cattle Producers. Retrieved from Digital Depository @ Iowa State University. 13749.

United States Department of Agriculture Economic Research Service. (2014, Sept.). State Fact Sheets: Ohio. Retrieved from http://www.ers.usda.gov/data-products/statefact-sheets/state-data.aspx?StateFIPS=39#.VMkeXlpibtt

University of Rhode Island. (2001, May). *It Came from Planted Earth: An Introduction*. Retrieved from http://www.uri.edu/cels/ceoc/documents/cameFromPlantedEarth.pdf

Wagler, A., & Cannon, K. J. (2015). Exploring ways social media data inform public issues communication: An analysis of Twitter conversation during the 2012-2013 drought in Nebraska. *Journal of Applied Communications, 99*(2). https://doi.org/ 10.4148/1051-0834.1047

Waldman, S. (2011). *The Information Needs of Communities*. Washington, D.C.: Federal Communications Commission.

White, D., Meyers, C., Doerfert, D., and Irlbeck, E. (2014). Exploring Agriculturalists' Use of Social Media for Agricultural Marketing. *Journal of Applied Communications, 98*(4). https://doi.org/10.4148/1051-0834.1094

Yoo, K. H., & Kim, J. R. (January 01, 2013). How U.S. state tourism offices use online newsrooms and social media in media relations. *Public Relations Review, 39*(5), 534-541.

Exploring the impact of Ohio agricultural organizations' social media use on traditional media coverage of agriculture

Discussant Remarks

Donna Westfall-Rudd

Theoretical Framework

Incorporating agenda setting theory and gratifications theory appears to be an excellent framework for this practical and relevant study. While this is not this discussant's research area, the theories are explained well and frame the study for excellent data analysis. This is especially important as the study examined both online and print media, which may have diverse audiences and purposes by users.

Methodology

This mixed methods study is a very good example of an effective use of content analysis to examine communication practices of the participating agricultural organizations and tradition news media. This section of the manuscript does a nice job of illustrating the methodological practices of the researchers. It may be beneficial to provide a very brief explanation of how the "top agricultural interests" were defined and perhaps a statement of the total number of organizations that were considered. The methods are clear and appear to be the most effective strategies to gather the desired data. The discussant appreciates the clarity of the process used to ensure reliability of the data analysis.

Conclusions

The discussion and recommendations of this study should be very beneficial and informative to the agricultural organizations in Ohio. The contrast between the reporting of the organizations and traditional media sources is profound and critical for discussion and development of purposeful media plans by the agricultural organizations to achieve their desired public relations goals to set public news-media agenda. The disparity is striking and an indication that further research in this area is valuable to the agriculture industry. Particularly, the recommendation to examine the sources of leads for the public news-media.

Taking Pulse: Consumers' Attitudes Toward Agriculture and Information Sources

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Abstract

It is imperative that consumers retain confidence in modern agriculture practices because of the positive impact modern agriculture practices have on farmers' ability to produce more food with fewer inputs and limited environmental impact. However, in order to insure this we must first understand what consumers' attitudes currently are toward agriculture organizations providing them the information, and the places they are looking for the information. This study thus aims to understand these very things while setting the stage for further research on how to address consumer concerns. Findings from the national sample survey show that consumers are unsure of their trust in multiple governmental organizations involved in agriculture. More importantly it is also concluded from these findings that while an emphasis has recently been put on social media as a channel for convenient and affordable communication, consumers do not necessarily utilize, or trust, social media regarding food and agriculture information.

Keywords: Agriculture Knowledge, Media Use, Attitude, Information Sources, Social Media

Introduction

Often times, a lack of understanding of farming practices causes criticism by consumers, especially the large majority who are disconnected from the farming industry. In 2012, over 314,000,000 people lived in the United States. However, according to the 2012 Census of Agriculture, of those people, only .3% claimed farming as their primary occupation, and only 2% lived on a farm (U.S. Department of Agriculture, 2012). This physical distance from the farm has certainly reduced agricultural literacy, forging the way for increased scrutiny of production agriculture.

Despite such increased scrutiny, it should be acknowledged that modern production agriculture has done three things remarkably well: produce an abundance of food, kept the price of that food extremely low, and insulate consumers from the volatility of food production (Kruger, 2014). Americans only spend roughly 10% of their household income on food (U.S. Department of Agriculture, 2014), in spite of the tremendous volatility farmers deal with year in and year out. Evidence of farm hardships are prevalent in the media: snowstorms that decimate cattle populations in the Dakotas, drought in the "produce basket" state of California, windstorms in the Midwest, and porcine epidemic diarrhea killing pigs in swaths. Yet, impact on consumer purchases is minimal. Food prices often remain relatively stable while crop yields and prices are volatile (Kruger, 2014). As a result, consumers are not only insulated from food's origins and the practices associated with its fructification, but also to the risk and volatility in production agriculture. Our food systems' ability to produce, store, process, and transport massive amounts of food, combined with urbanization, industrialization, and consolidation, has resulted in very few people knowing how food is produced (Clapp, 2012). "We have moved increasingly away from food being viewed primarily as a source of nourishment and a cultural feature of society, and toward food as any other product that firms produce, sell, and trade" (Clapp, 2012, p. 17). While production efficiency is a valuable tenant of modern agriculture, it is also the underpinning of numerous hurdles for agricultural communicators and educators as many consumers are far removed and lack first-hand experiences.

Purpose of the Study

Recently, numerous agricultural advocacy and public organizations have pushed a call to action that focuses on improving public and policy maker understanding of agriculture and natural resources. A recent House Agriculture Subcommittee hearing on biotechnology, horticulture, and research featured six firsthand accounts from farmers and ranchers on the importance of direct marketing and consumer education. In an opening statement, Subcommittee Chairman Rodney Davis said, "With the average individual being at least three generations removed from production agriculture, strengthening ties between producers and consumers is a particularly worthy goal as we attempt to enact policies that maintain and enhance food security" (Fisher, 2016, para. 2). Davis concluded the hearing by stating that he had "learned that building a relationship of trust with consumers is key in achieving transparency…[and] consumer trust and confidence in today's food system" (Fisher, 2016, para. 7).

It is imperative that consumers retain confidence in modern agriculture practices because of the positive impact modern agriculture practices have on farmers' ability to produce more food with fewer inputs and limited environmental impact. However, in order to insure this we must first understand what consumers' attitudes currently are toward agriculture organizations providing them the information, and the places they are looking for the information. The purpose of this study is to thus understand consumers' attitudes toward agricultural information while setting the stage for further research on how to address consumer concerns.

Research Objectives

This study was guided by the following research objectives:

1. Evaluate sources currently used by respondents to gather food-related information
2. Evaluate respondents' existing attitudes toward the U.S. agriculture industry and food-related public organizations
3. Evaluate respondent's willingness to learn about production agriculture

Literature Review

Agricultural Literacy and Consumer Perceptions

In the early decades of American history, most of the population lived in rural areas and students were exposed to agriculture during their schooling and at home (Jones, 2013). Additionally, in 1862, the U.S. Department of Agriculture was created (USDA, 2000), and shortly thereafter, the Morrill Act was passed. "The drive for agricultural education culminated in the passage" (USDA, 2000, para. 11), which provided federal land to each state to create a public institution that supported an education based in agriculture and related mechanical arts. Although the long-term effects of this act were valuable to agricultural education, the short-term effects left most of the population believing that "no need for instruction in agriculture in the public schools existed because any student who wanted to learn agriculture would go to the land grant college" (Moore, 1987, para. 7).

In the 1920s through the 1940s, the American farmer encountered the Great Depression and the Dust Bowl (Tauger, 2011). As a result of these crises, the number of people who farmed declined. At the same time, the prominence of agriculture in education began to follow the same trend (Van Scotter, 1991), as a shift occurred in teachers viewing agriculture as a career choice rather than an essential part of life (Phipps et al., 2008).

In response to the decreasing profitability of production agriculture and the weakening of agricultural education programs, the National Research Council formed a Committee on Agricultural Education in Secondary Schools in 1988 (NRC, 1988; Jones, 2013). The committee was created to “assess the contributions of instruction in agriculture to the maintenance and improvement of U.S. agricultural productivity and economic competitiveness here and abroad” (NRC, 1988, p. v). In addition, the committee indicated the importance of an agriculturally literate public. They defined an agriculturally literate person as one who understands the food and fiber system including the “history and current economic, social, and environmental significance” of the agriculture sector (NRC, 1988, p. 1). After the release of the NRC’s report in 1988, intense focus was placed on agricultural literacy by academics and various actors of the agricultural industry (AAAE Ad Hoc Agricultural Literacy Work Group, 1992; Phipps et al., 2008).

Because people depend so heavily on the ability of the agriculture industry to produce food, clothing, and raw materials for shelter, researchers have adamantly stated that agricultural literacy and familiarity should be elevated to a high priority in this country (Birkenholz, 1993). Failure to intentionally address agricultural literacy could result in policies being developed and directly influenced by groups and individuals with limited agricultural knowledge and experience, placing the industry in jeopardy of facing poor regulatory administration (Birkenholz, 1993). In addition, Frick published a wealth of literature in the 1990s on agricultural literacy, which he and his colleagues defined as “possessing knowledge and understanding of our food and fiber system,” and having the ability “to synthesize, analyze and communicate basic information about agriculture” (Frick, 1990, p.52). Furthermore, in 2013, Kovar and Ball conducted a synthesis of agricultural literacy research from the past 20 years. They found that “Knowledge and understanding of agriculture is necessary as the global population expands creating compounding issues of feeding the world, while establishing and maintaining a sustainable, viable agriculture system” (p. 175).

Various studies designed to measure the agricultural literacy of the U.S. public as it relates to factual knowledge about industry practices have demonstrated a substantial knowledge gap. For example, survey research that aimed to gain insight into consumers’ knowledge about pork production asked study participants to identify nine statements regarding pigs raised for pork in the United States as true or false (Cummins et al., 2015). Results showed that a majority of responses were incorrect, indicating that respondents are unfamiliar with how pigs are currently raised for pork in the United States (Cummins et al., 2015). Another study evaluated knowledge regarding poultry production found that, while almost 95% of layers are actually raised in cage systems, consumers think that only 37% are housed in these systems (Ward, 2014). Furthermore, Lusk (2010) stated that media surrounding California’s Proposition 2, which aimed to bar the use of cages in egg production, led to an increase in demand for organic and cage-free eggs; a phenomenon likely related to the fact that consumers are relatively unknowledgeable of the issue and are responding to social cues.

Sadly, all sectors of the agricultural industry can suffer from a lack of consumer understanding of agriculture and its practices (Powell, Agnew, & Trexler, 2008). Poor understanding “leads to the public’s questioning of agricultural production methods, animal wellbeing in farm animal systems, the environmental impact of agriculture, the utilization efficiency of resources in agriculture, and the safety of the food supply” (Nordstrom et al., 2000, para. 2). In addition, special interest groups can take advantage of reduced literacy to skew perceptions of agriculture (Doerfert, 2011). A 2010 study by Goodwin found that, while respondents were somewhat knowledgeable about the basic processes of agriculture, “the perceptions and justifications provided were not always accurate” (Goodwin, 2010, p. 116). This study called specifically for additional research that could improve the agriculture industry’s ability to communicate effectively with consumers and the public (Goodwin, 2010). Overall, agricultural literacy research demonstrates a need to inform the public about food production, not only to reduce concern, but also to correct misperceptions and create more transparency and trust regarding the agricultural industry.

Addressing reduced literacy is especially critical given findings that being knowledgeable and familiar with production methods correlates with acceptance and positive perceptions. A study by Hine and Loureiro (2002) indicated that consumers who considered themselves well informed about biotechnology and genetic modification did not appear as concerned about the mandatory labeling of genetically modified foods as those who were less informed. (Grande et al., 1999; Edgar, 2004; Starbird and Walker, 2004).

Attitude Formation

Public perceptions of modern agriculture practices play a significant role in attitude formation regarding risks, benefits, and associated food quality issues. Given the aforementioned information, consumers have a desire to know their food’s origin, as well as the processes and mechanisms associated with its movement through the food system. However, this desire is in direct conflict with their disconnect from the farm and their reduced agricultural literacy. In psychology, an attitude refers to a set of emotions, beliefs, and behaviors toward a particular object, person, thing, or event. Academically, attitude is defined by Cacioppo, Petty, and Crites (1994) as the general and enduring evaluative perception of some person, object, or issue. Similarly, Ajzen and Fishbein (1977) state that attitudes are held with respect to some aspect of an individual’s world, such as another person, physical object, behavior, or policy.

Philosophers Spencer and Bain first used the term attitude in psychology in the 1860s as a way to describe an internal state of preparation for action (Cacioppo et al., 1994). Nearly seven decades later, Thurstone's paper, "Attitudes Can Be Measured," described empirical research on the determinants of attitudes. Using his background in psychophysics, Thurstone defined an attitude as the net affective perception of (or feeling toward) a stimulus (Cacioppo et al., 1994). Since that time, research on attitudes, the determinants of attitude change, and attitude-behavior correspondence have focused on behavioral and social psychology research, with an emphasis placed on attitude change to motivate consumer selections, resolve conflicts, and modify maladaptive behavior (Cacioppo et al., 1994).

Attitudes can be positive, negative, uncertain, or mixed and can be explicit or implicit. Attitudes are generally accepted to be constructed of three components: affective, behavioral, and cognitive (Eagly & Chaiken, 1998). The affective component is an individual’s emotional response (in other words, liking or disliking) to the object or issue, while the behavioral component denotes the individual’s action or observable response to the object or issue. The cognitive component is the belief or perception the individual has regarding an attitude object or issue. According to Ajzen and Fishbein (1975), a belief is information, factual or non factual, an individual has about an object that specifically links the object and an attribute. Beliefs, or conscious representations of fact in the human mind, can refer to oneself, one’s behavior or one’s environment (Aimeur, 1998). Therefore, the cognitive component of attitude construction is directly linked to the cognition an individual has stored in regard to a given object or issue.

Methodology

The quantitative research design for this study included the use of an online survey instrument to evaluate consumers' perceptions toward agricultural practices and where they gather information. The platform used for the distribution of the online survey instrument was Qualtrics, a leading enterprise survey technology company that has been assisting in online market research for more than five years. The researchers utilized the Qualtrics Panels Team to recruit respondents and conduct data collection. Potential respondents are sent an email invitation informing them that the survey is for research purposes only and how long the survey is expected to take. To avoid self-selection bias, the survey invitation does not include specific details about the contents of the survey.

Over the course of five days, the Qualtrics Panels Team collected 212 valid responses for the online survey instrument. Attention checks were used to guarantee that respondents were carefully taking the survey. Any respondents who straight-lined through the instrument or finished in less than one-third of the average survey completion time were removed. Qualtrics was instructed to ensure that the sample collected resembled the U.S. Census Bureau data for resident population by sex, age, race, and hispanic origin for the United States and States: April 1, 2010 to July 1, 2014.

Instrumentation

The researcher-developed survey instrument used in the data collection process was a 66-item online questionnaire divided into four sections, this article will only be addressing two of those sections. Section one of the survey instrument asked respondents about their existing perceptions and attitudes regarding public organizations related to agriculture.

Section two of the survey was designed to gain additional insight into the respondents' motivation to learn about production agriculture as well the sources they currently use to gather food-related information. The first two questions of the section asked respondents about their willingness to visit a working farm operation and a slaughterhouse. The third question of section four asked respondents to provide information about their use of their media sources and their level of trust regarding those sources. Final questions of the survey instrument asked for respondents' demographics.

Validity of the survey instrument was established through a field test by a panel of consumers varying in age, education, and background. These consumers were able to prove insights to strengthen the instrument's content validity and face validity. Based on the field test, several items were rearranged or rewritten for increased clarity.

Results

Demographics

The metrics used to guide subject selection based on 2014 U.S. Census Bureau data. The actual demographics of the respondents were very close to the aforementioned metrics. Of the 212 respondents surveyed, 49.1% (n=104) identified as male and 50.9% (n=108) identified as female. Of the 212 respondents, 12.3% (n=26) were 18 to 24 years of age; 35.8% (n=76) were 24 to 44 years of age; 35.4% (n=75) were 45 to 64 years of age; and 16.5% (n=35) were 65 years of age or older. The age range was 18 to 82 years and the mean age was 45.36. In regard to race, 74.5% (n=158) of the 212 respondents identified as White/Caucasian while 9.9% (n=21) identified as Black/African American, 9.4% (n=20) identified as Hispanic/Latino, 4.7% (n=10) identified as Asian/Pacific Islander, and 1.4% (n=3) identified as Native American/American Indian.

Additional questions used to learn about the sample population asked about buying habits. When asked about time spent reading food labels, 42.9% (n=91) of respondents answered that they "sometimes" spend time reading food labels, while 25% (n=53) answered that they read food labels "most of the time." Furthermore, when asked about buying habits regarding organic food products, 40.6% (n=86) answered that they purchase organic food products "sometimes," while 29.7% (n=63) said they "rarely" purchase organic food products and 14.2% (n=30) said they "never" purchase organic food products. Finally, when asked about consuming food products that contain meat, an overwhelming 93.4% (n=198) answered that they do eat meat.

Objective 1. Evaluate sources currently used by respondents to gather food-related information

In evaluating media use, the survey instrument asked respondents how often (never, rarely, occasionally, often, or very often) they used various media outlets for information regarding agriculture and food production. Media outlets to choose from included newspapers, magazines, websites, social media, television news, fictional television programs, documentary films, fictional films, and other. Media outlets with the highest mean score for use were television news (μ=2.96), websites (μ=2.72), and documentary films (μ=2.58). Media outlets with the lowest mean score for use were fictional television programs (μ=1.89), fictional films (μ=1.99), and magazines (μ=2.11). For the selection of "other," commonly entered answers were "none" (7.5%, n=16), "radio" (1.4%, n=3) and "word of mouth" (3.3%, n=7). Respondents were also asked to rate their level of trust (poor, fair, good, very good, and excellent) in regard to agriculture and food production information sourced from these same media outlets. Media outlets with the highest mean score for level of trust in regard to agriculture and food production information were documentary films (μ=3.37), television news (μ=3.02), and newspapers (μ=2.86). Media outlets for the lowest mean score for level of trust in regard to agriculture and food production information were fictional television programs (μ=1.99), fictional films (μ=2.03), and social media (μ=2.26) (Table 1).

Table 1.*Media Sources for Information Regarding Agriculture and Food Production*

Media Source	Mean score for use	Category selected by the highest number of respondents for use	Category selected by the highest number of respondents for level of trust	Mean score for level of trust
Newspapers	2.36	Never (n=66)	Good (n=62)	2.86
Magazines	2.11	Never (n=76)	Fair (n=68)	2.59
Websites	2.72	Occasionally (n=59)	Good (n=70)	2.85
Social media	2.25	Never (n=86)	Poor (n=62)	2.26
Television news	2.96	Occasionally (n=62)	Good (n=60)	3.02
Fictional television programs	1.89	Never (n=105)	Poor (n=78)	1.99
Documentary films	2.58	Occasionally (n=70)	Very good (n=55)	3.37

Fictional films	1.99	Never (n=98)	Poor (n=71)	2.03

*1= Poor to 5=Excellent

Objective 2: Evaluate respondents' existing attitudes toward the U.S. agriculture industry and food-related public organizations.

The survey instrument employed a matrix table to evaluate respondents' level of trust for nine different public organizations, all of which are connected to agriculture and food production. A large majority of respondents were unsure about their trust levels of these organizations and/or lacked knowledge about the organizations. More than 1/3 of respondents (n=70) answered *not sure* regarding their trust levels of the Food and Nutrition Service (FNS) and the National Institute of Food and Agriculture (NIFA). More than one-fourth of respondents (n=53) answered *not sure* regarding their trust levels of the Food Safety and Inspection Service (FSIS), American Farm Bureau (AFB), Environmental Protection Agency (EPA), and Animal Plant and Health Inspection Service (APHIS). Additionally, more than 1/5 of respondents (n=42) answered that they had *no knowledge* of NIFA and APHIS. Respondents appeared to be most familiar with the Food and Drug Administration (FDA), Centers for Disease Control (CDC), and the United States Department of Agriculture (USDA). When analysis filtered *not sure* and *I have no knowledge of this organization* answers out, respondents rated the FDA, APHIS, FSIS, and the EPA as the *least trustworthy* and the CDC and AFB as *most trustworthy*. Mean values for trust calculated on a 4-point scale ranging from 1-*very untrustworthy* to 4-*very trustworthy* are shown in Figure 1.

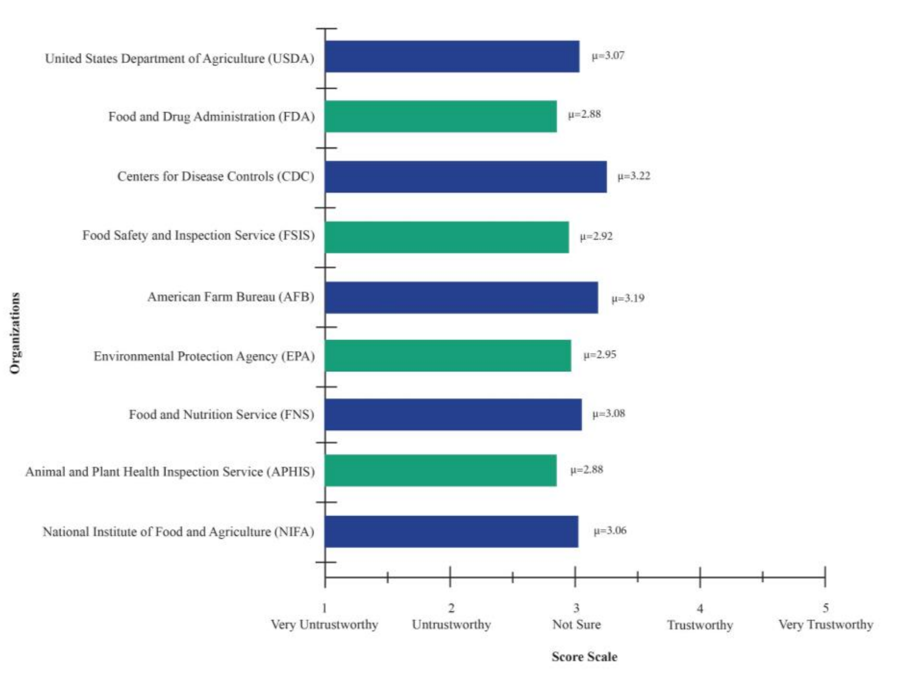

Figure 1. Respondents' level of trust with food-related organizations

Objective 3. Evaluate respondent's willingness to learn about production agriculture

The survey instrument also asked respondents about their willingness to learn more about production agriculture by visiting a working farm operation and a slaughterhouse. More than half of the respondents (51.4%, n=109) said that, if given a chance, they would visit a working farm operation. Fifteen percent (n=30) answered that they have already visited a working farm operation and were glad that they did. However, only 21.2% (n=45) of respondents said that they would visit a slaughterhouse if given a chance. Nearly half of the respondents (49.1%, n=104) said that they would not visit a slaughterhouse because they do not think they would enjoy it.

Conclusions and Recommendations

It appears that a majority of consumers are unsure of both their trust and knowledge of multiple federal agencies that work within the policy field of modern agriculture. For example, levels of public trust are uncertain for the Food and Nutrition Service (FNS) and National Institute of Food and Agriculture (NIFA). While this is not so surprising for NIFA, a federal funding mechanism for advancing the agriculture sciences, it is surprising for the FNS, given that the FNS administers multiple federal domestic nutrition assistance programs. Women, Infants and Children (WIC), the Supplemental Nutrition Assistance Program (SNAP), reduced and free school lunch programs, and 12 other programs meant to improve food access are all administered by the FNS. In fact, the FNS states on their website that their “nutrition assistance programs reach one in five Americans in the course of a year by providing food benefits and nutrition education” (Food and Nutrition Service, 2014, para.3). In addition, while consumers appear to be somewhat familiar with the Food Safety and Inspection Service (FSIS), American Farm Bureau (AFB), Environmental Protection Agency (EPA), and Animal and Plant Health Inspection Service (APHIS) and most familiar with the Food and Drug Administration (FDA), Centers for Disease Control (CDC), and United States Department of Agriculture (USDA), they feel that the CDC and AFB, a non-governmental organization, are most trustworthy. The FDA, APHIS, EPA, and FSIS are considered much less trustworthy than the CDC and AFB. These results support earlier findings that public concern exists regarding the role of the government in regulating modern agricultural practices (Wachenheim & Rathge, 2000). It would appear that, still today, there is a skepticism regarding the ability of public institutions to maintain food safety.

While these data do not explicitly outline whether this skepticism is based in public perceptions that inadequate standards of safety exist or that standards are inadequately enforced, they do provide some insight into this matter, since all four of the agencies found to be least trustworthy are regulatory commissions. In comparison, the CDC is an independent executive agency created to promote public health and safety and the AFB is a nonprofit organization focused on enhancing agriculture. This suggests that enforcement of food safety regulation and supervision remains to be a major concern of U.S. citizens, as it was in 1992, 1999, and 2004 (U.S. Congress, 1992; Tent, 1999; Wilcock et al., 2004)

In regard to consumers use of and trust in various media sources when seeking information about food and production agriculture, results of this study demonstrate that consumers most often rely on television news, websites, and documentary films. Interestingly, of these three, consumers are most trusting of documentary films. This finding is consistent with several recent studies which concluded that documentary films have recently expanded in popularity. According to Patricia Aufderheide, an expert on documentary film at American University's School of Communication, documentaries have become more popular as a distrust of mainstream media has grown (Barrett, 2008). In comparison to mainstream media, viewers see documentarians as truth tellers. This high trust in documentary films makes them an ideal platform for distributing educational information, marketing technology use in food production, and, as a result, reducing cognitive dissonance in consumers.

Media sources least utilized by consumers for food and production agriculture information were fictional television programs, fictional films, and magazines. In addition, sources least trusted were fictional television programs, fictional films, and social media. The mean score for level of trust of food information sourced from social media was 1.11 points lower than that of documentary films. This is intriguing, given the way in which companies and organizations, including those in the agriculture industry, have prioritized social media communications. While consumers may be on social media, they do not necessarily trust the information they see or read on the platforms. While a presence on social media is certainly important, these results demonstrate that, in practice, agricultural communicators' time and energy may be better spent writing press releases or filming documentaries than posting to social media.

Recommendations

Given the results of this study, future research in the field of agricultural communication and education should investigate a number of items. First, it is recommended that this study be replicated with a larger sample population in order to gather more generalizable results. During replication, the researchers suggest that a question for political affiliation be included in the demographic data collection so that results can be compared across political parties. The survey might also include questions about how politically involved and/or motivated the respondents perceive themselves to be, in order to describe their involvement (or lack of) in U.S. policymaking. This information would have been especially useful during this study, since media coverage of both the 2016 presidential campaign and the political climate of the U.S. have been extensive.

Given weak agriculture literacy and illusory superiority, consumers likely overestimate their own familiarity with modern agriculture practices. Because of this, it is recommended that further research be done to understand to what extent consumers over evaluate their familiarity with these practices and how this correlates with their actual literacy level.

The researchers believe that agricultural communicators and educators can make use of the data from this study in a number of ways. First, food-related government organizations need to take an active role in explicitly outlining how food safety enforcement is administered, supervised, and evaluated. The objective of deliberately communicating food regulation with consumers should be to reduce skepticism of government standards and regulatory practices in order to increase confidence and trust in the U.S. food system. Government organizations might look to partner with the non-governmental organization AFB to enhance the reputability of their education and communication materials (due to consumers' higher level of trust in AFB). Additionally, the two different types of organizations might investigate designing a multi-organizational partnership that works to improve both agricultural literacy and federal policy literacy at the same time. This could involve topical publications and educational activities arranged by different organizations that work to achieve the same objectives, including providing transparent information, clarifying concepts, and advocating choice in the food industry.

Furthermore, industry professionals should explore the development of a program that advocates choice for all parties. In a nation filled with diversity, choice in how to live one's life has nearly become a born right. Ideally, such a program would support alternative agriculture methods while also educating consumers on how alternative methods are not realistic for all parties due to issues with financial, physical, and temporal access. Although a small subset of the population is undoubtedly willing to pay higher prices to avoid products produced with modern agriculture practices, most consumers can or will not.

References

American Association for Agricultural Education Ad Hoc Agricultural Literacy Work Group. (1992). Strategies To Promote Agricultural Literacy. American Vocational Association Convention, St. Louis, MO.

Aimeur, E. (1998). Application and assessment of cognitive-dissonance theory in the learning process. *Journal of Universal Computer Science*, 4(3), 216-247.

Ajzen, I. and Fishbein, M. (1975). *Belief, attitude, intention and behavior: an introduction to theory and research.* Reading, MA: Addison Wesley.

Ajzen,I., and Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84, 888-918.

Barrett, M. (2008) American University professor documents the documentary's rise in popularity. Retrieved April 19, 2016 from http://augcluster.american.edu/AU/media/mediarel.nsf/608575dac58ec4a785256869007c9cba/4b2776873408fedd852573f000772f27?OpenDocument

Birkenholz, R. H. (1993). *Pilot study of agriculture literacy; Final report.* Washington, D.C.: U.S. Department of Agriculture.

Cacioppo, J., Petty, R. and Crites, S. 1994. Attitude change. *Encyclopedia of Human Behavior*, 1(36), 261-270.

Clapp, J. (2012). *Food.* Cambridge, England: Polity Press.

Cromartie, J. (2015). Population migration. Retrieved April 19, 2016 from http://www.ers.usda.gov/topics/rural-economy-population/population-migration.aspx

Cummins, A., Olynk Widmar, N., Croney, C., and Fulton, J. (2015). Perceptions of animal agriculture and meat products: Spotlights on Indiana, Illinois, Michigan, Ohio and Wisconsin. Center for Animal Welfare Science, Purdue University. Retrieved April 8, 2016 from http://www.vet.purdue.edu/CAWS/files/documents/062215-5stateWhitePaper.pdf

Curtis, K. R., and Cowee, M. W. (2011). Buying local: Diverging consumer motivations and concerns. *Journal of Agribusiness* 29(1), 1-22.

Doerfert, D. L. (2011). National research agenda: American Association for Agricultural Education's research priority areas for 2011-2015. Lubbock, TX: Texas Tech University, Department of Agricultural Education and Communications.

Eagly, A. and Chaiken, S. (1998). Attitude structure and function. *Handbook of Social Psychology*, 4(1), 269-322

Edgar, J. (2004). Future impact of food safety issues on animal production and trade: implications for research. *Australian Journal of Experimental Agriculture*, 44, 1073–1078

Fisher, K. (2016). Direct Marketing is invaluable for consumer education on agriculture. Retrieved April 08, 2016, from http://nfu.org/opportunities-and-challenges-in-direct-marketing/4131

Frick, M.J. (1990). A definition and the concepts of agricultural literacy: A national study. Unpublished doctoral dissertation, Iowa State University, Ames.

Goodwin, J. N. (2010). Knowledge and perceptions of agriculture practices and legislation related to social influences as predictors of voting on agriculture policy (Master's thesis). The Ohio State University, Columbus, OH.

Grande, J., Bjornstadt, E., Wilson, M. and Hanley, N. (1999). Assessment of consumer risk attitudes and behaviour related to countermeasures and radioactive contamination of food. Retrieved April 8, 2016, from http://www.sbes.stir.ac.uk/research/projects/ceser/x.acra.pdf

Hine, S. and Loureiro, M.L. (2002). Understanding consumers' perceptions toward biotechnology and labeling. Paper Presented at the American Agricultural Economics Association Annual Meeting, Long Beach, CA, July 28-31, 2002.

Jones, C. (2013). An assessment of agricultural literacy: What incoming freshmen at Oklahoma State University know about the food and fiber system. Electronic thesis. Oklahoma State University, Stillwater, OK.

Kovar, K. A., & Ball, A. L. (2013). Two decades of agricultural literacy research: A synthesis of the literature. *Journal of Agricultural Education*, 54(1), 167–178.

Kruger, C. (2014). The disconnect between the production and consumption of food. Retrieved April 08, 2016, from http://csanr.wsu.edu/production-and-consumption-disconnect/

Lusk, J. L. (2010). The effect of proposition 2 on the demand for eggs in California. *Journal of Agricultural & Food Industrial Organization*, 8(1), 1–20

Moore, G. E. (1987). The status of agricultural education prior to the Smith-Hughes act. *The Agricultural Magazine*, 59(8). Retrieved from http://grove.ufl.edu/~groberts/History/moore-pre-smith0hughes.html

Nordstrom, P.A., Wilson, L.L., Kelsey, T.W., Maretzki, A.N., & Pitts, C.W. (2000). The use of focus group interviews to evaluate agriculture educational materials for students, teachers, and consumers. *Journal of Extension*, 38(5).

National Research Council. (1988). *Understanding agriculture: New directions for education*. Washington, DC: National Academy Press.

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. (2008). *Handbook on agricultural education in public schools*. Clifton Park, NY: Thomson Delmar Learning.

Powell, D., Agnew, D. and Trexler, C. (2008). Agricultural literacy: Clarifying a vision for practical application. *Journal of Agricultural Education,* 49(1), 85-98.

Starbird, S.A. & Walker, G.A. (2004). Determinants of consumer perceptions of food safety risk. Paper presented at IAMA, Montreux, Switzerland, June 12, 2004.

Tauger, M. B. (2011). *Agriculture in world history*. New York: Routledge

Tent, H. (1999). Research on food safety in 21st century. *Food Control*, 10, 239–247.

United States Congress. (1992). A New Technological Era for American Agriculture–Office of Technology Assessment, OTA-F474. Washington, DC: U.S. Government Printing Office.

United States Department of Agriculture. (2000). A condensed history of American agriculture 1776-1999. Retrieved April 20, 2016 from http://www.usda.gov/documents/timeline.pdf

United States Department of Agriculture (2012). 2012 Census of Agriculture Preliminary Report: Washington, D.C. Retrieved December 15, 2015 from http://www.agcensus.usda.gov/Publications/2012/Preliminary_Report/Highlights.pdf

United States Department of Agriculture. (2014). Americans' budget shares devoted to food have flattened in recent years. Retrieved April 08, 2016, from http://www.ers.usda.gov/data-products/chart-gallery/detail.aspx?chartId=40094

Van Scotter, R. D. (1991). *Public schooling in America: A reference handbook*. Santa Barbara, CA: ABC-CLIO.

Wachenheim, C., & Rathge, R. (2000). *Societal Perceptions of Agriculture.* Agribusiness and Applied Economics Report, No. 449. Retrieved April 19, 2016 from http://www.worldcat.org/title/societal-perceptions-of-agriculture

Ward, Jonathan. (2014). From battery cages to barns: A cost-benefit analysis of a national standard for cage-free egg production. Center for Public Policy Administration, Capstones. Paper 34. Retrieved April 19, 2016 from http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1031&context=cppa_capstones

Wilcock, A., Pun, M., Khanona, J. & Aung, M. (2004). Consumer attitudes, knowledge and behavior: a review of food safety issues. *Trends in Food Science & Technology,* 1, 56–66

Taking Pulse: Consumers' Attitudes Toward Agriculture and Information Sources

Discussant Remarks

Donna Westfall-Rudd

Conceptual framework

While not explicitly stated, this discussant understands the conceptual framework to be grounded in attitude formation and in particular, the components of attitude, "The affective component is an individual's emotional response (in other words, liking or disliking) to the object or issue". A general observation is that this portion of the manuscript would benefit from the clear statement of the conceptual framework in which the study is based.

Methodology

It appears that the researcher used a well-developed quantitative methodological plan for data collection. The effort to conduct an attention check of the response is especially appreciated. One question of the discussant is the reasoning behind only reporting a portion of the findings for two of the survey sections. One note regarding the reporting of the findings, providing comprehensive numeric demographic data in paragraph form is always a challenge for the reader.

Conclusions

The most intriguing finding is that of consumer reported lack of trust in social media and the contrast between agricultural business investment in social media versus other communication methods. As the researchers suggest, this is a valuable finding for those in agricultural business charged with creating communications efforts. One caution for the researchers is what might be some disconnect between the reported findings and the final paragraph of recommendations regarding public education on alternative production methods. It is unclear where this directly connects to the findings reported here.

Examining Rural Community Planning: A Community Viability Indicator (CVI) Model

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Abstract

Community development initiatives must drive change to ensure fading rural municipalities are able to thrive and become viable communities. The community viability indicator (CVI) model, which includes community vision, sustainable infrastructure, capable leaders, and community sentiment as intertwined constructs, provides a basis for examining community development to increase overall community viability. We conducted a case study utilizing a concurrent, sequential, multi-phase mixed methods document analysis to examine four town development plans in comparison with the regional plan. Economic opportunities with a focus on historical, cultural, and tourism opportunities, partnerships, and citizen input emerged as themes within this case study. The regional plan yielded higher inclusion of CVI constructs. Community developers are including CVI constructs within their plans, but could still benefit from utilizing the CVI model in the planning process to incorporate the constructs and increase community viability.

Introduction

Rural communities today are facing a multitude of economic and ecological hardships. Within the United States, rural counties represent 85% of persistent-poverty (USDA Rural Development, 2016). Community development initiatives, which promote overall community viability, are essential for driving change and ensuring fading communities thrive. Community development occurs when individuals work collaboratively in productive and non-exploitative ways to improve collective conditions for all individuals (Blackshaw, 2010). A viable community is sustainable, resilient, and provides inhabitants with sources of income and meaningful lives (Aarsaether, Riabova, & Barerenholdt, 2004).

Many rural communities have internal and external resources and assets available to drive change and increase societal capacity (Magis, 2010). Within community development, leaders should engage community members within the examination of motivation, enthusiasm, attitudes, informal leadership, needs, access, and relationships (Cavaye, 2001). The Community Viability Indicator (CVI) model provides a framework for considering community resources and initiatives through the intertwined constructs of community sentiment, capable leaders, community vision, and sustainable infrastructure (Hogg et al., 2016).

Through a CVI lens, a community's successes and failures can often be attributed to a lack in one or more of the constructs (Hogg et al., 2016). For instance, the implementation of a community vision is greatly impacted by a lack of community sentiment and investment by community members (Wang & Pfister, 2008). Capable leaders are required to ensure the community vision is shared by and with local residents. When creating community development plans, leaders, community members, and Extension personnel can use the CVI model to understand the connectivity within their community and indicators of potential assets and barriers (Hogg et al., 2016).

Hogg et al. (2016) posit communities can benefit from using the CVI model to consider micro- and macro-level issues within the community development planning process. Within the state of Virginia, it is required for local planning commissions to develop and periodically update a comprehensive plan (Commonwealth of Virginia, 2017). These plans require assessment and studies to predict probable outcomes with existing conditions and current trends within the community. According to the Code of Virginia (Commonwealth of Virginia, 2017):

> The comprehensive plan shall be made with the purpose of guiding and accomplishing a coordinated, adjusted and harmonious development of the territory which will, in accordance with present and probable future needs and resources, best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants, including the elderly and persons with disabilities (para 2).

These comprehensive plans provide an avenue for exploring how constructs of the CVI model are already incorporated within the community planning process through preconstructed documents. With this insight, universities, Extension personnel, and agricultural educators will be better situated to connect the usage of the model with community partners. Therefore, this case study sought to examine town comprehensive plans within southwestern Virginia for connections to the CVI model.

Community Viability Indicator (CVI) Model

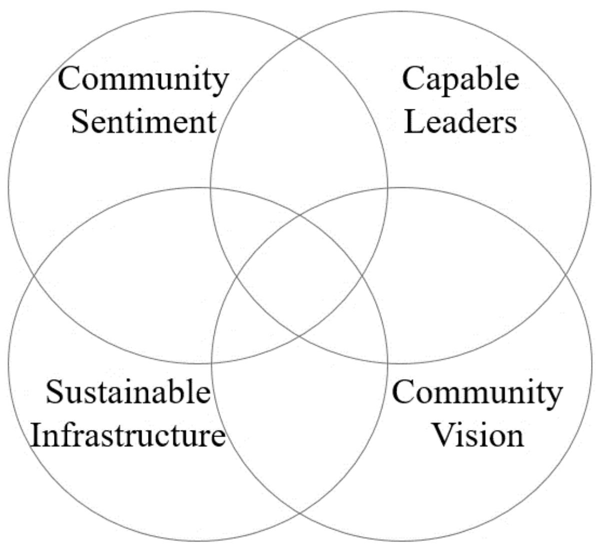

Figure 1. Community Viability Indicator (CVI) Model developed by Hogg et al. (2016)

The CVI model is a conceptual framework that encompasses capacities and conditions for a viable community (Figure 1). Within the CVI model, a viable community is one that is sustainable, resilient, and provide opportunities for citizens to lead meaningful lives (Hogg et al., 2016). Under this definition, sustainability represents social, economic, environmental, and institutional properties as an interconnected principle (Valentin & Spangenberg, 2000). Sustainable communities are those who have longevity within their community assets and are able to adapt and change over time for continuous growth. Resilient communities thrive in the face of unexpected change, unpredictability, and times of uncertainty (Magis, 2010). Additionally, community members must be able to see their own futures within the community. Through an extensive literature review with a theoretical foundation based on diffusion of innovations theory, psychological sense of community theory, and the community capitals framework (Flora, Flora, & Gasteyer, 2015; McMillan & Chavis, 1986; Rogers, 2003), capable leaders, community sentiment, sustainable infrastructure, and community vision emerged as interconnected constructs that predict community viability.

Theoretical Framework

Diffusion of innovations theory, psychological sense of community theory, and the community capitals framework serve as a theoretical basis for the CVI model. Diffusion of innovations theory provides insight on the paradox of social change (Rogers, 2003). Communities must be sustainable and resilient to be viable. In order to be viable, it is essential for communities to be open to and respond to change by accepting innovation initiatives. However, these initiatives must be attentive to community members' sense of community (McMillian & Chavis, 1986). This involves assessing membership, influence, integration, and fulfillment of needs for communities and their members. Community capitals framework provides a basis for understanding attributes, which contribute to community outcomes (Flora & Flora, 2008). Community capitals provide a foundation for community development enterprises and contribute to considerations for bolstering viability.

Conceptual Framework

Based on a theoretical framework and previous literature, Hogg et al. (2016) developed the CVI model to encapsulate essential components for viable communities. Community sentiment, capable leaders, sustainable infrastructure, and community vision emerged as indicators for conditions and capacities for viable communities. These indicators are interrelated and intertwined. For example, community sentiment is increased when capable leaders engage community members within the development process of a community vision. Capable leaders identify and bolster sustainable infrastructure through the development and belief in a community vision. A community vision is generated through capable leaders and community sentiment to increase sustainable infrastructure. An enterprise to increase sustainable infrastructure entails capable leaders, a community vision with longevity, and community support and sentiment.

The constructs all relate and contribute to the theoretical foundation in varying ways. Diffusion of innovations theory provides a pathway for capable leaders to drive community sentiment to strengthen a community vision, which aims to increase sustainable infrastructure. Psychological sense of community theory provides insight on the role of community sentiment. Within this theory, positive community sentiment is the basis for capable leaders, likelihood of building a sustainable infrastructure, and the probability of community vision adoption. Community capitals have a bi-directional relationship with the CVI model and are the basis for considering the indicators of community viability. Conversely, the CVI model also provides a conceptual model for examining capitals, assets, and attributes.

Community vision. Herbert-Chesire and Higgins (2004) postulated a community vision as "the key to improving the sustainability of disadvantaged regions and providing local people with the capacities to respond positively to change" (p. 289). Globalization challenges many rural communities to reexamine their community's developmental trajectory and consider how change efforts may benefit their community's growth and sustainability. Successful communities embrace change and are consistently implementing new innovations. To create a strong community vision, historical successes and failures must be examined to ensure community change is situated towards clear goals for thriving (Skerratt, 2013).

Rural communities must implement strategic thinking to vision for long-term planning efforts, which capitalize on community strengths and assets. Agritourism and historic perseveration initiatives are just two examples of ways rural communities utilized community visioning to increase local community viability (Wang & Pfister, 2008). A community's vision requires capable leaders who believe and openly support the vision, community sentiment and support from members, and an investment in sustainable infrastructure (Hogg et al., 2016).

Capable leaders. Capable leaders are crucial to a community's viability and are often directly related to the success, failure, and longevity of local initiatives (Beer, 2014). Institutional leaders, grassroots leaders, and the power elite all play distinct roles as capable leaders, and are the primary groups associated with decision-making and community action processes (O'Brien, Hassinger, Brown, & Pinkerton, 1991; Poplin, 1972). Institutional leaders are often appointed and have the role of representing the community through articulation of a clear vision, support for all community members, and providing an open climate for community member participation in community-based issue discussion (O'Brien, Raedeke, & Hassinger, 1998). Grassroots or opinion leaders do not always have formal authority, but often challenge the status quo and represent a voice, which other citizens acknowledge (Kezar & Gehrke, 2014).

These individuals engage within the community through local organizations and serve as indicators for community support of initiatives and reexamination of proposed goals. Finally, the power elite are those with the highest wealth, economic power, and/or personal influence (Poplin, 1972). The power elite have wide based networks and resources that provide assets for community collaboration (Beer, 2014). For these groups to work collaboratively, communities must acknowledge the importance of dispersion of power and leadership through community participation (Hogg et al., 2016). Capable leaders provide a voice for all community members to ensure that problem-solving efforts drive cohesion within the community.

Community sentiment. Community pride, engagement, heritage, culture, and values all impact overall community sentiment. Community sentiment emerges organically through community members' ties and personal interactions within their communities (Hogg et al., 2016). This construct determines culture, values, and dynamics within individuals and requires a bi-directional relationship between the individual and their community (Lysgård, 2016). Within these relations, each individual plays a role within their community and their community provides services to the individual.

A shared community identity arises when community members feel a strong bond to their community and fully understand how they fit into the schema (Blackshaw, 2010; Emery, Fey, & Flora, 2006). Shared community identity and sentiment are not created, but emerge organically. However, efforts driven on community tradition, heritage, and multi-generational memories can increase enthusiasm within communities and ultimately lead to a community where residents feel more invested (Lysgård, 2016, Wall, 1999). The key to these endeavors is a participatory nature and relevance to community members (Deweese-Boyd, 2005; Glenzer, Peterson, & Roncoli, 2011). Community sentiment has the capacity to drive initiative, indicate capable leaders, and bolster infrastructure development through community engagement and support.

Sustainable infrastructure. Within the CVI model, sustainable infrastructure is the most tangible construct. When considering investment initiatives, viable communities develop structures, which last over time, and have minimal ecological impact (Parrish & Chester, 2014). Additionally, accessibility, safety, and inclusivity must all be considered to ensure infrastructure enables the creation of for social and cultural capital (Cabrera & Najarian, 2015). For instance, sidewalks, trails, downtown shopping areas, and walkable spaces all encourage community engagement (Leyden, 2003). Sustainable infrastructure also encompasses social infrastructure including: social services, healthcare, food access, and social stability. Both physical and social infrastructure act as the building blocks for further community development. Communities require sustainable infrastructure to drive economic stability and growth.

Central themes. Sustainable infrastructure, capable leaders, community vision, and community sentiment are interconnected and overlapping indicators of community viability. From a sociological perspective, it would be rare for one construct exist without the influence of another. Power, resilience, sustainability, and the opportunity to lead a meaningful life serve as the items, which intersect in the middle of the indicators. Power is an undercurrent to all aspects of a community impacting change efforts, assets, and community attributes (Ricketts & Place, 2009). Communities must be sustainable and resilient in all indicators of the CVI model to be a true viable community. Additionally, improved well-being of all community members must be central to all concepts of community viability. Communities must keep in mind the central themes, while examining CVI components.

Purpose and Research Questions

The purpose of this case study was to explore if comprehensive plans of southwestern Virginia already incorporate components of the CVI model. This research aligns with research priority 6 of the American Association for Agricultural Education National Research Agenda, *Vibrant, Resilient Communities* (Graham, Arnold, & Jayaratne, 2016) by providing a model for examining indicators of community viability and increasing capacity within rural communities. We used a mixed method, document analysis design to explore the following questions:

RQ 1: Do comprehensive plans of southwestern Virginia communities include any constructs of the CVI model?

RQ 2: Within comprehensive plans of southwestern Virginia communities how are components of the CVI model incorporated?

RQ 3: What are the similarities and differences between a regional comprehensive plan and the comprehensive plans of communities within the region?

Methodology

We completed this case study utilizing a concurrent, sequential, multi-phase mixed methods document analysis with a qualitative priority. The process of document analysis includes finding, selecting, appraising, and synthesizing data from the selected documents (Bowen, 2009). We selected a sample of town comprehensive plans based on the following criteria: population density, publication year, geographic location, and availability of a comprehensive plan. We collected data collected concurrently and incorporated inductive and deductive analysis techniques. Table 1 includes the research design, which incorporated a sequential approach to qualitative analysis with both pre-set and emergent thematic coding procedures. We employed an inclusion rubric developed prior to data analysis for quantitative analysis. We chose a mixed method analysis design to capitalize on each individual method and provide a robust analytical design (Curry, Nembhard, & Bradley, 2009).

Table 1
Research Design: Research Approach, Analysis, and Outputs for Each Research Question

Research Question	Approach	Analysis and Outputs
RQ1: Do comprehensive plans of southwestern Virginia communities include any constructs of the CVI model?	Qualitative	We employed thematic coding for statements referring to any construct within the CVI model
RQ2: Within comprehensive plans of southwestern Virginia communities how are components of the CVI model incorporated?	Mixing	We coded articles with pre-set codes for each priority and association to each CVI construct. We used an inclusion rubric to score data. We examined previous thematic codes for each CVI construct priority.
RQ3: What are the similarities and differences between a regional comprehensive plan and the comprehensive plans of communities within the region?	Mixing	We examined scores on the rubric and thematic codes for each construct in comparison to the regional plan

The data collection process began with attainment of a regional development plan. We chose the specific region based on the researchers' knowledge of current community viability initiatives within the geographic area. Next, we attained all comprehensive plans from individual locales produced since 2010 with a population of less than 10,000. We excluded locales with county rather than individual town plans from the sample. The population yielded 10 potential plans for the sample. Out of the 10 plans, we excluded five based on population and one because it was a county-wide plan. From the search, we attained and selected four comprehensive plans for document analysis. We removed all identifying information from the documents for analysis.

We performed an iterative process, which combined content and thematic analysis, through superficial examination, thorough examination, and interpretation (Bowen, 2009). The content analysis began by reading each document and extracting relevant passages to the CVI model (Corbin & Strauss, 2008). This superficial examination allowed the researchers to separate any passage that was pertinent to the study and could be associated with a CVI construct. To answer the first research question, we open-coded the extracted passages with analytical codes (Corbin & Strauss, 1990, 1990). In phase one, we examined the analytical codes for patterns and emergent themes.

In phase two, we coded each extracted passage with pre-set codes relating to the constructs of the CVI model: community sentiment, capable leaders, community vision, and sustainable infrastructure. We determined each passage for priority to one of the four constructs. After being labeled as one of the four constructs, we then coded the passage for incorporation of other constructs. For instance, we found a passage to be primarily focused on community vision, but it mentioned capable leaders, we coded the passage with priority for community vision and incorporation of capable leaders. We then coded the purpose or vision statement for integration of

CVI model constructs. We developed a rubric prior to coding to quantize the qualitative data (Pearce, 2012). We scored purpose/vision statement, community sentiment, capable leaders, community vision, and sustainable infrastructure individually on a scale of zero to four. The rubric, featured in Table 2, has a maximum total score of 20.

Table 2

CVI Model Construct Inclusion Rubric

	0	1	2	3	4
Purpose/Vision Statement	Not Included	Includes one of the CVI model constructs	Includes two of the CVI model constructs	Includes three of the CVI model constructs	Includes all of the CVI model constructs
CVI Construct	Does not mention construct	Includes construct ten times or less	Includes construct more than ten times, but does not make a connection to other constructs	Includes construct more than ten times and makes a connection to at least one other construct	Includes construct more than ten times and makes a connection to all other constructs

Note. We scored each plan individually for each CVI construct: community sentiment, sustainable infrastructure, community vision, and capable leaders. Scores were out of 20 points.

We scored each of the four town comprehensive plans and the regional plan on the rubric. We then examined the analytical codes in relation to the pre-set codes. We examined patterns within each construct for each plan for emergent themes. To answer question three, we compared the mean score of the town plan to the regional plan's score on the rubric for observable differences. Finally, we compared the emergent themes identified for each construct within each town plan to the regional plan's emergent themes.

In qualitative analysis, it is important to acknowledge how our own biases, values, and background mold the findings in the study (Creswell, 2013). To increase authenticity, credibility, and trustworthiness (Creswell & Miller, 2000), we prepared the following reflexivity statement regarding our backgrounds and connections to the study:

> Both researchers live within the selected geographic area and had prior knowledge of community viability initiatives. Additionally, both researchers collaborated with others in the development of the CVI model. To mitigate biases, we incorporated reflection and biases monitoring through the process to reduce impact on the study. This process included extracting passages associated with CVI constructs and multiple rounds of coding as separate processes.

Results

To answer the first research question, we open-coded each of the town plans and examined patterns for emergent themes. Three themes, economic opportunities through community assets, citizen input, and partnerships, and two sub-themes, historical and cultural opportunities and tourism opportunities, emerged from the initial open coding process.

Economic Opportunities through Community Assets

Throughout the plans, utilization of community assets to bolster economic opportunities was pervasive. These communities understood their assets and aimed to find ways to capitalize for continued economic development and employment opportunities. One community focused on their agricultural assets by purposing "the perpetuation of viable farms and the promotion of sound farming techniques are therefore important to the entire community" (Plan 2). This passage discussed the importance of upholding agricultural practices, which would be viable for generations and generate revenue to the community. Another discussed the importance of being selective with development "the town can benefit economically and socially by preserving open spaces and even profit by not developing on these sites" (Plan 4). This town recognized the importance of utilizing natural assets for community economic development. This theme included historical and cultural opportunities and tourism opportunities as sub-themes based upon their prevalence as economic opportunities for use of local assets.

Historical and cultural opportunities. These rural communities identified their rich histories and culture as opportunities for economic development and driving revenue to increase local infrastructure. Town plans frequently discussed preserving historic buildings as an opportunity to receive financial support to restore local landmarks and rebuild their downtown areas. Plan 1 included the following statement: "The Town should also continue to raise awareness of the availability of historic rehabilitation tax credits for qualifying structures in the Town's residential historic districts." Aside from preserving historical buildings, communities saw the potential benefits for capitalizing upon local culture for development of their downtown areas. "The Downtown area of [Town 2] is a cultural jewel that provides social and commercial capital for the Town, County, and region" (Plan 2). Plan 2 recognized the importance of a downtown area for not only economic development, but also for increasing social capital.

Tourism opportunities. "The Town recognizes the increasing importance of tourism to the local economy" (Plan 3). The community plans shared this view of tourism. Plan 3 also included this passage "by promoting the area's river and mountain assets, the Town and its partners will help tourism make a growing contribution to the economy of the [Town 3] area." This passage explicitly states how the town intends to use natural assets to increase tourism within the community. Similarly, plan 4 discussed ecological value in relation to tourism, "fish and wildlife are important resources to the [Town 4]. In addition to their ecological value, these resources help draw tourists and outdoor recreation enthusiasts to the area." This community saw value in their recreational opportunities for tourism.

Citizen Input

The documents included various different discussions related to citizen input. Some discussed the importance of engaging citizens with community planning and development processes. For example, "ensure the sustainability of the rural life and local heritage through citizen input and involvement" (Plan 2). Here the town recognizes the importance of buy-in from community members. Others mentioned goals and objectives driven from community member surveys and evaluations. Plan 3 states "the people [Town 3] recognize that growth and economic development can improve the quality of life." This town incorporated this passage from community input gathered prior to development of the plan. Although the type of citizen input varied, all plans discussed the importance of citizen input in development processes.

Partnerships

The plans discussed the importance of partnerships for community success. Partnerships ranged from local to regional to statewide to global. However, the most common discussion of partnerships was around the importance of maintaining local partnerships for the benefit of citizen engagement. One community discussed the importance of working collaboratively on community activities. “A goal for the Town is to work towards better communication with these various organizations and increased cooperation and coordination of activities” (Plan 3). Another saw the goal of partnerships to increase community investment. “Work with partner organizations, businesses, and citizens to maintain and improve an atmosphere that encourages investment in the community” (Plan 1). Within these two examples and throughout the plans, communities viewed partnerships as ways to add benefit to the community by increasing opportunities for growth and an overall sense of belonging for citizens.

After examining emergent themes, each extracted passage underwent a second round of coding with pre-set codes for priority to one of the four CVI model constructs: community vision, capable leaders, community sentiment, and sustainable infrastructure. If the passaged had a connection to more than one construct, we sub-coded the additional constructs. We determined priority based on the construct, which was dominate in the passage. We then used the codes to quantize the data through an inclusion rubric. Scores for each construct and total scores out of 20 are included in Table 3. The regional plan had the highest score of 18 with plan 4 scoring the lowest at 13. Community vision and community sentiment had the highest mean score of 3.75. Purpose (*M*=2.50) and capable leaders (*M*=2.25) yielded the lowest means, respectively. The regional plan received a 4 for capable leaders. The regional plan generated higher scores on all constructs except for sustainable infrastructure.

Table 3

Town and Regional Scores for Each Category, Total Scores, Means of Town Scores

Plan	Purpose	Community Vision	Capable Leaders	Community Sentiment	Sustainable Infrastructure	Total
1	3	4	3	4	3	17
2	3	4	1	4	3	15
3	2	4	4	3	3	16
4	2	3	1	4	3	13
	M	*M*	*M*	*M*	*M*	*M*
	2.50	3.75	2.25	3.75	3.00	15.25
Regional	3	4	4	4	3	18

Note. Mean scores were determined for the town scores to be compared to the regional score.

To compare the individual town plans with the regional plan, we compared the open codes from phase one to the codes from round two relating to the CVI model. We then identified emergent thematic patterns for each construct for each individual plan (Table 4). Emergent thematic patterns for each construct yielded some notable differences between the regional plan and individual community plans. Overall, the regional plan had a higher focus on people. For example, within the plan it stated:

> The [Region] sees its people as its greatest resource for economic sustainability. We recognize thot in order for our area to be prosperous, our people must have the tools, resources, and education necessary to reach their full potential as citizens, workers and leaders.

This passage captures the investment the region has in the inhabitants and developing their skills for community viability. This was prevalent throughout passages coded with a community vision priority with community engagement and partnerships being common themes. The four town plans discussed leadership in terms of identifying leaders, explaining their role in partnerships and utilizing the views of citizens for plan implementation. Plan 2 did discuss the importance of utilizing leadership to build a sense of community. However, the regional plan dedicated a large section of the plan to discussing citizen advancement and workforce skills and programs for both adults and youth. This passage represents an overview of the section, "The Leadership category highlights opportunities in the [Region] for promoting and sustaining leadership development and engagement in our local and regional community."

The regional plan also varied in the discussion of sustainable infrastructure with a higher focus on education and human services for the betterment of local citizens to promote economic success. The plan noted a goal "to train and re-train workers for higher skills and productivity in the 21st Century economy." Additionally, the plan then discussed skill advancement as a way to increase the economic opportunities for individuals and the community as included in this goal "to enhance and link the region's labor skills and technology advantages to improve wage levels." Community sentiment had similar patterns in themes. The following passage includes an exemplar understanding of community sentiment taken from the regional plan: "The Natural and Cultural projects represent the importance our citizen's place on the often intangible aspects of quality of life that can make a place one that people are proud to call home."

Table 4

Emergent Thematic Patterns for each Construct

Plan	Community Vision	Capable Leaders	Community Sentiment	Sustainable Infrastructure
1	Increase sense of community, Economic opportunities, Community Assets	Identified institutional leaders, Partnerships, role of citizens views	Community organizing, Citizen investment, tourism, and Historic/Cultural Opportunities	Community assets, Community opportunities, Partnerships, Community issues
2	Opportunities, Historical/cultural preservation, Citizen views	Institutional leaders identified, Sense of community	Citizen Engagement, Historic/Cultural, Agriculture	Community opportunities, Community assets, Citizen views, Partnerships
3	Citizen investment, Community opportunities, Community assets	Institutional leaders identified, Partnership, the role of citizen views	Citizen Engagement, Historic/Cultural Opportunities, Tourism	Community assets, Economic opportunities, Partnerships, Community issues

4	Economic opportunities, Citizen views, community opportunities with community assets	Partnerships and the role of citizen views	Sense of belonging, Citizen Views, Historical/cultural preservation	Economic opportunities, Community assets, Partnerships
Regional	Citizen engagement, Economic opportunities, Partnerships	Citizen advancement, Workforce skills and programs	Historical/Cultural opportunities, Tourism, Citizen engagement	Economic opportunities, Education, Human services

Note. Thematic patterns were derived from sorting CVI model construct priority and the codes from the first phase open-coding process.

Conclusions and Implications

Communities could benefit from the usage of the CVI model with consideration to micro- and macro-level issues within the community development process (Hogg et al., 2016). Within this exploratory case study, we uncovered the constructs from the CVI model throughout community development plans and a regional plan. The town plans discussed community sentiment, capable leaders, community vision, and sustainable infrastructure through the emergent themes: economic opportunities, partnerships, and citizen input. The town plans included initiatives for tourism, historic preservation, and cultural initiatives to drive economic development. Within the CVI model, these initiatives are suggested for inclusion within a community vision to drive community sentiment and increase infrastructure (Wang & Pfister, 2008).

The results indicate components of the CVI model are evident within community development plans. Citizen input is postulated to increase community sentiment and investment of community members (Hogg, Bush, Rudd, & Seibel, 2016). Partnerships are incorporated as opportunities for the power elite and capable leaders to increase networks and community collaboration for development of a sustainable infrastructure. Citizen input and partnerships were emergent themes, but not readily discussed as a part of capable leadership. Developing capable leaders was a primary focus of the regional plan. However, the town plans primarily discussed leadership in terms of identifying leaders, explaining their role in partnerships, and utilizing the views of citizens for plan implementation. These rural communities should continue to explore the importance of building leaders.

Universities, Extension personnel, and agricultural educators have a critical role in increasing resiliency and building capacity through community outreach programs (Graham et al. 2016). The CVI model provides a framework for increasing knowledge and understanding of the mechanics of one’s community to increase rural community viability. Outreach programs, which are developed with the model in mind, stand to further community development initiatives and drive community change.

Recommendations

There are clear ties between the CVI model and existing plans. Education on the framework and a purposive effort to plan around the framework may lead communities to more robust planning and eventually, more resilient communities. We recommend that Virginia Cooperative Extension utilize this framework in community viability efforts. This framework stands to provide a different avenue for communities to consider how each portion of their community development plan is impacted through multiple different constructs.

We found less than optimal ties between the regional and local plans, we recommend a concerted effort for regional and local leaders to work together on planning efforts. Rural leaders and communities need to exploit all resources available to increase viability. The regional plan efforts provide further resources for local communities. Additionally, communities within the area will require variety of tourism initiatives to not overrun their geographic area with the same amenities. By working together regionally, communities can find diverse ways to use historical and cultural opportunities, which differ from neighboring locales.

While the existence of the components of the framework are evident there is no evidence of the effectiveness of the components on community viability. We recommend research be conducted using the CVI model to frame community planning. The research should be longitudinal with measures of viability as explained by capable leaders, sustainable infrastructure, community vision, and community sentiment. Citizen input and partnerships with universities, Extension personnel, and agricultural educators will be essential in this endeavor.

References

Aarsaether, N., Riabova, L., & Baerenholdt, J. O. (2004). Community viability. *Arctic Human Development Report*, 139-153.

Beer, A. (2014). Leadership and the governance of rural communities. *Journal of Rural Studies*, *34*, 254-262. doi:10.1016/j.rurstud.2014.01.007

Blackshaw, T. (2010). *Key Concepts in Community Studies.* Thousand Oaks, CA: Sage Publications.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27-40. doi:10.4135/9781452270043

Cabrera, J. F., & Najarian, J. C. (2015). How the built environment shapes spatial bridging ties and social capital. *Environment and Behavior, 47*(3), 239-267. doi:10.1177/0013916513500275

Cavaye, J. (2001). Rural community development- New challenges and enduring dilemmas. *The Journal of Regional Analysis & Policy, 31*(2), 109-124.

Commonwealth of Virginia. (2017). Code of Virginia. Retrieved from https://law.lis.virginia.gov/vacode

Corbin, J., & Strauss, A. (1990). Grounded theory research: Procedures, canons and evaluative criteria. *Zeitschrift für Soziologie*, *19*(6), 418-427.

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory.* Los Angeles, CA: Sage Publications.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approach.* Los Angeles, CA: Sage Publications.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, *39*(3), 124-130.

Curry, L. A., Nembhard, I. M., & Bradley, E. H. (2009). Qualitative and mixed methods provide unique contributions to outcomes research. *Circulation*, *119*(10), 1442-1452. doi: 10.1161/CIRCULATIONAHA>107.742775

DeWeese-Boyd, M. (2005). Community versus development? Land use and development policy in Vermont as a tool toward community viability. *Community Development Journal*, *41*(3), 334-351. doi:10.1093/cdj/bsi060

Emery, M., Fey, S., & Flora, C.B. (2006). Using community capitals to build assets for positive community change. *Community Development Practice,* 13. Retrieved from http://srdc.msstate.edu/fop/levelthree/trainarc/socialcapital/communitycapitalstodevelopassetsemeryfeyflora2006.pdf

Flora, C, B., Flora, J., L. (2008). *Community capitals.* Retrieved from http://www.soc.iastate.edu/staff/cflora/ncrcrd/capitals.html

Flora, C. B., Flora, J. L., & Gasteyer, S. P. (2015). *Rural communities: Legacy and change* (5th ed.). Boulder, CO: Westview Press.

Glenzer, K., Peterson, N., & Roncoli, C. (2011). Introduction to symposium on rethinking farmer participation in agricultural development: Development, participation, and ethnography of ambiguity. *Agriculture and Human Values,* 28(1), 97-98. doi:10.1007/s10460-010-9305-7

Graham, D. L., Arnold, S., & Jayaratne, K. S. U. (2016). Research priority 6: Vibrant, resilient communities. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 49-56). Gainesville, FL: Department of Agricultural Education and Communication.

Herbert-Cheshire, L., & Higgins, V. (2004). From risky to responsible: Expert knowledge and the governing of community-led rural development. *Journal of Rural Studies, 20*(3), 289-302. doi:10.1016/.jrurstud.2003.10.006

Hogg, D., Bush, S. A., Rudd, R., & Seibel, M. (2016). *Community viability indicator (CVI) model for rural communities.* Unpublished manuscript. Department of Agricultural, Leadership, and Community Education, Virginia Polytechnic and State University, Blacksburg, VA.

Kezar, A., & Gehrke, S. (2014). Grassroots leadership: Responding to declining shared governance in the neoliberal world. In Li, Q., & Gerstl-Pepin, C., *Survival of the fittest: The shifting* *contours of higher education in China and the United States* (pp. 101-117). Springer-Verlag Berlin Heidelberg.

Leyden, K. M. (2003). Social capital and the built environment: The importance of walkable neighborhoods. *American Journal of Public Health, 93*(9), 1546-1551. doi:10.2105/AJPH.93.9.1546

Lysgård, H. K. (2016). The 'actually existing' cultural policy and culture-led strategies of rural places and small towns. *Journal of Rural Studies*, *44*, 1-11. doi:10.1016/j.jrurstud.2015.12.014

Magis, K. (2010). Community resilience: An indicator of social sustainability. *Society and Natural Resources, 23*(5), 401-416. doi:10.1080/08941920903305674

McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology, 14*(1), 6-23. doi:10.1002/1520-6629(198601)14:1<6::AID-JCOP2290140103>3.0.CO;2-I

Poplin, D. E. (1979). *Communities: A survey of theories and methods of research.* New York, NY: Macmillan Publishing Co, Inc.

O'Brien, D. J., Hassinger, E. W., Brown, R. B., & Pinkerton, J. R. (1991). The social networks of leaders in more and less viable rural communities. *Rural Sociology*, *56*(4), 699-716. doi:10.1111/j.1549-0831.1991.tb00453.x

O'Brien, D. J., Raedeke, A., & Hassinger, E. W. (1998). The social networks of leaders in more or less viable communities six years later: A research note. *Rural Sociology*, *63*(1), 109. do:10.1111/j.1549-0831.1998.tb00667.x

Parrish, K., & Chester, M. (2014). Life-cycle assessment for construction of sustainable infrastructure. *Practice Periodical on Structural Design and Construction*, *19*(1), 89-94. doi:10.1061/(ASCE)SC.1943-5576.0000187

Pearce, L. D. (2012). Mixed methods inquiry in sociology. *American Behavioral Scientist*, *X*(XX), 1-20. doi: 10.1177/0002764211433798

Ricketts, K. G., & Place, N. T. (2009). Making communities more viable: Four essential factors for successful community leadership. *Journal of Extension*, *47*(2), 1-4. Retrieved from: https://www.joe.org/joe/2009april/iw2.php

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Skerratt, S. (2013). Enhancing the analysis of rural community resilience: Evidence from community land ownership. *Journal of Rural Studies*, *31*, 36-46. doi:10.1016/j.jrurstud.2013.02.003

Valentin, A., & Spangenberg, J. H. (2000). A guide to community sustainability indicators. *Environmental Impact Assessment Review*, *20*(3), 381-392. doi:10.1016/S0195-9255(00)00049-4

USDA Rural Development. (2016). *USDA rural development: 2016 progress report.* Retrieved from https://www.rd.usda.gov/files/USDARDProgressReport2016.pdf

Wall, M. (1999). Factors in rural community survival: Review of insights from thriving small towns. *Great Plains Research*, *9*(1), 115-135.

Wang, Y. A., & Pfister, R. E. (2008). Residents' attitudes toward tourism and perceived personal benefits in a rural community. *Journal of Travel Research*, *47*(1), 84-93. doi:10.1177/0047287507312402

Examining Rural Community Planning: A Community Viability Indicator (CVI) Model

Discussant Remarks

Donna Westfall-Rudd

Theoretical Framework

The researchers provide a very clear and concise description and justification for the theoretical framework of this study. It provided a very logical progression for the research efforts.

Conceptual Framework

This study uses the Community Viability Indicator model to assess the community viability practices of four participating communities. The CVI model and its respective component descriptions provide a very clear path for the research procedures. One critical question regarding the CVI model is the concern, how does the model account for the inclusivity of marginalize groups in a particular community. The current description appears to be generalized across the community population without mention of who is included or represented and more perhaps more importantly, who might be currently excluded from the community viability efforts? Finally, as the model accounts for and encourages historic preservation, it is not evident that there is an effort to note whose (ethnic or cultural groups for example) history is being preserved and if that history is inclusive of all groups, historical or current, of the community.

Methodology

This manuscript represents an excellent methodological process to examine existing public documents. Each step is clearly explained and justified. The research design table and inclusion rubric were very helpful and informative visuals that strengthened the process description.

Conclusions

As the conclusions section suggests, the CVI model appears to be a helpful tool for community leaders and others interested in focusing community resources on long-term sustainability of a given community. As mentioned above, this work could be strengthened with an examination of the inclusivity of the community viability practices.

Discussant – Gary Briers; Timekeeper – Joenelle Futrell

Teacher Education
The Status of U.S. Agricultural Teacher Education: A Review of Capacity *Rebecca Lawver, Daniel Foster, Amy Smith*
Deterrents to Service-Learning's Use as a Method of Instruction in the Preparation of Agricultural Education Teachers: The Beliefs and Intentions of Teacher Educators *Dr. Richie Roberts, Dr. M. Craig Edwards, and Dr. J. Shane Robinson*
Planned Behavior Typologies of Agricultural Education Teacher Educators in Regard to Service-Learning as a Method of Instruction: A National, Mixed Methods Study *Dr. Richie Roberts, Dr. M. Craig Edwards, and Dr. Toni A. Ivey*
The Supply of Secondary School-Based Agricultural Educations 2014-2016 *Daniel Foster, Rebecca Lawver, Amy Smith*

The Status of U.S. Agricultural Teacher Education: A Review of Capacity

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Daniel Foster, Pennsylvania State University
Amy Smith, University of Minnesota

Abstract

Agricultural teacher education has occurred in the United States since the early 1900s. A supply of highly qualified school-based agriculture teachers is critical to sustain school-based agricultural education. Although agricultural teacher education programs at the post-secondary level are at historic highs, the number and nature of full time equivalent (FTE) positions in post-secondary agricultural education is changing. The majority of agricultural education faculty, and both undergraduate and graduate academic programs in agricultural education are affiliated with colleges of agriculture. Academic opportunities in agricultural education at both the undergraduate and graduate levels are unevenly distributed across the nation. Further studies are recommended to describe the activities and workload of post-secondary agricultural education faculty involved in agriculture teacher preparation.

Introduction and Conceptual Framework

Since 1965, the National Supply and Demand for Agricultural Education project has been supported by the American Association for Agricultural Education (AAAE) and utilized by its members. The study has historically provided a great deal of valuable information to those engaged in the agricultural education profession. Particularly, determining who is teaching school-based agricultural education and whether or not there is an appropriate supply to meet demand is important to agriculture teacher educators, school-based agriculture students, parents, school administrators, policy makers and other stakeholders in agricultural education. Prior to efforts of the current National Supply & Demand project team, the most recently report prepared by Adam Kantrovich (2010) stated:

> Leaders of the profession need current, accurate estimates of the numbers of and demand for teachers of Agricultural Education to provide for meaningful policy decisions at all levels. Teacher organizations and teacher educators need current, accurate supply and demand information to use in recruitment activities and in counseling potential teachers of Agricultural Education. Yet, detailed data of that nature, specific to Agricultural Education, are not available outside this study (p. 8).

Bricker (1914) discussed common sources for agriculture teachers. He identified four main sources: 1) nature-study teachers; 2) agricultural college graduates; 3) high school science teachers; and 4) people raised on farms. While he was critical of all four sources to a degree, he was most critical of sourcing agriculture teachers from individuals raised on farms. Bricker stated, "They are persons who have been 'raised on the farm' and who therefore think themselves amply qualified to teach agriculture" (p 121). Less criticism was directed toward agricultural college graduates, but Bricker noted that such individuals do "not understand children" (p. 118). He continued, noting that "Association for a period of four or more years with adults has given him the point of view in education in which only matured minds, bodies, experiences and lives have entered" (p. 118). The attitude of high school science teachers was the main criticism suggested by Bricker, as agriculture is "more than a science: it is an art and a business" (p. 119).

Given limitations or challenges with each of these identified sources, where then are agriculture teachers to come from? Bricker proposed a then novel idea – agriculture teachers should come from agricultural education departments at normal schools and agricultural colleges; such programs would be designed to give training in the theory and practice of teaching within agriculture. Interestingly, several such departments existed near to that time. The Smith-Hughes Act of 1917 mandated that training of vocational teachers would be supervised by the State board for vocational education and outlined specifications which were to be followed in the training programs (Swanson, 1942). True (1929) reported 20 departments functioning at the time of the passage of Smith-Hughes. Stimson and Lathrop (1942) reported agricultural teacher preparation existed prior to 1917 at Iowa State University, Pennsylvania State University, and Texas A & M University.

Since the very beginning, there have been concerns about the professional capacity to prepare an adequate supply of school-based agricultural educators. According to Kruse (1915),

> This sudden and rapid growth and the resulting demand for teachers has created a serious, if not the most serious problem in the training of teachers… Nobody knew what should be taught in secondary agriculture, much less what qualifications the agricultural teacher should have, and least of all, how to train them (p. 2).

Swanson (1942) continued, "The initiation of vocational agriculture under the vocational education acts created a problem of teacher supply" (p. 526). True (1929) acknowledged that fluctuating demand was difficult for any one state to estimate. He continued, "The ideal would be to have production well in advance of the probable annual need, perhaps 10 to 20 percent. This would provide for emergency years and in average years allow for culling" (True, 1929).

Still, today shortages are occurring in a variety of areas for reasons ranging from a decrease in teachers entering the profession, an increase in student enrollment, and new positions and courses being added to better prepare students for life beyond graduation (Berry & Shields, 2017). The shortage is exacerbated by factors including public perception of the profession influenced by federal and state legislation, the teacher evaluation process (Goldhaber, 2015), and increased workload, paperwork, and the amount of classroom time lost to standardized testing (Thibodeaux, Labat, Lee, & Labat, 2015). As such, the need to explore policy interventions to address the desirability of the profession becomes acute.

While the teacher shortage is an issue facing the entire nation, the issue does not affect all content areas or geographic regions with the same magnitude. Repeatedly, it has been show that "dearth of qualified teachers is felt more acutely in schools serving more low-income and minority students" (Darling-Hammond, Furger, Shields & Sutcher, 2016). Additionally, the shortage is most significant in highly urban and rural areas, Title I Schools, and certain geographic areas, such as "the American West" due to geographic isolation (Martin & Mulvihill, 2016).

Within agricultural education, ongoing conversations have occurred at regional and national meetings of the American Association for Agricultural Education (AAAE) as well as in school-based agriculture stakeholder organizations. The profession has challenged individuals to tackle the ongoing recruitment and retention issues head on. While agricultural education has identified and monitored the appropriate supply of school-based agricultural education graduates since the 1960s, as a profession we are not unique in concern regarding supply and demand of qualified teachers.

The central mission of post-secondary agricultural education programs is the preparation of licensed educators in agriculture, with teaching and learning applications extending beyond that into a variety of settings (Barrick, 1993). Recognizing the capacity of post-secondary agricultural education programs for preparing licensed educators is essential for identifying challenges, opportunities and next steps with regard to the current shortage. This study directly addresses two of the core mandates outlined within the national research agenda for agricultural education (Roberts, Harder, & Brashears, 2016), by addressing the following priorities: *Research Priority Area 3: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century* and *Research Priority Area 5: Efficient and Effective Agricultural Education Programs.* Describing the status of the capacity of post-secondary teacher preparation programs to supply licensed school-based agriculture teachers can lead to more nuanced conversations around recruitment and retention best practices, interventions, and policy. It is the task of the leaders within the profession to identify contextually relevant and appropriate applications of these strategies with help from partners and stakeholders of school-based agricultural education.

The conceptual framework presented in Figure 1 guided this study. The framework identifies factors contributing to school-based agricultural educator supply and demand. Greater knowledge regarding the sources impacting supply and the factors influencing demand is necessary to reduce or eliminate the chronic teacher shortage issue within agricultural education.

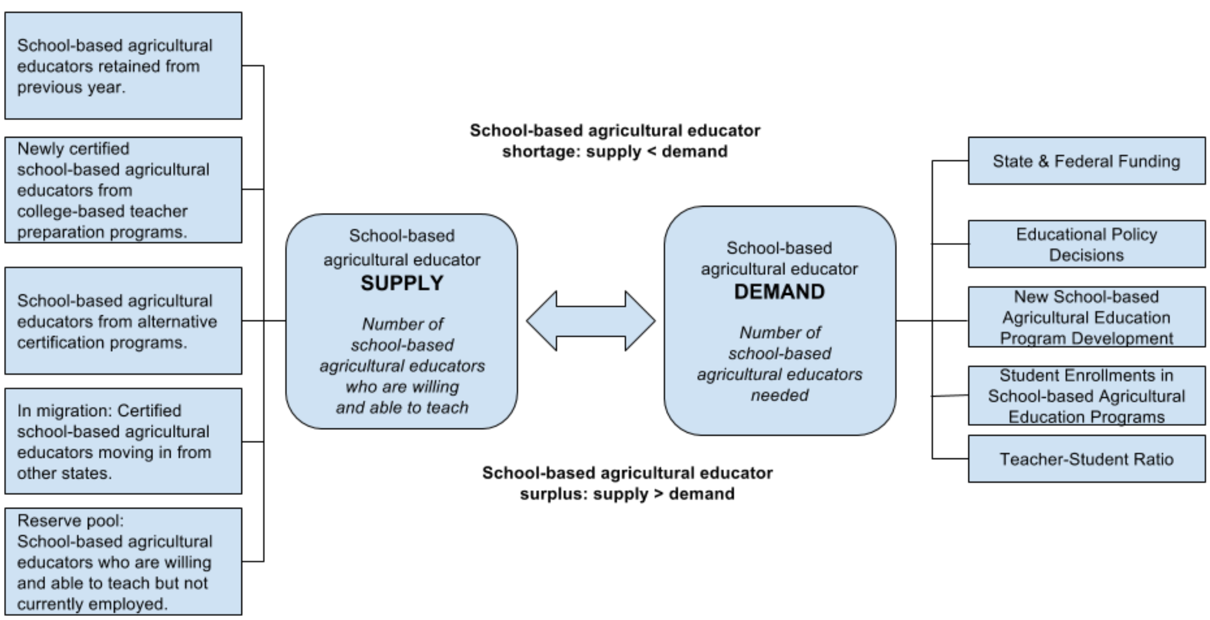

Figure 1. *Conceptual framework of School-based Agricultural Education National Supply and Demand Study. Adapted from Lindsay et al. (2009).*

Purpose & Objectives

The purpose of the study was to describe the capacity of school-based agricultural teacher education in the United States. The following objectives provided guidance for the development summary of data collected annually from 2014-2016:

1. Describe historical trends of agricultural teacher education in the United States.
2. Describe agricultural teacher education full time equivalent positions in higher education the United States.
3. Describe college affiliation of faculty, undergraduate programs and graduate programs in agricultural education in the United States.
4. Describe academic opportunities within agricultural education across the United States.

Methods

This study built upon existing processes and protocols in place for the National Agricultural Education Supply and Demand research. The project team worked to strengthen and streamline data collection methods for both supply and demand aspects of the study. The parameters for the study (#4564) were approved by the Institutional Review Board for Human Subjects Research at the Pennsylvania State University. Specifically, this segment of the research highlights data collected related to supply. The population included agricultural teacher educators from each institution that offers a school-based agricultural education program leading to teacher licensure. The original frame was developed from membership in AAAE, with additions being made as a result of key stakeholder input. Each year, prior to the start of data collection, the frame of institutions and institutional contacts was scrutinized to ensure accurate and up-to-date information. To stay informed of changes to institutional contacts, the last question of the supply survey requested the name and contact information for individual who should be asked to provide the following year's data; this allowed for anticipated changes to be noted within the frame. To assist with trustworthiness of data collection, an informational email was sent prior to the start of data collection to each institutional contact. This email provided a state snapshot of data reported the previous year and indicated who would be contacted in the coming weeks.

Data Collection and Instrumentation

As this is a legacy study, the starting point for the supply instrument was the list of items asked in previous iterations of the National Agricultural Education Supply and Demand study. Items were added and revised based on literature and feedback from a panel of expert agricultural teacher educators who reviewed the instrument for face, content, and construct validity. Reliability was checked annually and found to be appropriate for a descriptive study.

Data was collected using Qualtrics, in accordance with Dillman's (2014) guiding principles for Internet and mixed-methods data collection. Following dissemination of individual survey links and reminders by email, researchers followed up with individual phone calls to non-respondents. Individual links were resent or data was collected by phone.

The initial data collection occurred in 2014. This study reflects three years of data collection (2014, 2015, 2016). In 2014, initial contact was made in May, with data collection closing in August. In subsequent years, the timeline for data collection was altered so that initial contact occurred in August, with data collection closing in December. This adjustment was made in response to concerns expressed by teacher educators who were unable to provide accurate and complete data regarding program completers in the spring. All data were treated with confidentiality.

Handling potential survey error

There are four general sources of survey error: Sampling Error, Measurement Error, Coverage Error and Non-Response Error (Dillman et al, 2014). Below are the methods utilized to control for error. As a census of possible respondents was desired, sampling error was not applicable to this study. Measurement error was mitigated through the use of panel of experts to review and evaluate validity of the instrument. This included review for face, content, and construct validity. Similar to sampling error, a census approach controlled for coverage error. Recognizing that 17 institutions failed to respond to Kantrovich (2010), additional efforts were made to reduce non-response. Institutions who failed to respond were contacted in person via telephone. Due to familiarity with the population as well as the manageable frame size, researchers were aggressive in reaching out via multiple communication modes to obtain representative data. Table 1 reports the number of respondents, response rate and identifies non-respondent institutions. It should be noted that as of 2016, the following five states and territories do not have an agricultural teacher preparation program: Hawaii, Maine, Rhode Island, Vermont and the Virgin Islands.

Table 1
Supply Non-Respondents 2014-2016

	2014	2015	2016
Responding Institutions	91	96	101
Response Rate	88 %	97 %	100 %

Note. Non-Respondents in 2014: Univ. of Arkansas – Pine Bluff, Fort Hays State Univ., Univ. of Maryland – College Park, Univ. of Massachusetts, College of the Ozarks, Missouri State Univ., Univ. of New, Hampshire Delaware Valley College, Middle Tennessee State Univ., Angelo State Univ., Prairie View A&M & Univ. of Wisconsin – Platteville. Non-Respondents in 2015: Delaware State Univ., Univ. of Arkansas – Pine Bluff & Univ. of Georgia - Tifton

Data Analysis

Once data were collected, efforts were made to ensure the accuracy of data; the researcher team reviewed data reported for inconsistencies and errors. When issues were found, personal phone calls to institutional contacts were made to verify or correct the data. Data were analyzed primarily using excel database features for simple descriptive statistics. A longitudinal analysis of historical data was also conducted. Frequencies and percentages were used to describe historical trends. This included data analysis and utilization of historical research methods. Historical data prior to 2014 was obtained from previous National Agricultural Education Supply & Demand reports. Descriptive statistics including frequencies and percentages were used to describe agriculture teacher education programs including FTE, college affiliation, etc. Decisions regarding presentation of data were made with consideration of preserving the integrity for longitudinal analysis, building from previous reports.

Limitations

Data can only be taken at face value, as reported by each respective institutional contact. Each individual academic institution has disparate and unique data collection systems and processes. Ideally, increased fiscal resources would allow for human resources to verify data with state/federal data warehouses.

Findings

Objective 1: Describe Historical Trends of Agricultural Teacher Education in the United States

The importance of a well-prepared teacher and the role that teacher training played in that process is evidenced in the provisions of the Smith-Hughes Vocational Education Act of 1917, a significant piece of legislation impacting school-based agricultural education. For example, states participating were required to use the minimum amount appropriated for the training of teachers in order to secure other benefits of the act (Swanson, 1942). Evidence of agricultural teacher education programs exists starting as early as 1907 (Bailey, 1908) with numerical reports of newly qualified candidates existing as of 1920 (Jarvis, 1921, Federal Board for Vocational Education, 1921). Table 2 shows the number of institutions with agricultural teacher preparation programs as reported from 1907 to 2016. These numbers are pulled from historical reports (Jarvis, 1921; Swanson, 1942), past supply studies (Camp, 2000; Camp, Broyles, & Skelton, 2002; Kantrovich, 2007; Kantrovich, 2010) and current collected data from 2014-2016 (Foster, Lawver, Smith, 2014; Foster, Lawver & Smith, 2015; Smith, Foster, & Lawver, 2016).

Table 2
Historical Perspective of Reported U.S. Agricultural Teacher Education Programs

Year	Number of U.S. Institutions	Year	Number of U.S. Institutions
1907	1	1922	69
1908	1	1923	78
1909	3	1924	68
1910	6	1925	70
1911	7	1941	72
1912	9	1989	88
1913	13	1995	84
1914	17	1998	78
1915	18	2001	79
1916	19	2006	92
1917	30	2009	92
1918	47	2014	103
1919	60	2015	99
1920	64	2016	101
1921	69	2017[1]	101

[1]*Note: Reflects preliminary data collected.*

Objective 2: Describe Agricultural Teacher Education Full Time Equivalent Positions in Higher Education the United States

Data has been collected regarding the total full time equivalent positions dedicated to agricultural teacher education since 2001. From 2001 to 2014, the profession has experienced approximately a 20% decrease (n=48.95) in total FTE dedicated to agricultural teacher education. Table 3 presents the full time equivalent faculty dedicated to all instruction in agricultural teacher education as compared to the FTE accounted for by tenure track faculty. Since 2001, the FTE accounted for by tenure track faculty has been consistently near 2/3 of all agricultural teacher education positions (range of 60.84% to 72.23%). The data presented in Table 4 presents full time equivalent faculty of agricultural teacher education programs, by region and nationally, as reported in 2014. Data presented in Table 5 displays a historical perspective of full time equivalent faculty, tenure track faculty, instructors, graduate students, and clinical professors dedicated to agricultural teacher education.

Table 3
Full Time Position Equivalents Dedicated to Agricultural Teacher Education Since 2001

Year	Tenure Track	Total FTE	% of Positions
2001[1]	166.4	249.7	66.64 %
2004[1]	132	185.5	71.16 %
2006[1]	167.5	231.9	72.23 %
2009[1]	143.4	235.7	60.84 %
2014	142	200.75	70.73 %

[1]Note: Data presented in 2001, 2004, 2006, 2009was collected by Kantrovich (2010).

Table 4
2014 Agricultural Education Full Time Equivalent (FTE) Positions by Region & U.S. Totals

	Total FTE	**Asst./ Assoc./ Full Professor**	**Instructor**	**Graduate Assistant**	**Clinical Faculty/ Professor of Practice**	**Other**
North Central Region	48.00	29.80	10.25	5.50	2.20	0.25
Southern Region	106.30	81.55	11.00	11.50	1.25	1.00
Western Region	46.45	30.65	7.30	7.50	1.00	0.00
U.S. Total	200.75	142.00	28.55	24.50	4.45	1.25
U.S. 2009[1]	235.70	143.40	29.80	61.50	Not collected	1.00
U.S. 2006[1]	231.90	167.50	21.50	39.00	Not collected	4.00
U.S. 2004[1]	185.50	132.00	12.50	35.00	Not collected	6.00
U. S. 2001[1]	249.70	166.40	18.00	60.80	Not collected	4.50

[1]Note: Data presented in 2009, 2006, 2004, 2001was collected by Kantrovich (2010).

Table 5
Historical Perspective of Agricultural Education Full Time Equivalent (FTE) Positions in U.S.

Year	Reporting Institutions	Total FTE	Asst./ Assoc./ Full Professor	Instructor	Graduate Assistant	Clinical Faculty/ Professor of Practice	Other
2017[1]	93	171.96	135.71	25.7	16.1	14.55	3.85
2014	91	200.75	142.00	28.55	24.50	4.45	1.25
2009[2]	92	235.70	143.40	29.80	61.50	NA	1.00
2006[2]	92	231.90	167.50	21.50	39.00	NA	4.00
2004[2]	n/a	185.50	132.00	12.50	35.00	NA	6.00
2001[2]	79	249.70	166.40	18.00	60.80	NA	4.50

[1] Preliminary data collected by Smith, Lawver & Foster (2018).
[2]Note: Data presented in 2009, 2006, 2004, 2001 was collected by Kantrovich (2010). Clinical faculty were not reported.

Objective 3: Describe College Affiliation of Faculty, Undergraduate Programs and Graduate Programs in Agricultural Education in the United States

Table 6 reports the college home for agricultural teacher education faculty, undergraduate programs and graduate programs. The majority of faculty lines are housed in colleges of agriculture (n=72) with nine residing in colleges of education. Responses for institutions at which faculty are not affiliated with a college of agriculture or college of education (n=10) are listed in Table 7.

Table 6
College Affiliations of Agricultural Education Faculty, Undergraduate Programs and Graduate Programs as Percentages of Reporting Programs (N=91)

	College of Agriculture	College of Education	Other	No Response
Faculty	79%	10%	11%	0%
Undergraduate Program	69%	16%	14%	1%
Graduate Program	50%	13%	8%	29%

Note. Data as reported in 2014.

The majority of undergraduate students completing licensure programs in agricultural education received degrees through colleges of agriculture (n=61), while a smaller number of undergraduates receive degrees from colleges of education (n=14). Fewer than 1% (n=4) of students complete agricultural education licensure programs at institutions where the degree is only offered at the graduate level. Responses for institutions wat which undergraduate programs are not affiliated with a college of agriculture or college of education (n=12) are presented in Table 7.

The majority of graduate programs are housed within colleges of agriculture (n=46), while 8% (n=12) of graduate degrees are offered in colleges of education. Twenty-six institutions reported offering no graduate program. Responses for those with graduate programs not affiliated with a college of agriculture or college of education (n=7) are presented in Table 7.

Table 7

Listing of Other College Affiliations for Faculty Appointment, Undergraduate Degree, and Graduate Degree (N=91)

Faculty Other	Undergraduate Degree Other	Graduate Degree Other
• Arts and Sciences • Business • Collaborative Agreement • College of Applied Arts • College of Applied Sciences • College of Business and Technology • College of Natural Sciences • College of Sciences • College of Science and Engineering • Department of Agriculture	• Arts and Science • Business • College of Applied Arts • College of Applied Sciences and Technology • College of Business • College of Natural Science and Mathematics • College of Sciences • College of Science and Engineering • Different University Campus • Either BA of Education or BS of Agriculture • Science and Engineering	• Arts and Science • Business • College of Applied Arts • College of Applied Sciences and Technology • College of Business • College of Education • College of Graduate Education • College of Science and Engineering

Note. Data as reported in 2014.

Objective 4: Describe Academic Opportunities in Agricultural Education in the United States

In 2016, the third year of data collection, there were 101 reporting institutions (Smith, Lawver, & Foster, 2017). When analyzed by AAAE region, the Southern Region has the most reporting institutions (n=46; 45.5%), followed by the North-Central Region (n=38%; 37.6%), and the Western Region (n=17; 16.8%). In 2014, 91 programs responded to data collection. Table 8 presents the academic degree opportunities available at each institution. Of the 91 programs identified in 2014, the academic calendar was predominately semester based. Five programs (1 in the Southern Region and 4 in the Western Region) operated on quarters with the remaining 86 programs being semester based. Other Master’s degree programs offered at reporting institutions included a Masters of Agricultural Leadership Masters of Arts and Teaching and General Agriculture. Of the institutions reporting undergraduate programs (N=91) in 2014, 65.6% (n=59) require all agricultural education majors to complete teacher licensure requirements as opposed 34.4% (n=31) which provide a non-teaching option.

Table 8
Type of U.S. Post-Secondary Degrees Offered in Agricultural Education (N=91)[1]

	B.S.	B.A.	M.S.	M.A.	M.Ag.	M.Ed.	Other Masters	Ed.S.	Ed.D.	Ph.D.
North Central Region	25	2	13	3	0	6	1	0	0	7
Southern Region	42	0	24	1	5	6	3	1	5	8
Western Region	15	0	7	1	3	3	0	0	0	1
U.S. Total	82	2	44	5	8	15	4	1	5	16

[1] *This data was not previously collected in the Supply and Demand Project.*

Conclusions, Implications, Recommendations

For over a century, teacher preparation has been an integral part of post-secondary agricultural education programs. Through collaborative efforts of agriculture teachers, state supervisors, and university faculty, agricultural teacher preparation has served as the major source of school-based agriculture teachers across the United States. Currently, the number of agricultural teacher education programs is at a historic high. Nonetheless, the number of full-time equivalent positions and tenure-track positions in agricultural teacher education have decreased. The composition of faculty in agricultural education has steadily shifted from ranked, tenure-track positions to contingent positions, including instructors, clinical faculty/professors of practice, and graduate assistants. This shift is in alignment with observations in all areas of higher education. There has been significant growth in the number of faculty that are employed in part-time or full-time non-tenure track positions at U.S. colleges and universities over the last twenty-years (Anderson, 2002; Baldwin & Chronister 2001; Conley, Lesley, & Zimbler, 2002; Ehrenberg, 2004; Ehrenberg & Zhang, 2004). The hiring of contingent faculty in lieu of, or in addition to, tenure-track faculty is often due to budget constraints, decreasing state support, retirements, and changing enrollment patterns (Green, 2007). Critics charge that universities exploit contingent faculty and graduate students, engaging in a type of bait and switch, promoting institutional standing based on distinguished faculty who seldom teach undergraduates (Cross & Goldenberg, 2011). As a result, some suggest that undergraduates may be provided an inadequate educational experience (Cross & Goldenberg).

This shift away from ranked, tenure-track faculty in agricultural teacher education may create challenges within the profession. Ehrenberg and Zang (2005) suggests the use of part-time and full-time non-tenure track faculty adversely affects undergraduates enrolled at four-year universities by reducing their five- and six- year graduation rates. While expanding the use of non-tenure track faculty may be beneficial in allowing tenure track faculty to focus on research, Ehrenberg and Zang found a small positive effect on the volume of external research and development expenditures for tenure track faculty with the addition of full-time non-tenure track faculty and no effect with the addition of part-time non-tenure track faculty.

The future of agricultural teacher preparation programs requires additional tenure-track faculty to support the training of future agriculture teachers. One of the preeminent concerns of the general public and policymakers is the effectiveness of educators in leading students to high and ever-increasing levels of achievement (APA, 2014). While the increase in contingent hires in agricultural teacher preparation may have a positive influence on budgets, increased program enrollment, and research productivity of tenure-track faculty, it is recommended that institutions carefully consider the addition of non-tenure track faculty. Departments must ensure quality instruction, encourage instructional standards of the institution as well as school-based agricultural education, and promote research in agricultural education to remain current with national trends in education.

Colleges of agriculture across the U.S. appear to be the primary home of affiliation for faculty and both undergraduate and graduate academic programs in agricultural education. At the same time, there are a number of agricultural teacher preparation programs and faculty housed in other colleges. There are regionally disparate opportunities to access agricultural education academic programs in the United States, with the majority 52% of all undergraduate and graduate degrees are offered by the Southern Region, 31% by the North Central Region and only 17% by the Western Region of AAAE. Further examination of the supply and demand of agricultural education should compare the opportunities available for degrees and the shortage of teachers in each region. Eighty-four institutions offer undergraduate degrees in agricultural education, 76 masters degrees are available and 22 doctoral degrees. Due to the decrease in tenure-track faculty positions and increase in contingent faculty, what is the true demand for advanced degrees in agricultural teacher education? An exploration of graduate programs across the U.S. should occur to determine degree type and job placement of graduate degree completers.

Overall, continued collection of supply and demand data within school-based agricultural education is essential. Data including faculty full-time equivalent, college affiliation of faculty, undergraduate and graduate programs, and academic opportunity availability is necessary to anticipate and prepare for the future of agricultural teacher education. Future research could also investigate the impact of degree programs in colleges of education, impact of tenure-track and non-tenure track positions on recruitment, retention, graduation rates, and research productivity and supply and demand of doctoral candidates in agricultural education.

References

American Psychological Association (APA) (2014). *Assessing and Evaluating Teacher Preparation Programs*. Retrieved from http://www.apa.org/ed/schools/teaching-learning/teacher-preparation-programs.pdf

Anderson, E. L. (2002). *The new professoriate: Characteristics, contributions, and compensation. Washington* D.C.: American Council on Education, Center for Policy Analysis. Retrieved from http://www.acenet.edu/bookstore

Bailey, L. H. (1908). *On the training of persons to teach agriculture in the public schools (U.S. Bureau of Education Bulletin No. 1).* Washington, DC: U.S. Government Printing Office.

Baldwin, R. G., & Chronister, J. L. (2001). *Teaching without tenure: Policies and practices for a new era.* Baltimore Md.: Johns Hopkins

Barrick, K. R. (1993). A Conceptual Model for a Program of Agricultural Education in Colleges and Universities. *Journal of Agricultural Education 34* (3), 10-16.

Berry, B., & Shields, P. M. (2017). *Solving the teacher shortage: Revisiting the lessons we've learned.* Phi Delta Kappan, *98*(8), 8-18. doi:10.1177/0031721717708289

Bricker, G. A. (1914). *Agricultural education for teachers.* New York: American Book Company.

Conley, V. M., Leslie, D. W., & Zimbler, L. J. (2002). *Part-Time Instructional Faculty and Staff: Who They Are, What They Do, and What They Think.* Washington D.C.: U.S. Department of Education.

Camp, W. G. (2000). *The 33th volume of a national study of the supply and demand for teachers of agricultural education 1996-1998.* Blacksburg, VA: Virginia Polytechnic Institute and State University. American Association for Agricultural Education.

Camp, W. G., Broyles, T., & Skelton, N. S. (2002). *The 34th volume of a national study of the supply and demand for teachers of agricultural education 199-2001.* Blacksburg, VA: Virginia Polytechnic Institute and State University. American Association for Agricultural Education.

Cross, J. G. & Goldenberg, E. N. (2009). *Off-track profs: Non-tenured teachers in higher education.* Massachusetts Institute of Technology.

Darling-Hammond, L., Furger, R., Shields, P., Sutcher, L. (2016). *Addressing California’s emerging teacher shortage: An analysis of sources and solutions.* Retrieved from www.learningpolicyinstitute.org/addressing-ca-teacher-shortage

Dillman, D. A., Smyth, J. D., Christian, L. M., & Dillman, D. A. (2014). *Internet, mail, and mixed-mode surveys: The tailored design method.* Hoboken, N.J: Wiley & Sons.

Ehrenberg, R. G. (2004). Don't blame faculty for high tuition: The annual report of the status of the profession. *Academe, 90*(2), 19-103.

Ehrenberg, R. G. & Zhang, L. (2004). *The Changing Nature of Faculty Employment. Cornell Higher Education Research Institute Working Paper No. 44.* Ithaca N.Y.: Cornell Higher Education Research Institute (available at www.ilr.cornell.edu/cheri)

Ehrenberg, R. G. & Zhang, L. (2005). Do tenured and Tenure-track faculty matter? *The Journal of Human Resources*, *40*(3), 647-659.

Education, U. S. F. B. f. V. (1921). *Annual Report to Congress of the Federal Board for Vocational Education*: U.S. Government Printing Office.

Foster, D. D., Lawver, R. G., & Smith, A. R. (2014). *National Agricultural Education Supply and Demand Study, 2014 Executive Summary*. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Foster, D. D., Lawver, R. G., & Smith, A. R. (2015). *National Agricultural Education Supply and Demand Study, 2014 Executive Summary*. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Goldhaber, D. (2015). Exploring the potential of value-added performance measures to affect the quality of the teacher workforce. *Educational Researcher, 44*(2), 87-95. doi:10.3102/0013189X15574905

Green, D.W. (2007). Adjunct faculty and the continuing quest for quality. *New Directions for Community Colleges*, *2007*(140). 29-39.

Jarvis, C. D. (1921). *Agricultural education, Bulletin 1921, No. 40*. Washington, DC: Department of the Interior.

Kantrovich, A. J. (2007). *The 35th volume of a national study of the supply and demand for teachers of agricultural education 2004-2006.* West Olive, MI: Michigan State University. American Association for Agricultural Education.

Kantrovich, A. J. (2010). *The 36th volume of a national study of the supply and demand for teachers of agricultural education 2006-2009.* West Olive, MI: Michigan State University. American Association for Agricultural Education

Kruse, S. A. (1915). *The Work of the Agricultural Colleges in Training Teachers of Agriculture for Secondary Schools*. (Master of Arts), University of Wisconsin--Madison, Madison, WI. Retrieved from https://books.google.com/books?id=xGQ0AAAAMAAJ

Lindsay, J. J., Wan, Y., & Gossin-Wilson, W. (2009). *Methodologies used by Midwest Region states for studying teacher supply and demand (REL 2008–080).* Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. http://www.eric.ed.gov/?id=ED506631

Martin, L. E., & Mulvihill, T. M. (2016). Voices in Education: Teacher Shortage: Myth or Reality? *The Teacher Educator, 51*(3), 175-184. doi: 10.1080/08878730.2016.1177427

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Smith, A. R., Lawver, R. G., & Foster, D. D. (2017). *National Agricultural Education Supply and Demand Study, 2016 Executive Summary*. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Swanson, H. B. (1942). Teacher training in agriculture. In R. W. Stimson & F. W. Lathrop (Eds.), *History of agricultural education of less than college grade in the United States* (p. 516), Washington D. C.: Government Printing Office.

Stimson, R. W., & Lathrop, F. W. (1942). *History of agricultural education of less than college grade in the United States: A cooperative project of workers in vocational education in agricultural and in related fields*. Washington, DC: Federal Security Agency, U.S. Office of Education.

Thibodeaux, A. K., Labat, M. B., Lee, D. E., & Labat, C. A. (2015). The effects of leadership and high-stakes testing on teacher retention. *Academy of Educational Leadership Journal, 19*(1), 227.

True, A. C. (1929). *A history of agricultural education in the United States: 1785-1925*. Washington, DC: U.S. Government Printing Office.

The Status of U.S. Agricultural Teacher Education: A Review of Capacity

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Discussant Remarks

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The authors continue (or begin!) their sequential and systematic research into supply and demand (and capacity to supply) with this paper. I applaud them for their tenacity and focus on this area. Without knowing the sequential order of the two papers, I am a bit on a limb suggesting that this paper—which I deemed unilaterally the second study—should acknowledge the other paper lest there be a concern of self-plagiarism. (I hate to use that term—and I'm sure not trying to be accusatory—because I know that the researchers had no idea that either or both of the papers/ proposals would be accepted for presentation!) However, now that both were accepted, the papers might be differentiated or one reference/quote the other extensively to avoid that label. As one might expect, the papers had identical introductory paragraphs and conceptual frameworks, with similar narrative about that framework. So, I leave the authors with that caution.

In my conceptualization of these phenomena, I "see" demand as related to why there is a need for capacity (to meet that demand) and supply is a result of/dependent on some capacity to produce. But there is no capacity—the basis of this study—as a concept/variable/phenomenon is the conceptual framework presented. Should capacity be added to the front end of the framework to depict that one of the major suppliers of SBAE teachers is university-based agricultural teacher education programs and that supply of teachers is a result of that capacity to prepare teachers/assist students to program completion? I recommend capacity's addition to the framework.

I also recommend a wider review of literature of university teacher preparation. Are there any standards for number of students/prospective teachers per FTE? Instructional resources/demands and educational capacities are part of standards/metrics of professional/vocational programs such as medicine, law, accounting, engineering, journalism—perhaps all academic endeavors have "weights" to describe their relative positions to each other, e.g., lower division liberall arts classes have lower weights than upper division courses that have lower weights than master's level courses that have lower weights than doctoral-level courses in the same discipline. The classification of instructional programs (CIP) codes may be a place to begin. Too, institutional research offices of many universities can describe program weights. How are teacher education programs "weighted"?

Historical data on teacher education programs is interesting. For instance, during the most recent two decades, the number of agricultural teacher education programs varied from a reported 78 in 1998 to 103 programs in 2014 to 101 programs in 2017. And 9 years before the year 1998 and its 78 programs, the number was 88 (in 1989)—the largest number of programs in history until 2006. My recollection and belief is that the 88 programs in 1989 is more nearly accurate than 78 in 1998. The Camp report of 2000 as the 33rd volume suggests that these data—assuming volumes of triennial numbers (as the 33rd volume was three years)—would take us back beyond the 1907 data!

The data on FTEs of tenure-track, non-tenure-track, graduate assistants, etc., is both fascinating and perplexing. As a skeptic, I question whether—in less than a decade—tenure-track FTEs would vary from 166 down to 132 and back up to 167 and then down to 143 (2001-2009). Similarly, graduate assistant FTEs varied from a high of 61.5 (in 2009) to a low of 24.5 (2014). Total FTEs dropped

26% (-64 FTEs) from 2001 to 2004 and then increased 27% (+50 FTEs) by 2009. A historical study with triangulation of numbers—if at all possible—may be warranted.

Finally, I recommend rewording the categorization of 29% of institutions providing “no response” (Table 6) concerning affiliation of their graduate programs. Your narrative was that each of the 26 programs (the 29%) “reported offering no graduate program.” That should have been a separate category—“No graduate program.” Then, a recalculation of the percentages of graduate programs and where they resided would have provided 69% in college of agriculture, 18% in college of education, and 11% “other”—numbers very similar to the affiliations of undergraduate programs.

I believe that is important that we know trends and movements. It may be valuable in foreseeing the future. It is important that we know what each other faces. We can and should learn from each other’s experiences. Perhaps we should collect additional data concerning not only FTEs but also “head counts” and determine job responsibilities—teaching in a SBAE teacher education program, teaching in other programs/areas/levels in our work space, research expectations/ percentage of effort, and administrative and service commitments.

Deterrents to Service-Learning's Use as a Method of Instruction in the Preparation of Agricultural Education Teachers: The Beliefs and Intentions of Teacher Educators

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Abstract

Service-learning (SL) appears to have influenced school-based, agricultural education (SBAE) since its early inception. And current trends suggest the method may be gaining increased interest in the discipline. However, little is known about the role that agricultural education teacher educators' beliefs and intentions play in deterring SL's use as a method of instruction in the preparation of agricultural education teachers. Therefore, this study's purpose was to understand teacher educators' normative and control beliefs as well as their intentions regarding SL as a method of instruction. Participants reported that barriers existed at the classroom level, which influenced their intentions. SL teaching experience was also found to have a negative and statistically significant ($p < .01$) relationship with agricultural education teacher educators' beliefs about challenges they associated with using the method. As a result, it is recommended that future research explore diffusion methods that could help cultivate more widespread adoption of SL for agricultural education teaching methods courses in the United States.

Introduction

Our world is growing and evolving in complex ways. These changes have necessitated reconsidering how we conceptualize the nature of knowledge, knowing, and teaching (Brownlee, Schraw, & Berthelsen, 2011). As a consequence, scholars (Barnes, 2016; Butcher et al., 2003) have called for teacher preparation programs to prepare graduates to work in *more diverse, challenging, and resource-poor settings*. In response, teacher education programs have begun to place increasing emphasis on introducing preservice teachers to instructional methods intended to facilitate higher-order thinking skills, collaborative learning, as well as the ability to address ambiguous and complex social problems (Yang, Chang, & Hsu, 2008). Because service-learning (SL) as a method of instruction is positioned to assist in achieving such outcomes, it has received growing attention in universities, including teacher preparation programs (Barnes, 2016; Ball & Geleta, 2012; Butcher et al., 2003; Chambers & Lavery, 2012; Hart & King, 2007; Swick, 1999, 2001). SL has been defined operationally as an educational approach by which students learn through providing service in their communities while connecting curricular concepts to real-world issues with embedded opportunities for reflection (Bringle & Hatcher, 1995).

In agricultural education, SL appears to have influenced the discipline since its inception (Roberts & Edwards, 2015, 2017). And current trends suggest the method may be gaining increased interest among teachers and other stakeholders of school-based, agricultural education (SBAE). For instance, recent initiatives promoted by the National FFA Organization, such as the Agricultural SL Supervised Agricultural Experience (SAE) and National FFA Days of Service initiative, may demonstrate a pivot occurring in the discipline with this method of instruction becoming increasingly used and celebrated (National FFA Organization, 2014; Roberts, Terry, Brown, & Ramsey, 2016). To this point, Roberts and Edwards (2015) called for agricultural education teacher educators to begin showcasing SL as a method of instruction. However, doing such remains entangled in a web of social, cultural, and historical forces that complicate the method's acceptance and future possibilities as a substantial and respected instructional tool for SBAE (Roberts & Edwards, 2017). For example, although the aims of SL appear noble in *form* and *function*, Ward (1998) noted that gaining faculty members', including teacher educators, commitments to embrace *engagement* in their local communities remains a critical barrier, especially in regard to implementing SL as a method of instruction. As a result, much of the SL research focuses on the particular factors that either motivated or deterred faculty members from using the method.

The literature demonstrates that perspectives and orientations of academic institutions can negatively influence faculty members' adoption of SL (Moore & Ward, 2010). For example, the type of institution – *teaching* or *research* – can affect decisions to incorporate the method when designing courses (Aldersley, 1995; Pollack, 1999). At institutions emphasizing *research*, expectations for high scholarly productivity along with prioritizing traditional scientific discovery often discourages community engagement (Moore & Ward, 2010). In comparison, faculty members working at higher education institutions stressing *teaching* often have more freedom to engage in instructional methods allowing them to facilitate students' learning experiences in their surrounding communities (Aldersley, 1995). Faculty members at also frequently have distinctive professional characteristics – including educational backgrounds, training, appointments, and rank – shown to shape their beliefs and intentions regarding SL as a method of instruction (Abes, Jackson, & Jones, 2002; Banerjee & Hausafus, 2007; Colbeck & Wharton-Michael, 2006; Ward, 2003). Moreover, Abes et al. (2002) reported that faculty members at research-focused institutions often articulated finding it difficult to balance their professional roles with using time-consuming instructional methods. And because service is often the least rewarded aspect of the tenure process, many faculty members viewed SL as a *distraction* (Jaeger & Thornton, 2006; Russell-Stamp, 2015; Ward, 2003). Other characteristics may also inhibit faculty members' intentions regarding SL. To this point, Kezar (2013) identified faculty members' skepticism about the method's effectiveness, an absence of related resources and support, insufficient time, and late hiring as barriers to faculty members' intentions to implement SL. Therefore, more intimately understanding how teacher educators' beliefs shape their decisions to use SL in a variety of contexts is a crucial need. Although the existing SL literature provides some insight about deterrents to SL's use in higher education, scant evidence exists regarding the *beliefs* and *intentions* that most profoundly influence how SL is conceptualized and practiced by teacher educators who prepare agricultural education teachers. This deficit in the knowledge base motivated the current study.

Theoretical Lens

We chose to study *human behavior* through the prism of the theory of planned behavior (TPB). TPB, as articulated by its chief architect, Icek Ajzen (1991), posits that an individual's engagement in a particular behavior is a product of his or her underlying *beliefs* and *intentions* toward such action. In the TPB, individuals' views are guided by three underlying belief systems: (a) behavioral (attitudes), (b) normative (subjective or social norms), and (c) control (perceived behavior controls). *Behavioral beliefs* are views an individual may hold about the consequences, positive or negative, of exercising a behavior. As such, behavioral beliefs have been shown to greatly influence the development of attitudes about particular endeavors (Ajzen, 2006). *Normative beliefs* refer to the amount of social pressure an individual perceives regarding a behavior (Ajzen, 2002). The final belief system, *control beliefs*, is linked to the amount of perceived difficulty associated with executing a behavior. Another antecedent of actualized behaviors are individuals' intentions; by altering intentions, behaviors also may be modified (Ajzen, 2006).

Smith (2008) found faculty members' SL beliefs were related to their perceived abilities to navigate the challenges of implementing the method. Studies have also demonstrated statistically significant relationships between *normative* and *control* beliefs and faculty members' SL *intentions*, especially in regard to the method's deterrents (Abes et al., 2002; Bagnardi, 2006). In this investigation, behavioral beliefs were operationalized as agricultural education teacher educators' perceived beliefs about SL's benefits to communities and secondary school classrooms. Normative beliefs were interpreted as the barriers study participants may have perceived at the institutional level. Meanwhile, we analyzed participants' control beliefs as their perceived *barriers at the university classroom level*. Finally, intentions were measured by analyzing teacher educators' course syllabi. It should be noted that the literature (Abes et al., 2002; Banerjee & Hausafus, 2007; Frolow, 2010; Hou, 2010) identifies several key *external variables* that also may influence the behaviors of university faculty in regard to SL. Therefore, the influence of the most consistently reported extraneous variables were explored in this study. External variables included (a) experience, (b) gender, (c) age, (d) education, (e) tenure/rank, and (f) institution type. Application of the TPB in the study is displayed in Figure 1.

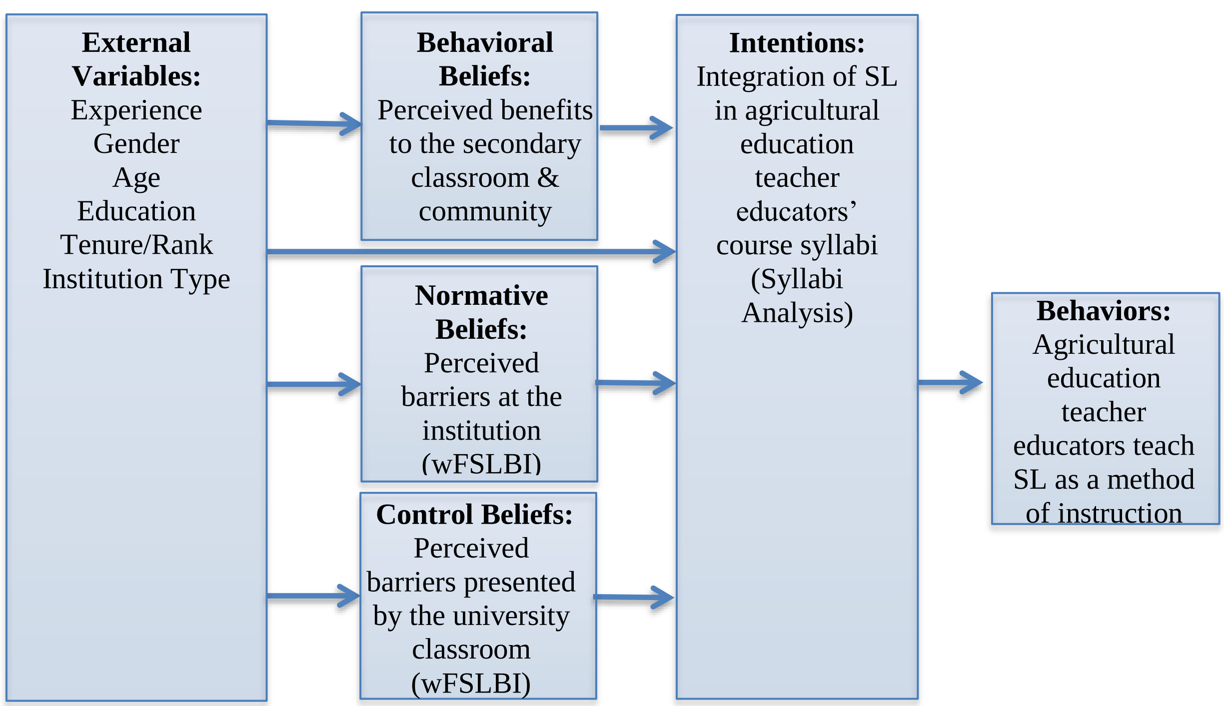

Figure 1. Application of the theory of planned behavior (Ajzen, 1991), as contextualized to agricultural education teacher education.

Purpose

The study's purpose was to understand agricultural education teacher educators' *normative* and *control* beliefs as well as their *intentions* regarding SL as a method of instruction. Data reported were derived from a larger investigation; participants' *behavioral beliefs* were examined but are not portrayed here. Because emphasis was placed on understanding factors that deter SL's use in the preparation of agricultural education teachers, this study addresses the American Association for Agricultural Education's Research Priority Area 6: *Vibrant, Resilient Communities*. This priority calls for investigations into educational methods that can be used to help communities build the capacity needed to "deal with community problems without relying on external resources" (Graham, Arnold, & Jayaratne, 2016, p. 51). To fulfill the study's purpose, three objectives guided the investigation: 1. Describe the *normative* and *control* beliefs of agricultural education teacher educators regarding SL; 2. Describe the *intentions* of agricultural education teacher educators regarding SL; and 3. Describe the relationships that existed among agricultural education teacher educators' *normative* and *control beliefs, intentions,* and *external variables* regarding SL.

Methods and Procedures

In this study, data were collected through the Qualtrics™ online survey system and in accord with Dillman's, Smyth's, and Christian's (2014) tailored design method's procedures. To begin the data collection process, a pre-notice message was sent as an electronic mail message to the AAAE listserv inviting members to participate in the study. This message included a brief description of the study. Three days later, we distributed an electronic mail message invitation to AAAE members. The invitation message included three components: (a) description of the study, (b) questions regarding participants' characteristics, and (c) a link to the instrument. After two weeks, a follow-up notice was sent to potential respondents as an electronic mail message. The second reminder notice was sent 10 days later. The final notice was sent one week thereafter. After participants completed the online survey instrument, they were asked to upload a course syllabus for one of their teaching methods courses to a Qualtrics™ digital dropbox or to send the document to the researcher as an electronic mail attachment. The 46 participants who completed the survey instrument and submitted their course syllabi qualified for one of the study's incentives, two $50 gift cards.

Description of the Study's Population and Recruitment Procedures

The population for this study was a census of agricultural education teacher educators who were active members of AAAE and taught at least one teaching methods course to preservice agricultural education students in the past three years or would during the spring academic term of 2017. The study's respondent frame was supplied by AAAE's listserv and corroborated by the organization's membership directory, as maintained by its membership secretary (AAAE, 2016). Participants were required to self-identify as agricultural education teacher educators before responding; however, it is possible that individuals who matched the population parameters did not receive an invitation to participate, especially if they were not members of AAAE at the time of the study. Therefore, those individuals would not have had the opportunity to provide responses, i.e., coverage error may have occurred (Dillman, et al., 2014). As a result of the study's recruitment procedures, 77 individuals responded. However, 31 did not meet the study's a priori requirements: (a) completion of the instrument, (b) submission of a course syllabus from a teaching methods course, and (c) providing contact information for follow-up procedures. As such, it was determined that 46 individuals (59%) provided usable responses.

The population was comprised of 33 males and 13 females. Forty-five (97.8%) participants reported they were White and one (2.2%) participant indicated she was African American. Despite exhibiting similarity regarding gender and race/ethnicity, participants were more diverse in age; 17 (36.9%) were from 31 to 40 years of age and 13 (28.3%) were from 41 to 50 years of age. In all, 26 states were represented in this study. More participants were from Texas (f = 7; 15.2%) than other states; however, Kentucky, North Carolina, Oklahoma, and Tennessee each had three (6.5%) representatives. More than 97% (f = 45) of the participants held doctoral degrees. In addition, 22 (47.8%) were assistant professors and 20 (43.5%) were either associate professors or professors.

Twenty-two (47.8%) participants were tenured, 18 (39.1%) were on a tenure track, and five (10.9%) were not on a tenure track. To understand better the educators' institutional characteristics, they were asked to provide information concerning their universities' land-grant institution and Carnegie Classifications for Higher Education statuses. In response, 67.4% (*f* = 31) indicated they were employed at a land-grant institution and 32.6% (*f* = 15) not. And more than 58% (*f* =27) worked at a Research 1 Institution. The agricultural education teacher educators were also asked to reveal their SL experiences. Twenty-six (56.5%) participants indicated they had teaching experiences involving SL. However, two-thirds (67.4%) did not experience SL as a student in postsecondary education and 76.1% had not at the secondary level.

Instrumentation

The study's web-based instrument consisted of items slightly modified from Hou's (2010) Web-based Faculty Service-Learning Beliefs Inventory (wFSLBI) and questions about the educators' personal and professional characteristics. Participants also submitted course syllabi on Qualtrics™, or by electronic mail, that were evaluated by three independent raters using a slightly modified version of the *Service-Learning Syllabus Analysis Guide* [SLSAG] (Gelmon, Holland, Driscoll, Spring, & Kerrigan, 2001). The wFSLBI was designed to understand faculty members' SL beliefs and is theoretically grounded in Ajzen's (1991) TPB. Hou's (2010) instrument contains four distinct subscales: (1) perceived benefits at the classroom level (PROS_CLS) with seven items, (2) perceived benefits at the community level (PROS_COM) with seven items, (3) perceived barriers at the institutional level (CONS_INST) with three items, and (4) perceived barriers at the classroom level (CONS_CLS) with four items. In this study, however, only findings from CONS_CLS and CONS_INST are reported.

The wFSLBI was presented on a five-point, Likert-type scale using these anchors to measure agreement: *1 = Strongly agree*, *2 = Agree*, *3 = Neutral*, *4 = Disagree*, and *5 = Strongly disagree* (Hou, 2010). During the instrument validation phase, Hou (2010) administered the wFSLBI to 449 tenured and tenure-track faculty members at a U.S. research university. Because of the importance of SL teaching experience, Hou (2010) conducted validation measures on each of the four subscales regarding this variable. As a result, Hou (2010) reported the instrument demonstrated satisfactory reliability estimates on all items with Cronbach's alphas ranging from .65 to .85 for participants with SL teaching experience and from .74 to .91 for those individuals without. Posthoc reliability estimates in the current study were .71 or larger and considered acceptable (Field, 2013).

The second instrument employed in this investigation was the SLSAG (Gelmon et al., 2001), which was used to analyze the agricultural education teacher educators' *intentions* in regard to using SL as a method of instruction. Gelmon et al. (2001) designed the SLSAG as a way to assess whether faculty members had intentions to incorporate quality indicators of SL into their courses. For the purpose of this investigation, we slightly modified the SLSAG to more appropriately fit the agricultural education teacher education context. To improve the reliability of this analysis, two external raters and the lead researcher scored participants' syllabi (Bornmann, Mutz, & Daniel, 2010). Before the rating process began, we provided a training session for the raters in which proper use of the SLSAG to score the syllabi was explained. Thereafter, each rater scored a randomly selected syllabus to identify scoring differences so recommendations could be provided to improve consistency among the raters. Raters individually assigned a "1" to items on the instrument if the syllabus contained the SL element and a "0" if it did not. Interrater reliability of the SLSAG was assessed using intraclass correlation coefficients (ICCs), which is the most widely accepted measure for interrater reliability (Shrout & Fliess, 1979). In this study, interrater reliability analysis yielded an ICC of .88, which was considered satisfactory (Whitehurst, 1984).

In addition to the wFSLBI and SLSAG, we also obtained the participants' personal and professional characteristics. These items were mostly dichotomous or categorical; for example, we inquired about participants' SL teaching experiences, experiences with SL at the postsecondary and secondary levels, ages, genders, home states, tenure statuses, institution types, whether their institutions were land-grant universities, and the ranking of their universities on the Carnegie Classification of Higher Institution's scale.

Data Analysis

To address objective one and two, descriptive statistics were performed to report measures of central tendency, including frequencies, means, and standard deviations (Gay, Mills, & Airasian, 2012). For objective three, bivariate correlational analysis was conducted to describe relationships between participants' beliefs and intentions in regard to using SL as a method of instruction based on Gay et al. (2012) recommendations. Depending on the variables tested – dichotomous, categorical, or ordinal – bivariate correlational analyses were computed, including point bi-serial correlational coefficient and Spearman's Rho. Davis' conventions (as cited in Miller, 1994) were used to describe the magnitudes of the correlation coefficients. $01 \geq r \geq .09$ = *Negligible*; $.10 \geq r \geq .29$ = *Low*; $.30 \geq r \geq .49$ = *Moderate*; $.50 \geq r \geq .69$ = *Substantial*; and $.70 \geq r \geq .99$ = *Very High.*

Findings

Objective One

To operationalize normative and control beliefs, Hou's (2010) wFSLBI was employed. The instrument used a Likert-type scale with anchors ranging from *1 = Strongly agree* to *5 = Strongly disagree.* As such, the real limits were 1.00 to 1.49 = *Strongly agree*, 1.50 to 2.49 = *Agree*, 2.50 to 3.49 = *Neutral*, 3.50 to 4.49 = *Disagree*, and 4.50 to 5.00 = *Strongly disagree*. Responding to the CONS_INST items, the subscale score yielded a *neutral perspective* (M = 2.92; SD = .953) regarding participants' beliefs about institutional barriers to using SL as a method of instruction. Item response percentages for the CONS_INST subscale, used to measure participants' normative beliefs (Ajzen, 1991), are provided in Table 1.

Table 1

Item Response Percentages for the CONS_INST subscale on the wFSLBI

Item	1	2	3	4	5
Faculty promotion and tenure policies do not support or encourage my use of service-learning as a method of instruction	10.9	28.3	26.1	21.7	13.0
Administrative leaders actively work to make service-learning a visible and important part of institutional work	15.2	26.1	28.3	23.9	6.5

My colleagues understand and value service-learning in promotion, tenure, and annual evaluation decisions	10.9	23.9	28.3	30.4	6.5

Note. 1 = *Strongly agree*; 2 = *Agree*; 3 = *Neutral*; 4 = *Disagree*; and 5 = *Strongly disagree*

For the CONS_CLS subscale, participants indicated they *agreed* (*M* = 2.28; *SD* = .682) that barriers existed at the classroom level in regard to integrating SL as a method of instruction. Table 2 provides item response percentages for the CONS_CLS subscale, which was used to measure agricultural education teacher educators' control beliefs (Ajzen, 1991).

Table 2

Item Response Percentages for the CONS_CLS subscale on the wFSLBI

Item	1	2	3	4	5
Time constraints interfere with my ability to teach a service-learning course	19.6	47.8	30.4	2.2	0.0
I feel that I am giving up control of the learning experience when teaching a service-learning course	19.6	60.9	13.0	4.3	2.2
I have a harder time assessing student learning and work in a service-learning course than in a traditional course	21.7	30.4	34.8	10.9	2.2
I experience challenges with the reduced time for classroom instruction in my service-learning course	17.4	43.5	19.6	17.4	2.2

Note. 1 = *Strongly agree*; 2 = *Agree*; 3 = *Neutral*; 4 = *Disagree*; and 5 = *Strongly disagree*

Objective Two

The second objective sought to assess participants' intentions in regard to using SL as a method of instruction. To accomplish this, Gelmon et al. (2001) SLSAG was used. The distribution of raters' composite item selections were expressed through means and standard deviations. When scoring syllabi, raters assigned a score of "0" if a syllabus did not contain a particular SL element, and "1" was assigned if the element was present (Gelmon et al., 2001). Then, to calculate the distribution of raters' item selections for the SLSAG, item frequencies were summed across raters and averaged by the total number of raters. Thereafter, item frequency was reported through composite means and standard deviations to allow direct comparison of SLSAG items in regard to raters' selection frequency. "Time dedicated to outlining the *use* of service-learning as an instructional method" emerged as the most frequently identified item (*M* = 4.00; *SD* = .266) in the agricultural education teacher educators' syllabi, as determined by the study's raters. The raters also identified "time dedicated to outlining partner-building techniques that might be employed when using service-learning as an instructional method" (*M* = 3.00; *SD* = .206) and "time dedicated to describing the *philosophy* of service-learning as an instructional method" (*M* = 2.67; *SD* = .225) more frequently than other items. Two of the 10 scoring criteria – "course objectives that are directly related to the teaching and learning of service-learning as an instructional method" and "course objectives that identify teaching the *philosophy* of service-learning as an instructional method" – were not found in any of 46 course syllabi (see Table 3).

Table 3

Composite Means of Raters' Frequencies for the SLSAG Items: Agricultural Education Teacher Educators' Course Syllabi

Service-Learning Course Elements	Composite Mean	*SD*
Time dedicated to outlining the *use* of service-learning as an instructional method.	4.00	.266
Time dedicated to outlining partner-building techniques that might be employed when using service-learning as an instructional method.	3.00	.206
Time dedicated to describing the *philosophy* of service-learning as an instructional method.	2.67	.225
Course objectives that directly relate to teaching the *use* of service-learning as an instructional method.	2.33	.201
Time dedicated to outlining techniques that might be used to *evaluate student learning* when using service-learning as an instructional method.	2.00	.150
Time dedicated to outlining *reflection techniques* that might be used to complement service-learning as an instructional method.	1.00	.083
The course description identifies service-learning as a topic to be addressed.	1.00	.108
Targeted readings/guest speakers/out-of-class assignments designed to augment learning regarding service-learning as an instructional method.	0.33	.049
Course objectives that are directly related to the teaching and learning of service-learning as an instructional method.	0.00	0.00
Course objectives that identify teaching the *philosophy* of service-learning as an instructional method.	0.00	0.00

To evaluate participants' intentions regarding their use of SL as a method of instruction, items on the *SLSAG* were summed and averaged across raters. Thereafter, individual mean scores were assessed using the following standards: *0 = Nonexistent*; *1* to *2 = Poor*; *3* to *5 = Fair*; *6* to *7 = Strong*; *7* to *9 = Excellent*; and *10 = Outstanding*. In total, one participant received a rating of *fair*, 18 *poor*, and 27 did not have any SL elements incorporated into their syllabi, as specified by the

SLSAG and expressed by averaging the three raters' scores. As such, the participants' overall mean intentions score was 0.70 (*SD* = .846) suggesting that agricultural education teacher educators' intentions to integrate SL into their methods courses were mostly *nonexistent*.

Objective Three

The third objective sought to examine the relationships between participants' beliefs, intentions, and selected external variables. As such, this section is organized by the appropriate bivariate correlational analysis (Field, 2013) used to describe the associations: (a) Spearman's Rho and (b) point-biserial. Each relationship was interpreted using conventions outlined by Davis (as cited in Miller, 1994) to describe magnitudes of association. Relationships were examined regarding agricultural education teacher educators' beliefs and intentions about SL as a method of instruction. A moderate and positive relationship (r_s = .376; $p < .01$) was found between CONS_CLS and Intentions, suggesting that participants' future behaviors were influenced by their views of existing barriers to using SL at the classroom level. No other statistically significant relationships were revealed among the variables examined (see Table 4).

Table 4
Spearman's Rho Correlation Matrix for Agricultural Education Teacher Educators' SL Beliefs and Intentions

Variables	1	2	3
1. CONS_CLS	-		
2. CONS_INST	.164	-	
3. Intentions	.376**	.236	-

Note. **Significant correlation coefficient at the 0.01 level.

Other relationships between the dependent variables measuring agricultural education teacher educators' beliefs and perceptions of barriers regarding their use of SL as a method of instruction and selected characteristics were described using Spearman's Rho correlation coefficient. No other statistically significant relationships were identified.

Point-biserial correlational analysis between dependent variables measuring the agricultural education teacher educators' beliefs and perceptions of barriers regarding the use of SL as a method of instruction and their selected personal and professional characteristics revealed two statistically significant relationships at $p < .01$. In particular, SL teaching experience demonstrated a very high and negative relationship with Intentions (r_{pb} = -.736), and a moderate and negative relationship with CONS_CLS (r_{pb} = -.483). The other relationships measured between the variables were not statistically significant (see Table 5).

Table 5

Point-biserial Correlations for Dependent Variables Measuring the Agricultural Education Teacher Educators' Beliefs and Perceptions of Barriers Regarding SL as a Method of Instruction and their selected Personal and Professional Characteristics

Dependent Variables	Gender	SL Teaching Experience	SL Postsecondary Experience	SL Secondary Experience	Land-grant Institution Employment
CONS_CLS	.136	-.483**	-.243	.093	.254
CONS_INST	-.051	-.286	-.044	.097	-.118
Intentions	.253	-.736**	-.185	-.282	-.098

Note. **Significant correlation at the 0.01 level.

Conclusions and Implications

This study aimed to understand agricultural education teacher educators' *normative* and *control* beliefs as well as their *intentions* regarding SL as a method of instruction. The study's results indicated that participants held a *neutral perspective* about existing barriers to SL at the institutional level, i.e., their normative beliefs (Ajzen, 1991). However, they generally *agreed* that control beliefs (Ajzen, 1991), or barriers to the classroom, served as a deterrent to SL's use in the preparation of agricultural education teachers. These findings are consistent with the existing SL literature in regard to faculty members' beliefs (Banerjee & Hausafus, 2007; Jaeger & Thornton, 2006; Ward, 2003). Such findings, however, have not been reported in agricultural education. Through the analysis of participants' course syllabi, it was determined that the intentions of agricultural education teacher educators regarding the use of SL as a method of instruction were mostly *nonexistent*. Although this finding is not present in the existing agricultural education literature, when considering the issue more broadly, other research indicates several critical reasons why university faculty members resist pedagogical innovations such as SL. For example, Koslowski (2006) argued faculty rejected educational innovations because they did not understand the related aims and purposes, perceived their academic freedom was being abridged, or held the position that they were too overwhelmed with other responsibilities to adopt a new practice.

A moderate and positive relationship was found between participants' conceptions of existing classroom challenges associated with SL and their intentions to implement the method. In a path analysis study, Bagnardi (2006) noted that control beliefs (challenges) exhibited a strong path to the intentions of faculty members regarding their use of SL as a method of instruction. Therefore, this study's finding is consistent with Bagnardi's (2006) results but adds a new dimension to agricultural education's literature base. A very high and negative relationship was also found in regard to agricultural education teacher educators' prior SL teaching experiences and intentions to use SL to instruct preservice students of agricultural education – a view currently not reflected in the literature. Prior SL teaching experience also yielded a moderate and negative relationship with participants' beliefs that barriers to implementing SL existed at the classroom level. The view that previous SL experience influences the beliefs of university faculty members is well-situated in existing literature (Abes et al., 2002; Hou, 2010; Russell-Stamp, 2015). This finding, however, provides new insight regarding the role that SL teaching experience may play in shaping how agricultural education teacher educators view the challenges inherent to using the method.

Recommendations

Findings from this study provide important opportunities for future research and practice. For example, we recommend that future research explore the diffusion methods and techniques (Rogers, 2003) that may help stimulate more widespread adoption of SL for teaching methods courses in agricultural education given the finding that participants' control beliefs (Ajzen, 1991) appeared to influence their decisions to use SL. Results from this study also call attention to the need for more understanding regarding which opinion leaders (Rogers, 2003) in the social networks of agricultural education teacher educators most profoundly influence their decisions about curricular choices for teaching methods courses. Perhaps a better understanding of the influence of these individuals could provide implications for addressing teacher educators' beliefs and intentions (Ajzen, 1991) about instructional methods that best prepare agricultural education teachers.

Because of the importance of the role of SL teaching experience, professional development models also should be explored to determine which would best prepare agricultural education teacher educators to use SL as a method of instruction with their preservice students. Due to the lack of intentions to integrate SL as a method of instruction, as evinced by the participants' course syllabi, more work is also needed to understand how teacher educators prioritize and select the various teaching methods used in their teacher preparation programs. Further, more research is needed about why SL does not appear to be a planned behavior (Ajzen, 1991), and why it is excluded from being allocated instructional time, as expressed by the teacher educators' intentions.

Discussion

Across academic disciplines, university faculty members have been called to turn their attention to community-based learning and renewal efforts to create mutual respect while also balancing relations of power (Hoy & Johnson, 2013). As community revitalization efforts and SL continue to intersect, Butin (2006) theorized these linkages could create a new movement in higher education institutions by which *communities* and *schools* become transformed in positive and generative ways. However, Roncolato (2013) argued the integration of SL and community renewal efforts do not usually occur in bounded contexts. Instead, advocates often emerge individually to create a formidable base to diffuse the concept more broadly (Jacoby, 2009). For example, it was the early proponents of SL who developed programming, drafted policies, created awards, and provided additional support to encourage its institutionalization (Stanton et al., 1999). These efforts, however, remain somewhat formative and are still taking shape in teacher education programs (Chambers & Lavery, 2012). Nevertheless, proponents of the method in teacher education (Barnes, 2016; Hildenbrand & Schultz, 2015; Tatebe, 2013) have called for SL to be a central focus, i.e., a critical planned behavior (Ajzen, 1991) for teacher preparation and credentialing.

At some teacher credentialing institutions, this call has been answered by implementing expectations for growth in preservice students' *leadership* and *service* as core components of their professional development and to better align such with standards established by the Council for the Accreditation of Educator Preparation (2017). As a working example, Oklahoma State University's teacher educators include a *service orientation* and *community outreach* expectation in their professional education units for which preservice students must demonstrate a commitment to service before entering the classroom (Oklahoma State University, 2017). The students must also provide evidence of service experiences as well as articulate the ways they intend to weave service-based endeavors into their future careers as educators (Oklahoma State University, 2017).

In addition, results from this study provided insights into beliefs and intentions that deter SL's use in teacher preparation programs of agricultural education. And, as a result, suggests implications for exploring how the *silencing of SL in teacher preparation* may limit students' learning experiences as well as the welfare of their communities. Perhaps these trends in teacher education present opportunities for *opening up* new possibilities by which to implement SL in teacher education, i.e., using the method to facilitate service-based outcomes while also integrating related curricular aims. This implication appears to be especially important in light of Roberts' and Edwards' (2015) proposition that instructors could use the method in each component of SBAE's comprehensive, three-circle model to enhance students' learning experiences. Although Roberts and Edwards (2015) illuminated new possibilities for the method in the context of agricultural education, at least two questions remain: *How could we best prepare preservice students to integrate the major components of SBAE's three-circle model by using SL as a method of instruction?* and *Is this an appropriate aim worthy of garnering the attention of teacher educators, teachers, and other stakeholders in agricultural education?* As such, more contemplation by and action from researchers and practitioners of agricultural education is needed in regard to SL as a method of instruction for enhancing the aims of SBAE.

References

Abes, E. S., Jackson, G., & Jones, S. R. (2002). Factors that motivate and deter faculty use of service-learning. *Michigan Journal of Community Service Learning*, *9*(1), 5-17. Retrieved from http://hdl.handle.net/2027/spo.3239521.0009.101

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decisions Processes*, *50*(1), 179-211. doi:10.1016/0749-5978(91)90020-T

Ajzen, I. (2002). *Constructing a TpB questionnaire: Conceptual and methodological considerations.* Amherst: University of Massachusetts System. Retrieved from http://www.people.umass.edu/aizen/pdf/TpB.measurement.pdf

Ajzen, I. (2006). *Behavioral interventions based on the theory of planned behavior*. Amherst: University of Massachusetts System. Retrieved from http://www.people.umass.edu/aizen/pdf/tpb.intervention.pdf

Aldersley, S. F. (1995). Upward drift is alive and well: Research/doctoral model still attractive to institutions. *Change*, *27*(5), 50-56. doi:10.1080/00091383.1995.9936448

American Association for Agricultural Education. (2016). *Membership information*. Author. Retrieved from http://www.aaaeonline.org/join

Bagnardi, M. (2006). *Faculty intention to use service learning as pedagogy in higher education* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Database. (UMI No. 3217559)

Ball, D., & Geleta, N. (2012). A delicate balance: Service-learning in teacher education. *Journal of the Scholarship of Teaching and Learning*, *5*(1), 1-17. Retrieved from http://files.eric.ed.gov/fulltext/EJ910337.pdf

Banerjee, M., & Hausafus, C.O. (2007). Faculty use of service-learning: Perceptions, motivations, and impediments for the human sciences. *Michigan Journal of Community Service Learning*, *14*(1), 32-45. Retrieved from http://hdl.handle.net/2027/spo.3239521.0014.103

Barnes, M. E. (2016). The student as teacher educator in service-learning. *Journal of Experiential Education*, *39*(4), 238-253. doi:10.1177/1053825916643831

Bornmann, L., Mutz, R., & Daniel, H. D. (2010). A reliability-generalization study of journal peer reviews: A multilevel meta-analysis of inter-rater reliability and its determinants. *PLoS ONE*, *5*(12), 1-10. doi:10.1371/journal.pone.0014331

Bringle, R. G., & Hatcher, J. A. (1995). A service-learning curriculum for faculty. *Michigan Journal of Community Service Learning*, *2*(1), 112-122. Retrieved from http://hdl.handle.net/2027/spo.3239521.0002.111

Brownlee. J., Schraw, G., & Berthelsen, D. (2011). *Personal epistemology and teacher education*. New York, NY: Routledge.

Butcher, J., Howard, P., Labone, E., Bailey, M., Groundwater, S., McFadden, . . . & Martinez, K. (2003). Teacher education, community service learning, and student efficacy for community engagement. *Asia-Pacific Journal of Teacher Education*, *31*(1), 109-124. doi:10.1080/13598660301612

Butin, D. W. (2006). The limits of service-learning in higher education. *The Review of Higher Education*, *29*(4), 473-498. doi:10.1353/rhe.2006.0025

Chambers, D. J., & Lavery, S. (2012). Service-learning: A valuable component of pre-service teacher education. *Australian Journal of Teacher Education*, *37*(4), 99-108. Retrieved from http://search.informit.com.au/documentSummary;dn=767781 396834335;res=IELAPA

Colbeck, C. L., & Wharton-Michael, P. (2006). Individual and organizational influences on faculty members' engagement in public scholarship. *New Directions for Teaching and Learning*, *2006*(105), 17-26. doi:10.1002/tl.220

Council for the Accreditation of Educator Preparation (CAEP). (2017). *Accreditation and program review*. Washington, DC: Author. Retrieved from http://www.caepnet.org/accreditation/about-accreditation/what-is-accreditation

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley & Sons.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Thousand Oaks, CA: Sage.

Frolow, M. (2010). *Determinants of a professor's decision to include service-learning in an academic course* (Unpublished doctoral dissertation). Seton Hall University, South Orange, NJ: Retrieved from http://scholarship.shu.edu/cgi/viewcontent.cgi?article=1366&context=dissertations

Gay, L. R., Mills, G. E., & Airasian, P. W. (2012). *Educational research: Competencies for analysis and applications* (10th ed.). Boston, MA: Pearson.

Gelmon, S. B., Holland, B. A., Driscoll, A., Spring, A., & Kerrigan, S. (2001). *Assessing service learning and civic engagement: Principles and techniques*. Providence, RI: Campus Compact.

Graham, D. L., Arnold, S., & Jayaratne, K. S. U. (2016). Research priority 6: Vibrant, resilient communities. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 49-56). Gainesville: Department of Agricultural Education and Communication, University of Florida.

Hart, S. M., & King, J. R. (2007). Service learning and literacy tutoring: Academic impact on pre-service teachers. *Teaching and Teacher Education*, *23*(4), 323-338. doi:10.1016/j.tate.2006.12.004

Hildenbrand, S. M., & Schultz, S. M. (2015). Implementing service learning in pre-service teacher coursework. *Journal of Experiential Education*, *38*(3), 262-279. doi: 10.1177/1053825915571748

Hou, S. I. (2010). Developing a faculty inventory measuring perceived service-learning benefits and barriers. *Michigan Journal of Community Service Learning*, *16*(2), 78-89. Retrieved from http://hdl.handle.net/2027/spo.3239521.0016.206

Hoy, A., & Johnson, M. (2013). *Deepening community engagement in higher education: Forging new pathways.* New York, NY: Palgrave MacMillan.

Jacoby, B. (2009). *Civic engagement in higher education: Concepts and practices.* San Francisco, CA: Jossey-Bass.

Jaeger, A. J., & Thornton, C. H. (2006). Neither honor nor compensation: Faculty and public service. *Educational Policy*, *20*(2), 345-366. doi:10.1177/0895904805284050

Kezar, A. (2013). Departmental cultures and non-tenure track faculty: Willingness, capacity, and opportunity to perform at four-year institutions. *Journal of Higher Education*, *84*(2), 153-183. doi:10.1353/jhe.2013.0011

Koslowski, F. (2006). *Overcoming faculty resistance to assessment*. Raleigh: North Carolina State University Press. Retrieved from www.ncsu.edu/assessment/symposium/presentations/A.10_Koslowski.pdf

Moore, T. L., & Ward, K. (2010). Institutionalizing faculty engagement through research, teaching, and service at research universities. *Michigan Journal of Community Service Learning*, *17*(1), 44-58. Retrieved from http://hdl.handle.net/2027/spo.3239521.0017.104

Miller, L. E. (1994). Correlations: Description or inference? *Journal of Agricultural Education,* *35*(1), 5-7. doi:10.5032/jae.1994.01005

National FFA Organization. (2014). *Supervised agricultural experience handbook*. Indianapolis, IN: Author. Retrieved from https://www.ffa.org/documents/learn/sae_handbook_V12.pdf

Oklahoma State University. (2017). Oklahoma State University LEADS core values. Stillwater, OK: Author. Retrieved from https://education.okstate.edu/peu/leads
Pollack, S. (1999). Early connections between service and education. In T. K Stanton, D. E. Giles, & N. I. Cruz (Eds.) *Service-learning: A movement's pioneers reflect on its origins, practice, and future* (pp. 12-32). San Francisco, CA: Jossey-Bass Publishers.

Roberts, R., & Edwards, M. C. (2015). Service-learning's ongoing journey as a method of instruction: Implications for school-based, agricultural education. *Journal of Agricultural of Agricultural Education*, *56*(2), 217-233. doi:10.5032/jae.2015.02217

Roberts, R., & Edwards, M. C. (2017). *Imaging service-learning in The Agricultural Education Magazine from 1929-2009: Implications for the method's reframing and use*. Paper presented at the meeting of the American Association for Agricultural Education (AAAE) National Conference, San Luis Obispo, CA.

Roberts, R., Terry R., Jr., Brown, N. R., & Ramsey, J. W. (2016). Students' motivations, value, and decision to participate in service-learning at the National FFA Days of Service. *Journal of Agricultural Education*, *57*(2), 187-202. doi:10.5032/jae.2016.02187

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: The Free Press.

Roncolato, D. (2013). Building deep partnerships and community-centered centers. In A. Hoy & M. Johnson (Eds.), *Deepening community engagement in higher education* (pp. 83-94). New York, NY: Palgrave-Macmillan US.

Russell-Stamp, M. (2015). Faculty use of community-based learning: What factors really matter? *Michigan Journal of Community Service Learning*, *21*(2), 37-48. Retrieved from http://hdl.handle.net/2027/spo.3239521.0021.203

Shrout, P. E., & Fliess, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, 86(2), 420-428. doi:10.1037/0033-2909.86.2.420

Smith, C. P. (2008). *Perceptions, motivations, and concerns of post-secondary faculty regarding implementing service-learning pedagogy into curriculum* (Doctoral dissertation). Available from ProQuest. (UMI No. 3444942)

Stanton, T. K., Giles, D. E., & Cruz, N. I. (1999). *Service-learning: A movement's pioneers reflect on its origins, practice, and future*. San Francisco, CA: Jossey-Bass.

Swick, K. J. (1999). Service learning helps future teachers strengthen caring perspectives. *The Clearing House*, *73*(1), 29-32. doi:10.1080/00098659909599635

Swick, K. J. (2001). Service-learning in teacher education: Building learning communities. *The Clearing House*, *74*(5), 261-264. doi:10.1080/00098650109599204

Tatebe, J. (2013). Bridging gaps: Service learning in teacher education. *Pastoral Care in Education*, *31*(3), 240-250. doi:10.1080/02643944.2013.774044

Ward, K. (1998). Addressing academic culture: Service learning, organizations and faculty work. In R. Rhoads & J. Howard (Eds.), *Academic service learning: A pedagogy of action and reflection* (pp. 73-80). San Francisco, CA: Jossey-Bass.

Ward, K. (2003). Faculty service roles and the scholarship of engagement. *Higher Education Report*, *29*(5), 1-188. Retrieved from http://files.eric.ed.gov/fulltext/ED476222.pdf

Whitehurst, G. J. (1984). Interrater agreement for journal manuscript reviews. *American Psychologist*, *39*(1), 22-28. doi:10.1037/0003-066X.39.1.22

Yang, F. Y., Chang, C. Y., & Hsu, Y. S. (2008). Teacher views about constructivist instruction and personal epistemology: A national study in Taiwan. *Educational Studies*, *34*(5), 527-542. doi:10.1080/03055690802288486

Deterrents to Service-Learning's Use as a Method of Instruction in the Preparation of Agricultural Education Teachers: The Beliefs and Intentions of Teacher Educators

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Discussant Remarks

Gary E. Briers, Texas A&M University

The authors point out in the introduction of the paper that service learning (SL) may have influenced agricultural education since its [ag ed's? or SL's] inception. So, there is historical significance to SL. Further, they provide evidence that there is current interest in SL, but they also acknowledge that there are perceived barriers to using SL and that those perceptions/beliefs and attitudes may be influenced by faculty members' institutions, expectations of performance, and others. Thus, the researchers developed this study to examine those deterrents. (One may ask if the NEXT paper will report on the encouragers/promoters of the use of SL!) The researchers identified the theory of planned behavior as the theoretical lens through which they examined perceived barriers and personal/contextual deterrents to implementing SL.

With a clear purpose and objectives, the authors chose respondents carefully and purposefully, selected an appropriate instrument with established values for reliability, and analyzed the data appropriately (with one question, perhaps).

To characterize institutional barriers (normative beliefs), the authors reported results of one of the scales, the CONS_INST scale. Because two of the items were stated such that agreement would indicate a more positive belief about implementing SL, that is, the item was NOT a barrier, I believe that the scale on those two items should have been reversed so that DISagreement would indicate that it was a barrier: e.g., Administrative leaders actively work to make service-learning a visible and important part of institutional work. (The responses were oh so slightly positive—indicating that administrative leaders tended NOT to be a barrier.) Because all three items yielded results near neutral, the change in direction is slight; in fact, the categorical interpretation would remain that they neither agreed nor disagreed about institutional barriers. I found it refreshing that faculty members did not resort to a kind of disavowal of any personal responsibility for not implementing SL; in other words, the INSTITUTION was not perceived to be, on average, a barrier. Granted, however, in each of the three statements, 30% to 39% indicated barriers. And, assuming a normal distribution, a similar number of respondents agreed that the institution/norms were a barrier (score less than 2.5).

So, were their deterrents? Yes, the barriers were those categorized as "control beliefs" (CONS_CLS) that is, barriers that are under the control of the faculty member/teacher educator. Then, perhaps because of their perceptions beliefs about barriers—barriers in their control—the teacher educators did not intend to inject elements of service learning into their courses. This certainly follows TPB! The correlation between control beliefs and intentions confirm that as respondents perceived there to be classroom barriers, they did not intend (lower score on SL in course syllabi) to implement SL.

Finally, the researchers examined the relationships or perceived barriers and intentions with gender, teaching experience, and kind of institution in which employed. Teaching experience using SL was NEGATIVELY related to intentions to use SL. This finding was not reflected in the current literature. Does this portend rejection of an innovation (SL)—because of disenchantment or replacement with another innovation? Is the method too complex? Without relative advantage? Can Everett Rogers help us?

The authors ask how preservice teachers should be prepared to use SL to integrate the major components of SBAE’s three-circle model. However, given the findings of this study, they ask further whether this is an appropriate aim worthy of our efforts. It appears that we should continue the conversation, the debate, the RESEARCH, the trial and error … all in attempts to determine the actual value of SL and its impact on learning for today’s society/world.

I do compliment the authors on a very well written paper. I am especially impressed with the lack of noise cause by errors in the references. There were only one that I found.

Planned Behavior Typologies of Agricultural Education Teacher Educators in Regard to Service-Learning as a Method of Instruction: A National, Mixed Methods Study

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Abstract

This mixed methods study sought to understand the service-learning (SL) beliefs and intentions of agricultural education teacher educators. Quantitative data were collected using a web-based survey instrument and participant-submitted course syllabi. Next, variables yielding statistically significant relationships were analyzed using cluster analysis. This process produced three unique clusters operationalized as typologies through qualitative analysis, which represented the planned behaviors (Ajzen, 1991) of agricultural education teacher educators in regard to SL as a method of instruction: (a) Optimistically Unaware, (b) Policy-focused Decision Makers, and (c) SL Implementers. The Optimistically Unaware expressed positive beliefs about the method, but did not understand how to integrate SL in their teaching methods courses. Meanwhile, the Policy-focused Decision Makers used established education policy standards as anchors when navigating their decision-junctures, such as whether or not to feature SL in the course design process. SL Implementers, the final typology, espoused strong beliefs about the method's potential while also emphasizing how it could be used to enrich the preparation of agricultural education teachers. Recommendations, implications, and discussion of the results point to the potential SL holds if operationalized as a complement to teacher preparation rather than an addition to current practice.

Introduction

The emergence of service-learning (SL) in higher education appears to be a relatively recent phenomenon. However, this instructional method has deep philosophical roots that can be traced to some of the earliest origins of formalized learning and education (Speck & Hoppe, 2004), especially in agricultural education (Roberts & Edwards, 2015, 2017). Although thought leaders have championed different instructional methods, curricula, and philosophical positions, their views often converge around the notion that education should be used to foster social harmony and improve society (Fraser, 2014; Tyack, Lowe, & Hansford, 1984). For example, early intellectuals argued that education could be used as a way to improve students' *morals*, *character*, and *virtues* (Rhee, 2012). In a similar way, educators who integrate SL into their courses often seek to advance students' morality, self-concept, and benevolence so they can more intimately understand the world's issues and problems (Crews, 2002; Eyler & Giles, 1999).

Although difficult to define, SL is described as a form of reciprocity in which students extend classroom learning into society to resolve communal problems while also accruing distinct benefits for all participants (Bringle & Hatcher, 1995). During the past two decades, numerous advancements in higher education regarding SL have catalyzed the method's adoption and use (Butin, 2006, 2010; Cipolle, 2010). For example, involvement in *Campus Compact*, a national coalition of postsecondary education institutions with a mission calibrated toward *service*, has soared past 1,100 committed campuses nationwide (Campus Compact, 2016). Yet despite SL's successes, Saltmarsh and Hartley (2008) suggested the movement had "stagnated and dissipated"

(p. 1), especially concerning its ability to bring about “democratic, community-based knowledge and action” (p. 1). To this point, Butin (2006) asserted that many programs were little more than community service efforts in *meaning* and *approach*. Nevertheless, in teacher education, SL has been championed as a way to help preservice teachers gain valuable practical experiences while also making contributions to local education systems and to their surrounding communities (Barnes, 2016; Hildenbrand & Schultz, 2015). In addition, teacher education programs have begun to place increasing emphasis on introducing preservice teachers to instructional methods intended to facilitate higher-order thinking skills, collaborative learning, as well as the ability to address ambiguous and complex social problems (Yang, Chang, & Hsu, 2008). Because SL as a method of instruction is positioned to assist in achieving such outcomes, it has received growing attention in teacher preparation programs (Ball & Geleta, 2012; Chambers & Lavery, 2012; Hart & King, 2007). Nonetheless, many instructors struggle with the ambiguities inherent in SL and choose to embrace more teacher-centric approaches in practice (Yang et al., 2008).

As a result, proponents interested in using SL in teacher education have begun to consider integrating the method into teacher preparation by exploring teacher educators’ *beliefs* and *intentions* (Ball & Geleta, 2012; Bates, 2009; Hou, 2010; Tatebe, 2013). Proponents of this integration assert SL is a way to instill professional and ethical core values (Anderson, 2000), to foster enhanced student meaning-making when solving complex problems (Lake & Jones, 2008), and to improve teachers’ efficacy for working with diverse populations (Daniels, Patterson, & Dunston, 2010). However, Hildenbrand and Schultz (2015) expressed concerns regarding the lack of evidence to support the claim that SL should be *used* and *highlighted* as a method of instruction in teacher preparation programs. Examples of obstacles to SL’s widespread adoption in teacher education include difficulties with attaining service sites, addressing challenges to upholding state and national teacher education standards, and juggling an already robust curriculum (Anderson & Pickeral, 1998) in many cases. Attempts to understand teacher educators’ beliefs and intentions regarding the use of SL in agricultural education appear to have received scant attention from researchers. Therefore, this question lingers: *Do agricultural education teacher educators’ beliefs and intentions support the use of SL as a method of instruction?*

Roberts and Edwards (2015, 2017) touched on this issue by calling for a sharper focus on SL in agricultural education teacher preparation programs. Nevertheless, little attention appears to have been devoted to addressing this issue. More research is needed to distill the beliefs and intentions that presage, inspire, and embolden teacher educators to use SL as an instructional method in their teacher preparation courses (a) to facilitate the learning of preservice students and (b) with the intention of students acquiring SL as a teaching method to use as in-service teachers. This insight may yield important new understandings of the behaviors influencing how SL is conceptualized and practiced in school-based, agricultural education (SBAE).

Theoretical Framework

This study was grounded in Ajzen’s (1991) theory of planned behavior (TPB). Through this lens, an individual’s *behavior* is shaped by his or her underlying *intentions* (Ajzen, 2006). However, Ajzen (1991) theorized that three systems of *belief* foreground an individual’s intentions: (a) behavioral (attitudes), (b) normative (subjective or social norms), and (c) control (perceived behavior controls). *Behavioral beliefs*, or *attitudes*, refer to the perceptions individuals’ hold regarding the consequences of particular behaviors; therefore, perceptions can influence the formation of positive or negative attitudes (Ajzen, 2006). If their attitudes toward given behaviors are favorable, individuals are more likely to engage in such, and the counterfactual is also more likely. On the other hand, *normative beliefs, or subjective norms*, represent the degree of *social pressure* individuals recognize, which influence their adoption or rejection of behaviors (Ajzen, 2002). Finally, *control beliefs,* or *perceived behavioral controls*, are related to the levels of difficulties individuals perceive associated with implementing or exercising behaviors. The manipulation of one or more of these belief systems is theorized to influence whether individuals intend to execute specific behaviors in the future (Francis et al., 2004). Figure 1 provides a visual representation of Ajzen's (1991) theory of planned behavior.

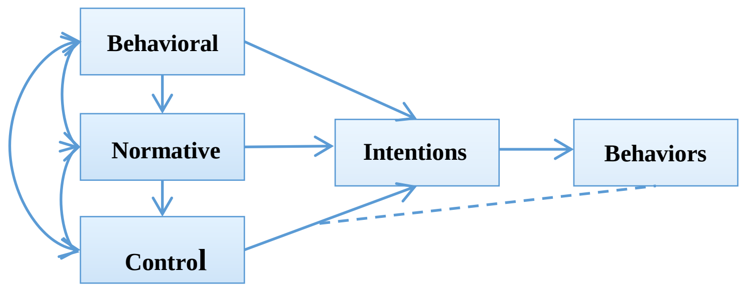

Figure 1. The theory of planned behavior. Adapted from "The Theory of Planned Behavior" by I. Ajzen, 1991, *Organizational Behavior and Human Decision Processes*, 50, p. 182. Copyright 1991 by Academic Press, Inc.

In this study, behavioral beliefs were conceptualized as the perceived benefits to the classroom and community, normative beliefs as perceived barriers within the institution, and control beliefs as the participants' perceived barriers to using SL in their classrooms. In addition, the intentions of agricultural education teacher educators were interpreted by the degree to which instructors integrated SL into their course syllabi. Therefore, this investigation sought to describe participants' beliefs and intentions about SL as a method of instruction.

Purpose

A mixed methods study sought to understand the SL beliefs and intentions of agricultural education teacher educators. As such, it was positioned to address Priority 6 of the American Association for Agricultural Education's (AAAE) National Research Agenda by focusing on effective delivery methods to build "vibrant, resilient communities" (Graham, Arnold, & Jayaratne, 2016, p. 49). By using Ajzen's (1991) TPB as a theoretical lens, one research question guided the portion of a larger investigation reported on here: *How did the study's qualitative findings help explain quantitative patterns?*

Methodology and Procedures

This study used an explanatory, sequential mixed methods design by which priority was assigned to the qualitative strand, i.e., Quan → QUAL (Creswell & Plano Clark, 2011). Relying on a pragmatist lens (Morgan, 2007), the first phase was comprised of quantitative data collection employing Dillman's, Smyth's, and Christian's (2014) tailored survey design procedures to collect data through a web-based instrument using Qualtrics™ online software. The participants also submitted course syllabi, which were quantized during analysis using the *SL Syllabus Analysis Guide* [SLSAG] (Gelmon, Holland, Driscoll, Spring, & Kerrigan, 2001). Cluster analysis procedures were followed (Macia, 2015) to identify patterns resulting from the quantitative findings. Cluster analysis allows researchers to categorize individuals using a combination of relevant variables. The combination of variables used for clustering was determined by mobilizing those yielding statistically significant relationships ($p < .05$) with the dependent variables (Mooi & Sarstedt, 2011). Thereafter, qualitative data were collected from nine agricultural education teacher educators, as determined by cluster analysis, to develop typologies – a procedure evoking rich meaning from the members of each cluster.

Role of the Researchers

Our engagement with the data changed based on the phase of the study. As such, it is important to reveal our previous experience and biases. For instance, each researcher served as a SBAE instructor in their respective home states. Further, the lead researcher had used SL to improve student learning outcomes and the method serves as his primary line of inquiry. It also bears noting that we had interacted with participants in this study at research conferences and other professional venues. Therefore, these interactions could have influenced some individuals to participate in the study as well as what they chose to share in their responses. Finally, gift card incentives were used to recruit participants for the study.

Phase I: Participant Recruitment, Quantitative Data Collection, & Instrumentation

The population was a census of agricultural education teacher educators who were active members of the American Association for Agricultural Education (AAAE). As such, the frame for this study was AAAE's membership directory maintained by its Membership Secretary (AAAE, 2016). However, instructors could teach methods courses that include aspects of SL who were not members of AAAE, i.e., the possibility of coverage error existed (Dillman et al., 2014). More than 80 higher educational institutions in the United States prepare SBAE instructors (Birkenholz & Simonsen, 2011). To ensure the population of interest was identified, we administered a web-based instrument packet (Dillman et al., 2014) through the AAAE electronic mail listserv. The participants were asked to indicate whether they taught at least one agricultural education teaching methods course either during the three previous academic years or would do such in the spring academic term of 2017. This criterion was used as a sorting variable to determine the eligibility of participants who should complete the survey instrument. Individuals who met the criterion were allowed to continue to the remainder of the instrument's items and submit a course syllabus; other respondents were not permitted to continue. In total, 77 agricultural education teacher educators responded to the online survey instrument, resulting in 46 useable responses (59%) with 43 institutions represented.

The web-based instrument had three measures: (a) personal characteristics, (b) items slightly modified from Hou's (2010) Web-based Faculty Service-Learning Beliefs Inventory (wFSLBI), and (c) items slightly modified from the SLSAG (Gelmon et al., 2001). Reported findings are part of a larger data set. Results from quantitative measures *are not featured here* but were used to demonstrate the quantitative strand's role in the development of typologies. The primary quantitative measure, the wFSLBI, was designed to understand faculty members' SL beliefs and is theoretically grounded in Ajzen's (1991) TPB. Through factor analysis procedures, Hou (2010) confirmed four distinct factors: (1) perceived benefits at the classroom level (PROS_CLS) with seven items, (2) perceived benefits at the community level (PROS_COM) with six items, (3) perceived barriers at the classroom level (CONS_CLS) with four items, and (4) perceived barriers at the institutional level (CONS_INST) with three items (Hou, 2010). Post-hoc reliability estimates for each of the instrument's four subscales were .71 or larger and considered acceptable (Field, 2013). We also used the SLSAG (Gelmon et al., 2001) to analyze the agricultural education teacher educators' *intentions* in regard to SL as evinced in their course syllabi. We provided a training session for the raters to establish interrater reliability in which two external raters and the lead researcher scored participants' syllabi (Bornmann, Mutz, & Daniel, 2010). Interrater reliability analysis yielded an interclass correlation coefficient (ICC) of .88 which was considered satisfactory (Whitehurst, 1984).

Inter-Phase: Clustering Procedures and the Identification of Qualitative Cases

In this study, we analyzed quantitative variables that yielded statistically significant relationships through cluster analysis procedures (Macia, 2015). Thereafter, a two-step cluster analysis approach was used rather than hierarchical or k-means because the variables of interest were a combination of ordinal and nominal data derived from different scales (Chiu, Fang, Chen, Wang, & Jeris, 2001). Each variable, therefore, was standardized before initiating clustering procedures. In the first stage, homogenous clusters were formed based on their rank (Chiu et al., 2001). After the first iteration, eight clusters were generated. Then, clusters were discriminated, and reduced, based on predictor importance (Mooi & Sarstedt, 2011). Through this technique, *three high-quality clusters* were identified. Across clusters, predictor importance included participants' (a) SL experiences in postsecondary education, (b) SL teaching experiences, (c) intentions, (d) SL experiences in secondary education, as well as (e) their perceptions of SL regarding CONS CLS, PROS CLS, CONS INST, and PROS COMM. The three clusters were then operationalized as bounded cases (Stake, 2006) for qualitative analysis.

Phase II: Qualitative Data Collection, Analysis, and Typology Development

In the qualitative phase, we used a multiple case study approach (Stake, 2006) to *develop* and *define* typologies. Emphasis in the qualitative strand was placed on gaining *representativeness* (Teddlie & Yu, 2007). Therefore, we selected three qualitative cases from each cluster using random selection – an approach that is *rare but acceptable in qualitative inquiry* (Miles, Huberman, & Saldaña, 2014). For example, we randomly selected participants 41, 44, and 46 in the first cluster, participants 9, 20, and 39 in the second cluster, and participants 13, 24, and 26 in the third cluster. As such, nine participants participated in 45 to 60 minute semi-structured telephone or Skype® interview sessions (Creswell & Plano Clark, 2011). Thereafter, each qualitative interview was transcribed verbatim. Next, qualitative analysis software NVivo® was used to manage and explore the data. Initial data analysis was conducted using the constant comparative method, which was facilitated through three coding types: (a) open, (b) axial, and (c) selective (Corbin & Strauss, 2015). Open coding required us to label data units into distinct categories. Thereafter, axial coding necessitated that we scrutinize relationships among categories to develop evidentiary warrants (Saldaña, 2012). We then used selective coding to create an analytic storyline of the data. As a result, our assertions for typology generation were *built up* to narrate the multiple views presented in each cluster (Corbin & Strauss, 2015). Through case comparisons and contrasts, we then chose to operationalize the clusters as typologies by weaving the voices of *within case* participants into rich descriptions (Stake, 2006). It should be noted that Lincoln's and Guba's (1985) four criteria for qualitative quality – credibility, confirmability, transferability, and dependability – drove our ethical decision making. To achieve this, we triangulated findings through multiple forms of data (credibility); were explicit about our decisions, biases, and other influences (confirmability); sought a theoretically diverse sample (transferability); and strove to conduct an investigation that was stable and consistent with the traditions of qualitative inquiry (dependability) [Lincoln & Guba, 1985].

Findings

The three typologies identified through cluster analysis procedures represent the planned behaviors (Ajzen, 1991) of agricultural education teacher educators in regard to SL as a method of instruction: (a) *Optimistically Unaware*, (b) *Policy-focused Decision Makers*, and (c) *SL Implementers*. It is important to note that no typology is considered better or more correct in regard to conceptualizing or delivering teaching methods courses in agricultural education. A description of each typology is offered next along with supporting themes, which are grounded in Ajzen's (1991) three belief systems: (a) behavioral, (b) normative, and (c) control.

Typology #1: *Optimistically Unaware*

The *Optimistically Unaware* participants expressed positive beliefs about the potential of SL. In addition, each of the three participants interviewed were familiar with the term *service-learning* and two had experience with the method at the secondary school level. However, the *Optimistically Unaware* explained they did not fully understand how to integrate or feature the method in their teaching methods courses within existing design structures. Therefore, given the background of the *Optimistically Unaware* their beliefs and intentions were presented through a lens of *projection*, i.e., largely experience and context free.

Behavioral Beliefs

Two sub-themes explained the *Optimistically Unaware*'s behavioral *beliefs* (Ajzen, 1991): (a) experiential learning, and (b) SL's benefit to SBAE's comprehensive, three-circle model.

Experiential Learning. Each participant belonging to the *Optimistically Unaware* typology articulated that they saw value in SL because of its experiential nature. They explained that teaching experientially could help *bring the curriculum to life* by making learning more permeable in which the *walls* separating classrooms and the real-world could be diminished. Participant 44 explained: "Hands on anything is always a positive. And I think that service-learning has potential to actually put them [students] in those real-world situations."

SL's Benefits to SBAE's Comprehensive, Three-Circle Model. Although the *Optimistically Unaware* did not appear to have put much deep philosophical thinking into using SL as a method of instruction, they were able to articulate ways the method might benefit each component of SBAE's comprehensive, three-circle model. For example, describing SL's role in SBAE, Participant 41 highlighted the ways in which SBAE teachers were using SL through classroom activities in her home state. She elaborated: "Yesterday afternoon [I visited] a meat laboratory, the hams and bacon that [did not] get bought [were] donated to the local food bank."

Normative Beliefs

Receiving support from individuals of influence is critical to forming intentions of planned behavior – a concept Ajzen (1991) called normative beliefs. Therefore, in this study, normative beliefs refer to whether participants perceived their institutions' leaders encouraged the use of SL. Overall, participants reported a *supportive institutional culture* in regard to SL. Participant 48 even suggested that his institution might look favorably on using SL in the tenure and promotion process: "In the teaching portion of our P&T packet, there is a place where it asks not just for like your normal coursework or anything like that, [but also] other teaching experiences and I think you could highlight service-learning."

Control Beliefs

How individuals view the perceived challenges of an endeavor is critical in the formation of control beliefs (Ajzen, 1991). As such, participants in this study considered their personal challenges as well those that preservice teachers might face in regard to implementing the method. To this point, the *Optimistically Unaware's* control beliefs emerged through two subthemes: (a) lack of understanding and (b) time.

Lack of Understanding. The most consistently reported barrier from the *Optimistically Unaware* typology was the *lack of understanding of SL*. For example, the participants perceived neither they nor others in agricultural education fully understood the difference between SL and community service. And, as a consequence, opportunities for using SL were not fully realized. Participant 41 explained: "I think there's something going on [with SL but] they [SBAE teachers] just don't know what it is."

Time. Acknowledging the challenge of overwhelming *time commitments* when conducting quality SL projects also arose as a core *control belief*. Participant 44 elaborated: "I think the time; time is definitely a barrier to doing these type[s] of service-learning things." Although the *Optimistically Unaware* participants recognized the advantages of SL, their lack of understanding and perceptions of time constraints seemed to inhibit their adoption of the method. Nevertheless, they were optimistic about SL's potential as a method of instruction in SBAE.

Typology #2: *Policy-focused Decision Makers*

The second typology was comprised of individuals with SL experience as students and teachers. However, their intentions concerning the use of SL varied considerably. Through analysis of these discrepancies, the second planned behavior typology emerged as *Policy-focused Decision Makers* because, although their experiences, beliefs, and intentions often supported the use of SL, perceptions of existing educational policies determined the degree to which they incorporated the method in their teacher preparation courses.

Behavioral Beliefs

The *Policy-focused Decision Makers* expressed largely positive and encouraging views concerning the benefits of SL as a method of instruction. Existing attitudes within this typology, therefore, supported the use of SL – a notion connected to Ajzen's (1991) behavioral beliefs. Two distinct subthemes emerged uniformly through data analysis: (a) SL's benefits to SBAE's comprehensive, three-circle model and (b) the personal development of students.

SL's Benefits to SBAE's Comprehensive, Three-Circle Model. When articulating the advantages that SL may offer agricultural education, the *Policy-focused Decision Makers* noted the method could assist instructors with delivering SBAE's comprehensive, three-circle model. In support, Participant 39 described how his ideal three-circle model would include a SL component. He opined: “Ideally if you had [a] paintbrush, [being] the paint guy, you want a program that’s going to be meant for service-learning with all three circles being equal.”

Personal Development of Students. Each of the *Policy-focused Decision Makers’* interviews mentioned the transformative potential that SL could offer students. Participant 9 explained how SL might be used to help students adopt a more accepting and change-focused worldview. She elaborated: “[I]t’s so critical that students think past our own very small individual universe and think about that whole idea of tithing, in the big sense not religious, but giving back.” Therefore, they appeared to perceive the method could help their students grow in deeply personal ways.

Normative Beliefs

Ajzen (1991) referred to normative beliefs as views influenced by individuals and forces deemed important within a given social system. For the *Policy-focused Decision Makers*, these beliefs surfaced as conflicted yet distinguishing features. Two subthemes provided the basis for this interpretation: (a) policies as decision anchors and (b) supportive institutional cultures.

Policies as Decision Anchors. Although *Policy-focused Decision Makers* expressed positive views about SL, their intentions were diverse in regard to integrating the method into their teaching methods courses. After reflecting on the participants’ perspectives, the belief that *policy served as their decision anchors* emerged. For example, when conceptualizing courses, individuals comprising this typology appeared to consult existing policies to decide which teaching methods, assignments, and projects held the most value for their students. In the case of Participant 20, she explained that “[e]verything goes through the teacher education committee. They’re a governing body of the education division. I have the freedom to do some things, but something that affects the portfolio of those students, I don't have that authority.”

Supportive Institutional Culture. Participants 9, 20, and 39 articulated that their campuses largely promoted a *culture* in which SL was encouraged. For example, all reported having an Office of SL, institutional missions that addressed the need for the method, as well as the provision of SL-related professional development opportunities on their campuses. Participant 39 elaborated: “My university requires each college to have SL in their classes. In our university catalog, some courses are designated as a SL course.”

Control Beliefs

Control beliefs, or how easy or difficult a behavior may be to implement, of *Policy-focused Decision Makers* related to the issue of time. Participant 20 contended: “The biggest thing is time.” The teacher educators explained that SBAE instructors in their home states had many job duties and, therefore, little temporal space existed in which to implement what they perceived to be a time-consuming method of instruction. The *Policy-focused Decision Makers* had significant experience with SL as a method of instruction, however, existing educational policies appeared to shape the degree to which they chose to integrate SL in their teaching methods courses.

Typology #3: *SL Implementers*

Members of the third cluster, *SL Implementers*, espoused strong beliefs about the method’s potential while also emphasizing how it could be used to enrich agricultural education teacher preparation.

The *SL Implementers* articulated their beliefs and intentions (Ajzen, 1991) in regard to SL by drawing on prior related teaching experiences rather than projecting what the method of instruction *might* achieve. *SL Implementers* had experiences with the method as students and teachers and voiced intentions to continue to use the method in their future practice.

Behavioral Beliefs

Emerging from the data corpus were *SL Implementers'* richly storied and temporally marked illustrations of their behavioral beliefs: (a) SL as a complement to teacher education, (b) SL's role in SBAE's comprehensive, three-circle model, and (c) the personal development of students.

SL as a Complement to Teacher Education. The *talk* of *SL Implementers* in regard to the method illuminated how they used it in teacher preparation to *uphold* and *operationalize* their philosophies of teaching. For example, they revealed that using the method emboldened them to challenge their students to grapple with the complexities of teaching and learning outside the walls of university classrooms while negotiating such experiences through reflection. Participant 13 explained: "It starts to give them [my students] a halfway real perspective of what it looks like to be a teacher in a classroom."

SL's Benefits to SBAE's Comprehensive, Three-Circle Model. The *SL Implementers* also elucidated the *strategic advantages* that using SL could provide teachers in regard to delivering SBAE's comprehensive, three-circle model. For example, patterns of discourse converged on the notion that SL could assist in facilitating learning experiences within and among the FFA, SAE, and classroom and laboratory aspects of SBAE. When considering SL's potential, Participant 24 explained: "I think service-learning plays a part in all" three dimensions of an agricultural education program. However, they also noted that challenges still had to be overcome before its use became more widely adopted in all three components of the model.

Personal Development of Students. By design, SL is employed to assist students with *making sense* of experiences while also forging deep connections regarding how their actions can create change in local communities. Participant 26 described how the method could enhance students' personal development. He explained that by partaking in acts of service, students begin to embrace a sense of "leadership" and "responsibility" which helped them adopt more mature perspectives. He maintained this maturation was visible when interacting with individuals in the community. He further said: "By helping within the community you [, i.e., his students,] start to be looked upon as a leader and someone to go to."

Normative Beliefs

Faculty members are often influenced in their roles by *institutional controls* (Lawrence, 2008) that govern existing practices, policies, and day-to-day activities. Two sub-themes undergird the normative beliefs theme: (a) supportive institutional cultures and (b) professional enrichment.

Supportive Institutional Cultures. Each participant interviewed from the third cluster emphasized the highly supportive culture for SL at his or her respective institution. Participant 26 stated: "We have a whole office of service-learning. We were one of the first institutions in the country to require each department to have a certain number of hours of service-learning." Other examples of assistive institutional cultures included offices of SL on the participants' campuses, award recognitions, professional development opportunities, SL-designated course offerings, and student course credit hours for their SL endeavors.

Professional Enrichment. The *SL Implementers* interviewed also described the scholarly enrichment the method offered to their careers. For example, the participants had used the method to support their scholarly interests, while also benefitting students and local communities. Participant 13 explained: "I did just a brief poster presentation last year based on some data we collected on a couple semesters in terms of our [SL] project."

Control Beliefs

The third theme captured *SL Implementers'* beliefs and experiences navigating the perceived challenges of SL – a concept Ajzen (1991) termed *control beliefs*. The *SL Implementers* were candid about the method's downsides and collectively expressed the view that SBAE teachers must be fully committed to ensure their SL projects are successful. The major challenge stressed by the *SL Implementers* was the concept of time. Participant 26 gave voice to this issue: "for them to have extra time to go devote two or three days for a [service-learning] project is sometimes quite difficult." The *SL Implementers* advocated for SL in their teacher preparation programs based on previous experiences supporting beliefs that it could be used to complement teacher education by helping to build preservice teachers' capacities to implement the method in their future practice.

Conclusions

The intent of this investigation was to understand the SL beliefs and intentions of agricultural education teacher educators. Findings suggested that the planned behaviors (Ajzen, 1991) of agricultural education teacher educators regarding their use of SL as a method of instruction can be interpreted through three typologies. For example, the *Optimistically Unaware* explained they did not understand how to implement SL into their courses. Meanwhile, *Policy-focused Decision Makers'* beliefs systems often supported the use of SL, however, existing educational policies influenced their decisions on whether to use SL. The final typology, *SL Implementers*, articulated how they used SL as a *complement* to teacher preparation. These views offered new insights on the TPB (Ajzen, 1991) as well as the practice of SL, especially concerning the method's existing position in programs for the preparation of agricultural education teachers. Findings, therefore, not only broaden the SL and agricultural education literature bases but also introduce new developments for the relevance of Ajzen's (1991) TPB toward understanding the pedagogical choices of teacher educators.

A cross-case analysis (Stake, 2006) of the study's qualitative themes revealed similarities and differences in regard to the dimensions of participants' three belief systems, as theorized by Ajzen (1991). Differences among the study's emergent factors helped define and describe each typology distilled by the researchers. Moreover, it is critical to acknowledge that across typologies, three subthemes were constant: (a) SL's benefits to SBAE's comprehensive, three- circle model, (b) supportive institutional cultures, and (c) time. For instance, representatives from each typology spoke to SL's potential to serve as a delivery strategy in all three programmatic dimensions of SBAE: (a) classroom and laboratory instruction, (b) SAE, and (c) the FFA. For the teacher educators in this study, however, their articulation of examples and strategies for SBAE instructors to use in facilitating SL in students' SAEs was mostly tacit if not ambiguous – a finding not currently reflected in the agricultural education literature. In each typology, participants reported relatively supportive institutional cultures for SL. In this regard, the participants reported their institutions maintained offices of SL, provided professional development opportunities, offered faculty awards, and, in some cases, required colleges and departments to designate SL courses. Further, the teacher educators perceived their administrators were supportive of the method's use in teacher preparation for agricultural education. These findings align with existing SL literature (Barnes, 2016; Butcher et al., 2003; Hart & King, 2007), but had not been previously reported in agricultural education.

When asked to articulate the potential challenges of integrating SL into their courses, the participants identified *time* as a consistent barrier. The time factor was perceived as a challenge because the agricultural education teacher educators described struggling to find enough space in their courses to properly integrate and feature the method. The participants also noted that time was a barrier for SBAE instructors due to the many duties, responsibilities, and expectations associated with their jobs, which already monopolized their schedules. Although time is a common barrier reported in the SL literature (Butin, 2006; Chambers & Lavery, 2012), it may not have received sufficient attention in preparing teachers of agricultural education to use SL.

Recommendations, Implications, and Discussion

The development of planned behavior typologies in this investigation appear to unsettle and expand existing conceptions of SL in the context of agricultural education. Given these new insights, it is important to address the resulting implications for research, theory, and practice.
First, future researchers should explore how teacher educators' behavioral, normative, and control beliefs (Ajzen, 1991) influence the ways they depict SL's ability to integrate the primary dimensions of SBAE's comprehensive, three-circle model (Croom, 2008; Roberts & Edwards, 2015). Because of the rich discourse surrounding SL, as articulated by participants in this study, more research is needed to explain how successful SL SAE's are defined and operationalized . In addition, given the emergence of the *Policy-focused Decision-Makers* typology, researchers should also consider the ways and extent that existing educational policies might stifle the use of SL in teacher preparation courses. Because some teacher educators reported they did not feature or use SL as a method of instruction, future studies should also investigate the implications of silencing SL in the teacher education curriculum that may negate potential outcomes for student learning and the transformation of SBAE programs and local communities. More research is also needed to uncover the stories that *SL Implementers* tell about the impacts of SL on students and communities associated with using the method. In addition, future investigations should seek to identify which *lived experiences* involving SL influence teacher educators' decisions to integrate the method into their teacher preparation courses.

Ajzen's (1991) TPB is often used as a theoretical grounding in quantitative-oriented studies (Armitage & Conner, 2001; Chiaburu & Tekleab, 2005; McCarthy & Garavan, 2006). However, this study offered new understandings into the ways the theory could be expanded, i.e., the development of planned behavior typologies. As such, more theory-building efforts should be devoted to understanding the limits and possibilities of Ajzen's (1991) TPB, especially in regard to SL in agricultural education. For example, by securing a theoretical sample (Miles et al., 2014), grounded theory methods could be used to more intimately describe the influences, processes, and parameters that foreground the planned behaviors of teacher educators.

This study also holds important implications for future practice. To this aim, agricultural education teacher educators should utilize the resources available at their home institutions to support them in considering how SL could be integrated in their teaching methods courses. Perhaps these local professionals can provide valuable institutional knowledge and assets that would assist teacher educators in traversing the various educational policies and scheduling issues appearing to influence their underlying intentions about using SL as a method of instruction. In addition to using local resources, professional development opportunities should be incorporated at American Association for Agricultural Education (AAAE) conferences – regional and national – to demonstrate how SL can be used in teaching methods courses. During these professional development opportunities, dialogue could occur among teacher educators regarding the instructional methods that best prepare preservice teachers to deliver SBAE's comprehensive, three-circle model in more integrated and complementary ways (Roberts & Edwards, 2015). Such discussions should also involve SL's place and relevance in the delivery of SBAE programs by agricultural education teachers.

Although agricultural education teacher educators appear to understand the benefits of SL as a method of instruction, more work is needed to assist them with learning to navigate the challenges inherent to its use. To that aim, professional development sessions should specifically address issues such as *lack of knowledge* of SL and *time constraints*, as perceived to be associated with implementing the method. Example course syllabi should be shared with AAAE members that demonstrate how to integrate SL as a method of instruction in teaching methods courses. Perhaps by considering high-quality examples of how the method is being used to enrich teacher preparation, agricultural education teacher educators would begin to make shifts in their practice. Further, teacher educators should be encouraged to reconsider the view that SL will require *additional time* in their methods courses. Instead, they should be urged to consider SL as a *complement* to their teacher preparation programs. For example, perhaps a service-based learning project serves as a *capstone experience* in teaching methods courses by which a majority of the assignments, such as lesson plan development and use, are connected to a larger SL undertaking in their institutions' surrounding communities. Finally, agricultural education teacher educators should be encouraged to model the use of SL so their preservice students' opportunities increase to observe and experience the method, including the creation of awareness, how-to, and principles knowledge (Rogers, 2003). Implementing these approaches could create space for discussing the challenges SBAE instructors may encounter when using SL in their teaching practice and how to overcome such.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decisions Processes*, *50*(1), 179-211. doi:10.1016/0749-5978(91)90020-T

Ajzen, I. (2002). *Constructing a TpB questionnaire: Conceptual and methodological considerations.* Amherst: University of Massachusetts System. Retrieved from http://www.people.umass.edu/aizen/pdf/TpB.measurement.pdf

Ajzen, I. (2006). *Behavioral interventions based on the theory of planned behavior*. Amherst: University of Massachusetts System. Retrieved from http://www.people.umass.edu/aizen/pdf/tpb.intervention.pdf

American Association for Agricultural Education. (2016). *Membership information*. Author. Retrieved from http://www.aaaeonline.org/join

Anderson, J. B. (2000). *Learning in deed: Service-learning and preservice teacher education*. Denver, CO: Education Commission of the States.

Anderson, J. B., & Pickeral, T. (1998). *Challenges and strategies for success with service-learning in preservice teacher education*. Omaha: University of Nebraska.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of Social Psychology*, *40*(4), 471-499. doi: 10.1348/014466601164939

Ball, D., & Geleta, N. (2012). A delicate balance: Service-learning in teacher education. *Journal of the Scholarship of Teaching and Learning*, *5*(1), 1-17. Retrieved from http://files.eric.ed.gov/fulltext/EJ910337.pdf

Barnes, M. E. (2016). The student as teacher educator in service-learning. *Journal of Experiential Education*, *39*(4), 238-253. doi:10.1177/1053825916643831

Bates, A. J. (2009). Service learning as an instructional strategy for the preparation of teachers. *Journal of Effective Teaching*, *9*(1), 5-23. Retrieved from http://files.eric.ed.gov/fulltext/EJ1092201.pdf

Birkenholz, R. J., & Simonsen, J. C. (2011). Characteristics of distinguished programs of agricultural education. *Journal of Agricultural Education*, *52*(3), 16-26. doi: 10.5032.jae.2011.03016

Bornmann, L., Mutz, R., & Daniel, H. D. (2010). A reliability-generalization study of journal peer reviews: A multilevel meta-analysis of inter-rater reliability and its determinants. *PLoS ONE*, *5*(12), 1-10. doi:10.1371/journal.pone.0014331

Bringle, R. G., & Hatcher, J. A. (1995). A service-learning curriculum for faculty. *Michigan Journal of Community Service Learning*, *2*(1), 112-122. Retrieved from http://hdl.handle.net/2027/spo.3239521.0002.111

Butcher, J., Howard, P., Labone, E., Bailey, M., Groundwater, S., McFadden, . . . & Martinez, K. (2003). Teacher education, community service learning, and student efficacy for community engagement. *Asia-Pacific Journal of Teacher Education*, *31*(1), 109-124. doi:10.1080/13598660301612

Butin, D. W. (2006). The limits of service-learning in higher education. *The Review of Higher Education*, *29*(4), 473-498. doi:10.1353/rhe.2006.0025

Butin, D. W. (2010). *Service-learning in theory and practice: The future of community engagement in higher education*. New York, NY: Palgrave.

Campus Compact. (2016). *Presidents' declaration on the civic responsibility of higher education*. Author. Retrieved from http://www.compact.org/presidential/declaration.html

Chambers, D. J., & Lavery, S. (2012). Service-learning: A valuable component of pre-service teacher education. *Australian Journal of Teacher Education, 37*(4), 99-108. Retrieved from http://search.informit.com.au/documentSummary;dn= 767781 396834335;res=IELAPA

Chiaburu, D. S., & Tekleab, A. G. (2005). Individual and contextual influences on multiple dimensions of training effectiveness. *Journal of European Industrial Training, 29*(8), 604-626. doi:10.1108/03090590510627085

Chiu, T., Fang, D., Chen, J., Wang, Y., & Jeris, C. (2001). A robust and scalable clustering algorithm for mixed type attributes in a large database environment. *Proceedings of the 7th International Conference on Knowledge Discovery and Data Mining* (pp. 263–268), San Francisco, CA.

Cipolle, S. B. (2010). *Service-learning and social justice: Engaging students in social change*. Lanham, MD: Rowman & Littlefield Publishers.

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). Thousand Oaks, CA: Sage.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage.

Crews, R. J. (2002). *Higher education service-learning*: *Sourcebook*. Westport, CT: Oryx Press.

Croom, D. B. (2008). Development of the integrated three-component model of agricultural education. *Journal of Agricultural Education*, *49*(1), 110-120. doi:10.5032/jae.2008.01110

Daniels, K., Patterson, G., & Dunston, Y. (2010). Rules of engagement: A service learning pedagogy for preservice teacher education. *Journal for Civic Commitment*, *15*(1), 1-16. Retrieved from http://ccncce.org/wp-content/uploads/2014/06/15_Daniels.pdf

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley & Sons.

Eyler, J., & Giles, D. E. (1999). *Where's the learning in service-learning?* San Francisco, CA: Jossey-Bass.

Gelmon, S. B., Holland, B. A., Driscoll, A., Spring, A., & Kerrigan, S. (2001). *Assessing service learning and civic engagement: Principles and techniques*. Providence, RI: Campus Compact.

Graham, D. L., Arnold, S., & Jayaratne, K. S. U. (2016). Research priority 6: Vibrant, resilient communities. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 49-56). Gainesville, FL: Department of Agricultural Education and Communication, University of Florida.

Hart, S. M., & King, J. R. (2007). Service learning and literacy tutoring: Academic impact on pre-service teachers. *Teaching and Teacher Education*, *23*(4), 323-338. doi:10.1016/j.tate.2006.12.004

Hildenbrand, S. M., & Schultz, S. M. (2015). Implementing service learning in pre-service teacher coursework. *Journal of Experiential Education*, *38*(3), 262-279. doi: 10.1177/1053825915571748

Hou, S. I. (2010). Developing a faculty inventory measuring perceived service-learning benefits and barriers. *Michigan Journal of Community Service Learning*, *16*(2), 78-89. Retrieved from http://hdl.handle.net/2027/spo.3239521.0016.206

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Thousand Oaks, CA: Sage.

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., & Foy, R. (2004). *Constructing questionnaires based on the theory of planned behavior: A manual for health services researchers*. Newcastle, UK: Centre for Health Services Research. Retrieved from http://openaccess.city.ac.uk/1735/

Fraser, J. W. (2014). *The school in the United States: A documentary history* (3rd ed.). New York, NY: Routledge.

Lake, V. E., & Jones, I. (2008). Service-learning in early childhood teacher education: Using service to put meaning back into learning. *Teaching and Teacher Education*, *24*(8), 2146-2156. doi:10.1016/j.tate.2008.05.003

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.

Macia, L. (2015). Using clustering as a tool: Mixed methods in qualitative data analysis. *The Qualitative Report*, *20*(7), 1083-1094. Retrieved from http://www.nova.edu/ssss/QR/QR20/7/macia3.pdf

McCarthy, A., & Garavan, T. (2006). Postfeedback development perceptions: Applying the theory of planned behavior. *Human Resource Development Quarterly*, *17*(3), 245-267. doi:10.1002/hrdq.1173

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis* (3rd ed.). Thousand Oaks, CA: Sage.

Mooi, E., & Sarstedt, M. (2010). *Cluster analysis*. New York, NY: Springer.

Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1*(1), 48-76. doi:10.1177/2345678906292462

Rhee, M. (2012). *Radical: Fighting to put students first*. New York, NY: Harper.

Roberts, R., & Edwards, M. C. (2015). Service-learning's ongoing journey as a method of instruction: Implications for school-based, agricultural education. *Journal of Agricultural of Agricultural Education*, *56*(2), 217-233. doi:10.5032/jae.2015.02217

Roberts, R., & Edwards, M. C. (2017). *Imaging service-learning in The Agricultural Education Magazine from 1929-2009: Implications for the method's reframing and use*. Paper presented at the meeting of the American Association for Agricultural Education (AAAE) National Conference, San Luis Obispo, CA.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: The Free Press.

Saldaña, J. (2012). *The coding manual for qualitative researchers* (2nd ed.). Thousand Oaks, CA: Sage.

Saltmarsh, J., & Hartley, M. (2008). *Democratic civic engagement: Higher education and democracy: The future of engagement*. Boston, MA: New England Resource Center for Higher Education.

Speck, B. W., & Hoppe, S. L. (2004). *Service learning: History, theory, and issues*. Westport, CT: Praeger Press.

Stake, R. E. (2006). *Multiple case study analysis*. New York, NY: Guilford Press.

Tatebe, J. (2013). Bridging gaps: Service learning in teacher education. *Pastoral Care in Education, 31*(3), 240-250. doi:10.1080/02643944.2013.774044

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods* Research, *1*(1), 77-100. doi:10.1177/2345678906292430

Tyack, D., Lowe, R., & Hansford, E. (1984). *Public schools in the hard times: The Great Depression and recent years*. Cambridge, MA: Harvard University Press.

Whitehurst, G. J. (1984). Interrater agreement for journal manuscript reviews. *American Psychologist*, *39*(1), 22-28. doi:10.1037/0003-066X.39.1.22

Yang, F. Y., Chang, C. Y., & Hsu, Y. S. (2008). Teacher views about constructivist instruction and personal epistemology: A national study in Taiwan. *Educational Studies, 34*(5), 527-542. doi:10.1080/03055690802288486

Planned Behavior Typologies of Agricultural Education Teacher Educators in Regard to Service-Learning as a Method of Instruction: A National, Mixed Methods Study

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Discussant Remarks

Gary E. Briers, Texas A&M University

This study continues a line of inquiry of the first author, especially. Dr. Roberts has a laser focus on the study of service learning (SL). This is at least the fifth paper/article on the use of SL in agricultural education authored by Dr. Roberts and associates. During a career of studying SL, Dr. Roberts can and will develop deep understanding of , appreciations for, and skills related to this educational strategy, its employment, what encourages educators to adopt the method, what barriers discourage its adoption, and, as this study attempts, what differentiates and distinguishes potential or actual users of SL. This attempt at categorizing agricultural teacher educators into types describes typology. Typology refers simply to the study of types; it is the classification of people or other "things" according to their characteristics. Thus, I contend that the title of the study might be more appropriately deemed "A Typology of Agricultural Education Teacher Educators Based on Their Planned Behaviors in Regard to Service-Learning as a Method of Instruction."

Through a rigorous, systematic, and persistent effort, the researchers have examined the literature related to SL, identified possible variables potentially related to the use of SL, and asked an important question about those potential relationships. Then, armed (or burdened) with an important but unanswered question, they sought to answer that question—again, using systematic methods to shape their work: They grounded their study in a theoretical framework of planned behavior (TPB). Based on that theory, they identified three fundamental or possible causes (independent variables of intentions (a variable measured through analysis of course syllabi) ultimately to behave in a specific way (use SL as a method of instruction in their teacher preparation programs).

More specifically, they sought to determine if they could use quantitative results (phase I) to identify homogeneous groups of individuals with each group of individuals distinctly different from other clusters of individuals (interphase). This process resulted in the identification of three groups. Then, the researchers selected individuals from each of the three clusters and used qualitative methods to develop the types more fully, that is, to define/describe them narratively. In other words, they developed a typology.

The researchers provided descriptions, then, of each of the three types. These descriptions arose from the qualitative methods—multiple case studies with rather extensive interviews, transcription of the "voices" of the interviewees, systematic coding of the transcribed results that describe each of the three types in the typology. Each of the types was described based on the original three belief systems from TPB: behavioral (benefits of SL), normative (institutional barriers), and control (levels of personal difficulties to act).

While the researchers acknowledged that "results from quatitative measure *are not featured here*," I suggest that those results be referenced. In other words, where can an interested reader turn to understand those results? (Some of those quantitative results are, indeed, featured in the other paper presented here. Too, I suspect that these results might be available in the senior author's dissertation, and it may be unavailable until journal articles and papers are written.)

A kindergartner who “graduated” to first grade came home from the first day of first grade with this report on first grade to his mom, “It ain’t gonna be easy.” The literature on SL use generally is positive. This research illuminates the typology of potential users of SL. And the authors acknowledge that the diffusion of SL among agricultural teacher educators may be onerous. In other words, “it aint gonna be easy.”

The Supply of School-Based Agricultural Educators: 2014-2016

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Abstract

There is a continued shortage of school-based agricultural educators in the United States. Since 1965, the American Association for Agricultural Education (AAAE) has contributed to better understanding this issue by providing reliable data for decision makers and stakeholders through the National Agricultural Education Supply and Demand Study. Currently, although the quantity of licensed program completers is not at historic highs, trends are positive. Notably, 1/3 of agricultural teacher licensure programs produced 2/3 (n=1452) of all school-based agricultural education program completers between 2014 to 2016. During that three-year timeframe, approximately 72% of program completers accepted a position in school-based agricultural education. Based on available demographic data, the typical program completer in agricultural education is a white female. To date, agricultural teacher education program completers are not demographically representative of the general population, school population, or membership in the National FFA Organization. Further research is needed to explore the growing gender, race and ethnic disparity that exists within agricultural education. Additionally, to increase the overall supply of school-based agricultural educators, research regarding the viability, accessibility, and sustainability of alternative pathways is needed.

Introduction and Conceptual Framework

There is a documented shortage of educators across the United States, impacting a number of content areas. Shortages are occurring for reasons ranging from a decrease in teachers entering the profession, an increase in student enrollment, and new positions and courses being added to better prepare students for life beyond graduation (Berry & Shields, 2017). The shortage is exacerbated by factors including public perception of the profession influenced by federal and state legislation, the teacher evaluation process (Goldhaber, 2015), and increased workload, paperwork, and the amount of classroom time lost to standardized testing (Thibodeaux, Labat, Lee, & Labat, 2015). As such, the need to explore policy interventions to address the desirability of the profession becomes acute.

Since the very beginning, there have been concerns about the professional capacity to prepare an adequate supply of school-based agricultural educators. According to Kruse (1915),

> This sudden and rapid growth and the resulting demand for teachers has created a serious, if not the most serious problem in the training of teachers… Nobody knew what should be taught in secondary agriculture, much less what qualifications the agricultural teacher should have, and least of all, how to train them (p. 2).

Swanson (1942) continued, “The initiation of vocational agriculture under the vocational education acts created a problem of teacher supply” (p. 526). True (1929) acknowledged fluctuating demand was difficult for any state to estimate. He continued, “The ideal would be to have production well in advance of the probable annual need, perhaps 10 to 20 percent. This would provide for emergency years and in average years allow for culling” (True, 1929, p. 8).

Since 1965, the National Supply and Demand for Agricultural Education project has been supported by the American Association for Agricultural Education (AAAE) and utilized by its members. The study has historically provided a great deal of valuable information to those engaged in the agricultural education profession. Particularly, determining who is teaching school-based agricultural education and whether or not there is an appropriate supply to meet demand is important to agriculture teacher educators, school-based agriculture students, parents, school administrators, policy makers and other stakeholders in agricultural education. Kantrovich (2010) stated:

> Leaders of the profession need current, accurate estimates of the numbers of and demand for teachers of Agricultural Education to provide for meaningful policy decisions at all levels. Teacher organizations and teacher educators need current, accurate supply and demand information to use in recruitment activities and in counseling potential teachers of Agricultural Education. Yet, detailed data of that nature, specific to Agricultural Education, are not available outside this study (p. 8).

Ongoing conversations have occurred regarding the supply of agricultural educators at regional and national AAAE meetings, and school-based agriculture stakeholder organization meetings. The profession has challenged individuals to tackle recruitment and retention issues head on within their respective states. This study directly addresses priorities in the AAAE research agenda (Roberts, Harder, & Brashears, 2016) with *Research Priority Area 3: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century* and *Research Priority Area 5: Efficient and Effective Agricultural Education Programs.* By describing the supply of agricultural educators, the profession will be better positioned to achieve systematic sustainability and growth in the coming years. It is the task of the leaders within agricultural education to identify contextually relevant and appropriate applications of this research.

The conceptual framework presented in Figure 1 guided this study. The framework identifies factors contributing to school-based agricultural educator supply and demand. Greater knowledge regarding the sources impacting supply and the factors influencing demand is necessary to reduce or eliminate the chronic teacher shortage issue within agricultural education.

Purpose and Objectives

The purpose of the study was to describe the supply of school-based agricultural educators prepared by agricultural teacher education programs across the United States. The following objectives provided guidance for data collected annually from 2014-2016:

5. Describe historical trends of agricultural teacher education program completers.
6. Describe the production of agricultural teacher education program completers by institution and state.
7. Describe intended employment plans of agricultural teacher education program completers.
8. Describe the demographic profile of agricultural teacher education program completers.

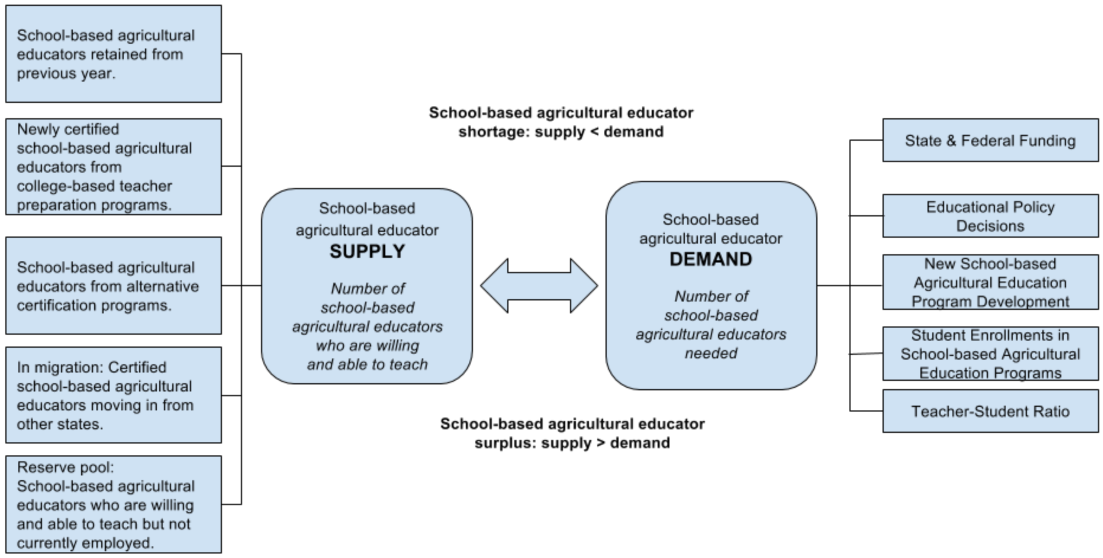

Figure 1. Conceptual framework of School-based Agricultural Education National Supply and Demand Study. Adapted from Lindsay et al. (2009).

Methods

This study built upon existing processes and protocols in place for the National Agricultural Education Supply and Demand research. The project team worked to strengthen and streamline data collection methods for both supply and demand aspects of the study. The parameters for the study (#4564) were approved by the Institutional Review Board for Human Subjects Research at the Pennsylvania State University. Specifically, this segment of the research highlights data collected related to supply. The population included agricultural teacher educators from each institution that offers a school-based agricultural education program leading to teacher licensure. The original frame was developed from membership in AAAE, with additions being made as a result of key stakeholder input. Each year, prior to the start of data collection, the frame of institutions and institutional contacts was scrutinized to ensure accurate and up-to-date information. To stay informed of changes to institutional contacts, the last question of the supply survey requested the name and contact information for individual who should be asked to provide the following year's data; this allowed for anticipated changes to be noted within the frame. To assist with trustworthiness of data collection, an informational email was sent prior to the start of data collection to each institutional contact. This email provided a state snapshot of data reported the previous year and indicated who would be contacted in the coming weeks.

Data Collection and Instrumentation

As this is a legacy study, the starting point for the supply instrument was the list of items asked in previous iterations of the National Agricultural Education Supply and Demand study. Items were added and revised based on literature and feedback from a panel of expert agricultural teacher educators who reviewed the instrument for face, content, and construct validity. Reliability was checked annually and found to be appropriate for a descriptive study.

Data was collected using Qualtrics, in accordance with Dillman's (2014) guiding principles for Internet and mixed-methods data collection. Following dissemination of individual survey links and reminders by email, researchers followed up with individual phone calls to non-respondents. Individual links were resent or data was collected by phone.

Initial data collection occurred in 2014. This study reflects three years of data collection (2014, 2015, 2016). In 2014, initial contact was made in May, with data collection closing in August. In subsequent years, the timeline for data collection was altered so that initial contact occurred in August, with data collection closing in December. This adjustment was made in response to concerns expressed by teacher educators who were unable to provide accurate and complete data regarding program completers in the spring. All data were treated with confidentiality.

Handling potential survey error

There are four general sources of survey error: Sampling Error, Measurement Error, Coverage Error and Non-Response Error (Dillman et al, 2014). Below are the methods utilized to control for error. As a census of possible respondents was desired, sampling error was not applicable to this study. Measurement error was mitigated through the use of panel of experts to review and evaluate validity of the instrument. This included review for face, content, and construct validity. Similar to sampling error, a census approach controlled for coverage error. Recognizing that 17 institutions failed to respond to Kantrovich (2010), additional efforts were made to reduce non-response. Institutions who failed to respond were contacted in person via telephone. Due to familiarity with the population as well as the manageable frame size, researchers were aggressive in reaching out via multiple communication modes to obtain representative data. Table 1 reports the number of respondents, response rate and identifies non-respondent institutions. It should be noted that as of 2016, the following five states and territories do not have an agricultural teacher preparation program: Hawaii, Maine, Rhode Island, Vermont and the Virgin Islands.

Table 1
Supply Non-Respondents 2014-2016

	2014	2015	2016
Responding Institutions	91	96	101
Response Rate	88 %	97 %	100 %

Note. Non-Respondents in 2014: Univ. of Arkansas – Pine Bluff, Fort Hays State Univ., Univ. of Maryland – College Park, Univ. of Massachusetts, College of the Ozarks, Missouri State Univ., Univ. of New, Hampshire Delaware Valley College, Middle Tennessee State Univ., Angelo State Univ., Prairie View A&M & Univ. of Wisconsin – Platteville. Non-Respondents in 2015: Delaware State Univ., Univ. of Arkansas – Pine Bluff & Univ. of Georgia – Tifton

Data Analysis

Once data were collected, efforts were made to ensure the accuracy of data; the researcher team reviewed data reported for inconsistencies and errors. When issues were found, personal phone calls to institutional contacts were made to verify or correct the data. Data were analyzed primarily using excel database features for simple descriptive statistics. A longitudinal analysis of historical data was also conducted. Frequencies and percentages were used to describe historical trends. This included data analysis and utilization of historical research methods. Historical data prior to 2014 was obtained from previous National Agricultural Education Supply & Demand reports. Descriptive statistics including frequencies and percentages were used to describe numbers of agriculture teacher education program completers by institution and state, and intended employment plans for and demographic profile of program completers. Decisions regarding presentation of data were made with consideration of preserving the integrity for longitudinal analysis, building from previous reports.

Limitations

Data can only be taken at face value, as reported by each respective institutional contact. In some cases, terminology used needed to be clarified. For example, the term “program completer” was operationally defined to include any individual reported to have fulfilled teacher licensure requirements; in some cases, this may imply program graduate, yet in others licensure requirements may be completed prior to degree completion. Each individual academic institution has disparate and unique data collection systems and processes. Ideally, increased fiscal resources would allow for human resources to verify data with state/federal data warehouses.

Findings

Objective 1: Describe historical trends of agricultural teacher education program completers.

A total of 746 agricultural education program completers were reported by 87 institutions in 2014. In 2015, there were 96 institutions which reported a total of 742 completers; 101 institutions reported 772 completers in 2016. Figure 2 depicts the context of agricultural education program completer production from a historical perspective beginning in 1920. Figure 3 highlights production of agricultural education program completers throughout the 21st century, from 2000-2016.

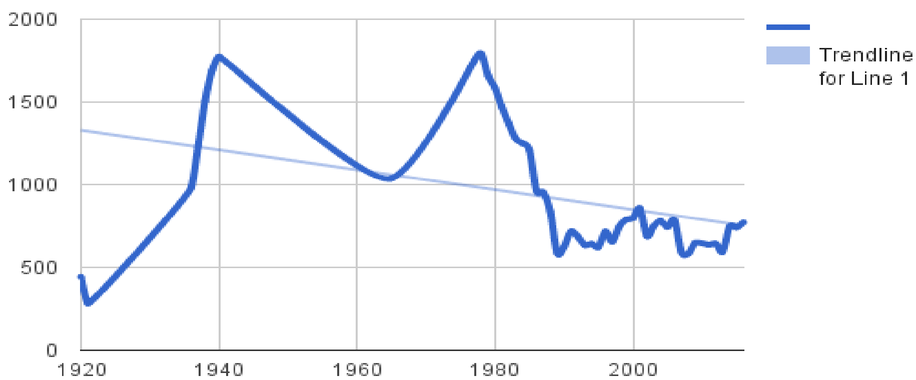

Figure 2. *Historical perspectives of agricultural teacher education program completers, 1920-present. Note: No data found for 1922-1935; 1941-1965; 1966-1976; 2010.*

Figure 3. *Agricultural teacher education program completers, 2000-2016.*
Note: No data available for 2010.

Based on historical data available beginning in 1920, an overall average of 58.5% of program completers accept school-based agricultural education positions (data not available for 1941-1964; 1966-1976; 1996-1997, 1999-2000, 2002-2003, 2005, 2007-2008, 2010-2013). Table 2 presents both the total number of program completers and the number of program completers who accepted positions in school-based agricultural education (either in-state or out-of-state) as reported by teacher education institutions from 2014-2016.

Table 2
Yield of Program Completers Accepting Positions in School-Based Agricultural Education

Year	Total Program Completers	Program Completers Accepting SBAE Positions	Percentage Yield
2014	713	514.0	72.1 %
2015	724	512.5	70.2 %
2016	772	569.0	73.7 %
Total	2,209	1,595.5	72.2 %

Objective 2: Describe the production of agricultural teacher education program completers by institution and state.
Objective 2 allowed for deeper analysis of the 2,165 program completers reported as having successfully completed teacher licensure in agricultural education from 2014-2016. While Table 2 (above) reports the actual number of reported program completers from 2014-2016, Figure 4, reports the number of graduates each year from 2014-2016 by undergraduate bachelor's degree, post-baccalaureate degree, graduate degree, and licensure only program. Note, the total program completers by degree/licensure in 2013-2014 differs from the previously reported total number of program completers. This discrepancy led to the development of a system of checks and balances within Qualtrics to eliminate this during the 2014-2015 and 2015-2016 data collection.

Undergraduate teacher preparation is the most common form of agriculture teacher preparation (see Figure 4), and includes 80.9% (n=1,731) of all license eligible program completers from 2014-2016; 19% (n=408) are prepared post baccalaureate (n=159), graduate (n=185) and in licensure only (n=90) programs for a total of 2165 graduates.

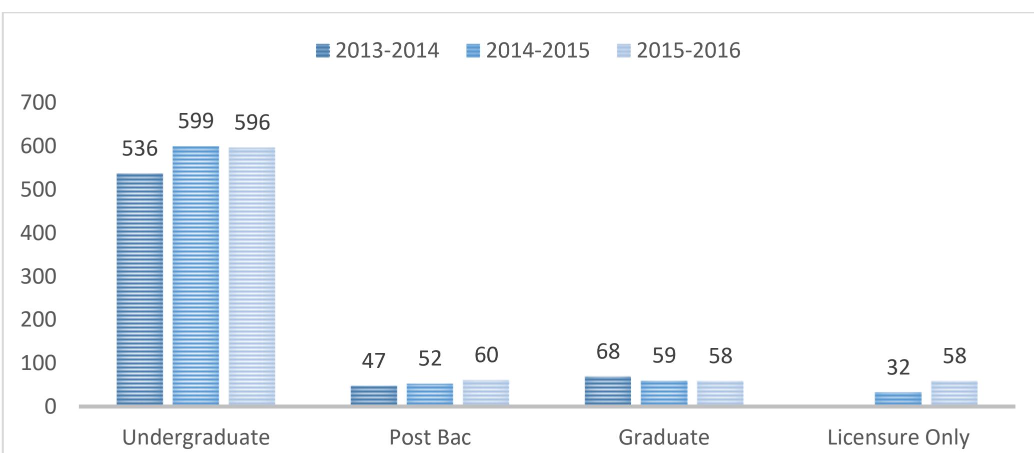

Figure 4. Licensed program completers by degree/license earned.

From 2014-2016, 101 institutions were contacted for supply data. A total of 92 institutions reported at least one program completer in the three-year period with a total of 2,209 from all institutions combined. The program completers certified by institutions from 2014-2016 ranged from 0 to 128. The average three-year total of program completers certified per institution was approximately 22, with an approximate annual average of 8 program completers per institution.

Table 3 presents agricultural education teacher preparation institutions categorized by the number of program completers reported from 2014-2016. Institutions are grouped into thirds, with institutions listed alphabetically in each category. Table 4 presents metrics related to the supply of school-based agricultural education program completers by state. For each of the top 25 producers of program completers from 2014-2016, the table highlights the number of program completers reported, the number of institutions represented, and the full-time teaching equivalent (FTE) devoted to teacher education. Additionally, the table provides ratios of program completers reported over the three-year period of time to FTE, to current agriculture teachers, and to school-based agricultural education programs in each state.

Table 3

Total Production of Program Completers (2014-2016) by Institution, Presented Alphabetically

Lower 33% producing institutions (0-9 completers in 3 years)	Middle 33% producing institutions (10-28 completers in 3 years)	Top 33% producing institutions (29-128 completers in 3 years)
1. Alcorn State Univ.	1. Angelo State Univ.	1. Auburn Univ.
2. Arkansas State Univ.	2. Arkansas Tech Univ.	2. California State Polytechnic Univ.-San Luis Obispo
3. California State Polytechnic Univ.-Pomona	3. Eastern Kentucky Univ.	3. California State Univ.-Chico
4. College of Ozarks	4. Louisiana State Univ.	4. California State Univ.-Fresno
5. Cornell Univ.	5. McNeese State Univ.	5. Clemson Univ.
6. Delaware State	6. Mississippi State Univ.	6. Colorado State Univ.
7. Delaware Valley	7. Missouri State Univ.	7. Iowa State Univ.
8. Dordt College	8. Montana State Univ.	8. Kansas State Univ.
9. Eastern New Mexico Univ.	9. Morehead State Univ.	9. New Mexico State Univ.
10. Ferrum College	10. Murray State Univ.	10. North Carolina A&T Univ.
11. Fitchburg State	11. North Dakota State Univ.	11. North Carolina State Univ.
12. Fort Hayes State Univ.	12. Northwest Missouri State Univ.	12. Oklahoma State Univ.
13. Fort Valley State Univ.	13. Northwestern Oklahoma State Univ.	13. Pennsylvania State Univ.
14. Illinois State Univ.	14. Oregon State Univ.	14. Purdue
15. Louisiana Tech Univ.	15. South Dakota State Univ.	15. Sam Houston State Univ.
16. Michigan State Univ.	16. Southern Arkansas Univ.	16. Tarleton State Univ.
17. Middle Tennessee State	17. Stephen F. Austin State Univ.	17. Texas A&M Univ.
18. Panhandle State Univ.	18. Texas A&M-Kingsville	18. Texas A&M Univ.-Commerce
19. Rutgers Univ.	19. Texas State Univ.	19. Texas Tech Univ.
20. Southeastern Missouri State Univ.	20. Univ. of Arizona	20. The Ohio State Univ.
21. Southern Illinois Univ.-Carbondale	21. Univ. of California-Davis	21. Univ. of Arkansas
22. Southwest Minnesota State Univ.	22. Univ. of Connecticut	22. Univ. of Florida
23. State Univ. of New York, Oswego	23. Univ. of Idaho	23. Univ. of Georgia-Athens & Tifton Campus
24. Sul Ross State Univ.	24. Univ. of Illinois-Urbana-Champaign	24. Univ. of Kentucky
25. Tennessee State Univ.	25. Univ. of Mount Olive	25. Univ. of Minnesota-Twin Cities
26. Tennessee Technological Univ.	26. Univ. of Nebraska Lincoln	26. Univ. of Missouri
27. Univ. of Alaska-Fairbanks	27. Univ. of Tennessee	27. Univ. of Puerto Rico
28. Univ. of Arkansas-Pine Bluff	28. Univ. of Wisconsin-Platteville	28. Univ. of Wisconsin-River Falls
29. Univ. of Maryland-College Park	29. Univ. of Wyoming	29. West Texas A&M Univ.
30. Univ. of Maryland-Eastern Shore	30. Univ. of Delaware	30. West Virginia Univ.
31. Univ. of Minnesota-Crookston	31. Utah State Univ.	
32. Univ. of Nevada-Reno	32. Virginia Tech	
33. Univ. of New Hampshire	33. Washington State Univ.	
34. Univ. of Tennessee-Martin	34. Western Illinois Univ.	
35. Virginia State Univ.		
36. Western Kentucky Univ.		
37. Wilmington College		

Table 4
Top 25 States Ranked by Total Production of Licensed Program Completers in Agricultural Education from 2014-2016

State	Number of Program Completers	Number of Institutions	FTEs in Ag Ed Teacher Education 2014	Program Completer to FTE Ratio	Program Completer to Agriculture Teachers Ratio	Program Completer to Agriculture Programs Ratio
1. Texas	485	11	26.5	18.3	0.22	0.5
2. Oklahoma	112	3	13	8.6	0.26	0.3
3. Missouri	107	5	4	26.8	0.21	0.3
4. North Carolina	107	3	13.75	7.8	0.22	0.3
5. California	105	5	15.5	6.8	0.12	0.3
6. Kentucky	79	5	4.5	17.6	0.30	0.5
7. Georgia	71	2	6.75	10.5	0.16	0.2
8. Arkansas	70	5	6.5	10.8	0.25	0.3
9. Iowa	58	2	4	14.5	0.23	0.3
10. Wisconsin	58	2	2	29.0	0.19	0.2
11. Illinois	50	4	10.95	4.6	0.13	0.2
12. Indiana	49	1	3.25	15.1	0.18	0.2
13. Pennsylvania	49	2	2.5	19.6	0.21	0.3
14. Tennessee	45	5	3.5	12.9	0.13	0.2
15. Kansas	43	2	3	14.3	0.19	0.2
16. Minnesota	42	3	1.75	24.0	0.17	0.2
17. Alabama	41	1	2	20.5	0.13	0.2
18. New Mexico	40	2	12	3.3	0.38	0.5
19. Florida	37	1	2.35	15.7	0.08	0.1
20. Ohio	37	2	5	7.4	0.08	0.1
21. Puerto Rico	37	1	2	18.5	-	-
22. West Virginia	33	1	4	8.3	0.31	0.4
23. South Carolina	32	1	6	5.3	0.25	0.3
24. Colorado	29	1	1.8	16.1	0.21	0.2
25. Louisiana	29	3	7	4.1	0.12	0.2
National [1]	101	2151	203.7	10.6	0.17	0.26

[1]*Note: National numbers are representative of all reported data (50 states, Puerto Rico & Virgin Islands).*

Objective 3: Describe intended employment plans of agricultural teacher education program completers.

Table 5 highlights the intended employment plans for licensed program completers as reported within the 2014 - 2016 data collection period. While a total of 2209 program completers were reported in Table 2, employment plans were only provided for 2204. While the majority (72.4%; n=1595.5) of graduates choose a career in school-based agricultural education, 15.6% (n=344.5) pursued career opportunities outside of school-based agricultural education. Agricultural education graduates who do not choose the formal classroom are still drawn to education as substitute teachers, community college instructors, university staff employees, trainers in industry, or other areas of education (not graduate school). Other career opportunities sought by agricultural education graduates included an assortment of domestic and international service such as student ministry, Habitat for Humanity, mission work, and the Peace Corp. Of graduates (n=1717) who chose careers in education, the majority (92.9%; n=1595.5) chose school-based agricultural education, 4.5% (n=76.5) pursued teaching another subject, or 2.6% (n=45) chose to enter extension. Further, a few choose careers not related to agriculture or education, including internships, speaking, technology, insurance, U.S. Congress, auto mechanic, and are self-employed or in other careers in industry. Finally, a small number of graduates reported wanting to stay-at-home with family.

Table 5
Employment Plans of Program Completers

	2013-2014	2014-2015	2015-2016	Total
SBAE in-state	469	446	508	1423
SBAE out-of-state	45	66.5	61	172.5
Graduate school	52	64	56	172
Agribusiness	58	64	47	169
Teaching another subject	16	31.5	29	76.5
Other	-	-	20	20
Unknown	41	12	16	69
Unemployed	-	12	11	23
Production agriculture	8	9	11	28
Extension	22	13	10	45
Military	2	1	3	6

Objective 4: Describe the demographic profile of agricultural teacher education program completers in the United States.
The study explored demographics of those completing licensure programs from 2014-2016. The typical program completer was a white female. In fact, 65.2% (n=1454) of the program completers were female, with 33.7% (n=751) male, and 1.1% (n=26) unknown. The majority of female license eligible program completers from 2014-2016 was 91.5% (n=1320) white. Of other ethnicities reported (n=123), most female program completers were Hispanic (57%; n=70), American Indian/Alaskan Native (15%; n=17), or African American (7%; n=9). Ethnicity of male program completers from 2014-2016 was 88.8% (n=677) white. Of non-white male program completers (n=85), the majority was Hispanic (55%; n=47) or African American (15%; n=13). A total of 14% (n=12) of all males reported unknown ethnicities.

The researchers were curious how ethnicity and gender of agricultural education program completers compared to other populations within school-based agricultural education. Table 6 highlights the 2015-2016 program completers' ethnicity as compared to total FFA membership. Table 7 compares the gender of program completers from 2014-2016 to gender of FFA members, as reported in 2016. While FFA membership numbers may not accurately represent the ethnicity and gender of all students enrolled in school-based agricultural education, it does provide a snapshot of current membership in comparison to those preparing to teach.

Table 6
Comparison of Agricultural Education Program Completers and FFA Members by Ethnicity

	Program Completers 2015-2016	%	FFA Membership 2016*	%
African American	6	0.8	18663	0.05
American Indian/ Alaskan Native	5	0.7	30136	3.6
Asian	4	0.5	5183	0.62
Bi-Racial/Multi-Racial	0	0	42291	5.05
Hispanic	41	5.3	77369	9.24
Hawaiian/Pacific Islander	1	0	2277	0.27
White	691	90	390570	46.7
Other	3	0.4	7826	0.93
Unknown	16	2	262436	31.3
Total	767	100	836751	100

**Note: FFA membership is reported for school-based agricultural education programs and may include duplicated students (students are reported in grades 7-12 and/or 9-12).*

Table 7
Comparison of Agricultural Education Program Completers and FFA Membership by Gender

Gender	Program Completers 2014-2016	%	FFA Membership 2016*	%
Female	1,454	65.2	357,901	40.8
Male	751	33.7	472,697	53.9
Unknown	26	1.2	46,587	5.3
Total	2,231	100	877,185	100

**Note: FFA membership is reported for school-based agricultural education programs and may include duplicated students (students are reported in grades 7-12 and/or 9-12).*

Conclusions/Recommendations/Implications

The supply of license-eligible program completers in agricultural teacher education has increased throughout the three-year segment of time (2014-2016) reflected by this study. Not surprisingly, the vast majority of said program completers completed an undergraduate teacher licensure program. Interestingly, a relatively small number of agricultural teacher education programs produced the vast majority of all program completers from 2014-2016. In fact, only one-third of agricultural teacher education programs produced two-thirds (n-1452) of all program completers. Not only does this potentially create programmatic challenges with regard to institutional capacity, it also may contribute to uneven availability of program completers across the nation. A majority of agricultural teacher education program completers who chose to teach accept a teaching position in their home state, or that of their degree-granting institution. Given that, what could be done to increase the overall number of program completers at all institutions, more evenly distribute program completers, or encourage greater geographic mobility of program completers?

For 30 years, there has been a consistent increase in the total number of agricultural education teacher licensure program completers acquiring school-based agricultural education positions. This is certainly a positive sign, suggesting that program completers are highly likely to accept a position in school-based agricultural education. Perhaps this is an indication that post-secondary agricultural education teacher preparation programs are appropriately preparing program completers for the realities and rigors of the profession and that program completers feel capable of successfully entering the profession upon completion of student teaching. Additionally, this increase could be a reflection of the positive perception program completers have of the teaching profession, in response to heightened promotional efforts through NAAE and the National Teach Ag Campaign.

Agricultural teacher education program completers, as reported from 2014-2016, are disproportionately white, non-Hispanic, females. Approximately 90% of program completers during this time frame were White, 1% African American, 5% Hispanic, and 3% other. From related research, we know that current school-based agricultural educators reflect little racial diversity as well, with 69% of all agricultural education teachers identify as white. Almost 47% of current school-based agricultural educators are white males and about 21% white females. These numbers may in fact be much higher as race/ethnicity was reported as unknown for 28% of school-based agricultural education teachers. Kantrovich (2010) also reported that Caucasian was most commonly reported among newly qualified school-based agriculture teachers, with only 4% of newly qualified teachers being non-Caucasian.

Current school-based agricultural education teachers are disproportionately white, non-Hispanic males, although both racial and gender percentages vary by state and region. Some progress has been made in this area, particularly with regard to gender. Even in 2010, Kantrovich stated that the tide seemed to be slowly turning with regard gender equity. At that time, approximately 53% of newly qualified teachers from 2006-2009 were female. Presently, the tides have turned within teacher preparation, with 65.2% of program completers reported as female and 33.7% male (1.1% unknown). This continued trend may in fact lead to gender inequality with males the minority within the profession. Consideration should be given to why this shift has occurred and what may be done to more consistently attract both males and females to the profession of school-based agricultural education. Perhaps focused recruitment efforts are necessary to depict agricultural education as a viable, rewarding career for young men.

Beyond the issue of gender, significant efforts are needed to recruit and retain a more diverse workforce within school-based agricultural education. Ethnic minorities are badly under-represented within school-based agricultural education; major, strategic, intentional efforts should be made to recruit, prepare, and retain minority teachers within the profession. Not only would these efforts help ensure demographics of school-based agricultural education teachers more closely reflect demographics of students served by school-based agricultural education, it may also encourage other under-represented minorities to consider the profession. To make changes in this area, it would be beneficial to collaborate with other educational and agricultural organizations and businesses to learn more about best practices for meeting the needs of a more diverse workforce.

Students in the school-based agricultural education classes deserve to be taught by variety of teachers, as school is meant to be a reflection of the world in general. All professions need a gender-balanced workforce and this includes teaching. As the face of the American population continues to change, post-secondary agricultural education teacher preparation programs should also work diligently to attract qualified minority faculty; this may prove invaluable in the recruitment and retention of under-represented students in school-based agricultural education.

References

Barrick, K. R. (1993). A Conceptual Model for a Program of Agricultural Education in Colleges and Universities. *Journal of Agricultural Education 34* (3), 10-16.

Berry, B., & Shields, P. M. (2017). *Solving the teacher shortage: Revisiting the lessons we've learned.* Phi Delta Kappan, *98*(8), 8-18. doi:10.1177/0031721717708289

Camp, W. G. (2000). *The 33th volume of a national study of the supply and demand for teachers of agricultural education 1996-1998.* Blacksburg, VA: Virginia Polytechnic Institute and State University. American Association for Agricultural Education.

Camp, W. G., Broyles, T., & Skelton, N. S. (2002). *The 34th volume of a national study of the supply and demand for teachers of agricultural education 199-2001*. Blacksburg, VA: Virginia Polytechnic Institute and State University. American Association for Agricultural Education.

Dillman, D. A., Smyth, J. D., Christian, L. M., & Dillman, D. A. (2014). *Internet, mail, and mixed-mode surveys: The tailored design method.* Hoboken, N.J: Wiley & Sons.

Education, U. S. F. B. f. V. (1921). *Annual Report to Congress of the Federal Board for Vocational Education*: U.S. Government Printing Office.

Foster, D. D., Lawver, R. G., & Smith, A. R. (2014). *National Agricultural Education Supply and Demand Study, 2014 Executive Summary*. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Foster, D. D., Lawver, R. G., & Smith, A. R. (2015). *National Agricultural Education Supply and Demand Study, 2014 Executive Summary*. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Goldhaber, D. (2015). Exploring the potential of value-added performance measures to affect the quality of the teacher workforce. *Educational Researcher, 44*(2), 87-95. doi:10.3102/0013189X15574905

Kantrovich, A. J. (2010). *The 36th volume of a national study of the supply and demand for teachers of agricultural education 2006-2009.* West Olive, MI: Michigan State University. American Association for Agricultural Education.

Kruse, S. A. (1915). *The Work of the Agricultural Colleges in Training Teachers of Agriculture for Secondary Schools*. (Master of Arts), University of Wisconsin--Madison, Madison, WI. Retrieved from https://books.google.com/books?id=xGQ0AAAAMAAJ

Lindsay, J. J., Wan, Y., & Gossin-Wilson, W. (2009). *Methodologies used by Midwest Region states for studying teacher supply and demand (REL 2008–080).* Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. http://www.eric.ed.gov/?id=ED506631

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Smith, A. R., Lawver, R. G., & Foster, D. D. (2017). *National Agricultural Education Supply and Demand Study, 2016 Executive Summary*. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Swanson, H. B. (1942). Teacher training in agriculture. In R. W. Stimson & F. W. Lathrop (Eds.), *History of agricultural education of less than college grade in the United States* (p. 516), Washington D. C.: Government Printing Office.

Stimson, R. W., & Lathrop, F. W. (1942). *History of agricultural education of less than college grade in the United States: A cooperative project of workers in vocational education in agricultural and in related fields*. Washington, DC: Federal Security Agency, U.S. Office of Education.

Thibodeaux, A. K., Labat, M. B., Lee, D. E., & Labat, C. A. (2015). The effects of leadership and high-stakes testing on teacher retention. *Academy of Educational Leadership Journal, 19(*1), 227.

True, A. C. (1929). *A history of agricultural education in the United States: 1785-1925*. Washington, DC: U.S. Government Printing Office.

The Supply of School-Based Agricultural Educators: 2014-2016

Daniel Foster, Pennsylvania State University
Rebecca Lawver, Utah State University
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Discussant Remarks

Gary E. Briers, Texas A&M University

The supply of teachers for school-based programs of agricultural education is a persistent and even increasing problem. The authors have captured that concern well. Population continues to rise; number of children increases; enrollment in school-based agricultural education increases. What is the result for those of use in agricultural teacher education? Increased demand for teachers in school-based agricultural education. This study reports on **one** of the sources of those teachers—universities and colleges, the conventional supplier of those teachers. The title of the study may be misleading. Use of the definite article "the" implies that this study will report on that supply. However, the study reports on university-prepared school-based agricultural educators—a supply source, but not the (only) supplier.

The data collected from universities show that the numbers of university based agricultural education program completers annually from the late 1980s through 2016 is relatively stable (slight downward trend; see Figure 2 of the study). From the year 2000, those numbers annually are similar (see Figure 3). So, an obvious question is, "How or what accounts for this supply source remaining constant while the total numbers of teachers increase Is it that a larger percentage of completers entered the profession today compared to earlier? That percentage has, indeed, increased—by perhaps 15 percentage points over the past 95 years. But, during that time frame, the trend line for numbers of program completers points downward. Using the trend line, pick two years—1940 and 2016. There were 1,200 program completers in 1940. Assuming that only 50% took positions in teaching agriculture, there would have been 600 new teachers from university-based programs. The year 2016 saw 772 program completers (actual and from trend line) with 569 of those becoming new teachers. So, this comparison does not explain how we have additional teachers. In fact, they might suggest that the numbers of teachers in the profession should be decreasing.

Are teachers teaching for more years? Studies of tenure suggest that 14-15 years of teaching has been the average for years. So, no, this is not the answer. Could it be that university-based program completers enter teaching some years after completing their programs and are not accounted for in this supply study? Could be. Could it be that the supply of school-based agricultural education teachers includes a source or sources other than university-based teacher education programs? All of my rhetoric is simply to suggest that we study **the** supply—meaning all of the supply—or retitle the study to begin with the indefinite article "a."

Another point of discussion has to do with implications related to gender and ethnicity. The data relating to those two variables are perplexing. A generation or more ago, say 1970, all teacher educators in agriculture and almost all SBAE teachers were male. Then, the numbers of females teachers began to increase somewhat dramatically so that a decade ago, a slight majority of program completers (53%0 were female. Today, the percentage of female completers is 65%. Yet, male teacher educators have outnumbered female teacher educators by perhaps two to one. So, a contention that gender role models—in numbers reflective of the population—are necessary to encourage same gender protégés may not hold for teacher educators/teachers. But what about school-based teachers and their students? The data are perhaps lacking concerning the percentage of female agricultural teachers totally. Data from National FFA show females as 43% of the membership. Is that a higher percentage than the percentage of female SBAE teachers? Even though we currently prepare females at ~66% of the total program completers—about twice as many females as males—I doubt that female teachers have "caught up" with males in the total number of SBAE teachers.

Thus, perhaps it is not necessary that numbers be a direct reflection of society/our population but rather a critical mass. And that may explain some of why ethnic minorities are not "catching up" to be anywhere near reflective of our population: We simply do not have a critical mass of Hispanic or African-American or Asian-American or Native American role models as teacher educators or as teachers to encourage/lead a more ethnic diverse enrollment.

So, do we need to study OTHER field/professions to move in the right direction concerning ethnic representation in our field? Let's continue the discussion. THANK you, researchers/authors, for sharing with us these data and these analyses.

Discussant – Jon Ramsey; Timekeeper – Lauren Cline

FFA
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Aiming for the Gold Emblem: An Examination of Factors Predicting Performance in National Career Development Events

Abstract

This study examined the role of motivation on the performance of competitors at National-level FFA Career Development Events (CDEs). A census of all competitors (N = 1,306) and their coaches (N = 340) in nine events representing team-based content and skills, team-based leadership, and individual leadership events was conducted. Competitors and coaches were surveyed on the motivational constructs of goal orientation, grit, self-efficacy, interest, and control beliefs. Survey data from both audiences were connected to individual performance in the event (gold/silver/bronze emblem). A regression analysis comprised of motivational and demographic factors accounted for 22 percent of the variation in student performance. The strongest positive predictors of student performance were student grade point average and coaches' performance-approach goal orientation. Recommendations for coaches include exploring ways to build the self-efficacy and competitive drive of their students and set performance goals at the beginning of the season. Recommendations for future research include examining the structural components of FFA CDE for the inclusion of skills which attract and reward mastery-driven competitors and coaches.

Introduction

The hallmarks of a successful agricultural education program at the local level are effective classroom/laboratory instruction, experiential learning, and social and leadership development, all in and about agriculture. Traditionally, experiential learning is delivered through a quality Supervised Agriculture Experience Program (SAE). The social and leadership development is most commonly provided by a student-led FFA chapter and various leadership opportunities. A significant piece of the FFA chapter leadership component includes the various forms of competition, in which students engage with agricultural content in a real world and problem-solving context. Career Development Events (CDEs) are competitive educational events that reinforce agricultural content area knowledge and skills for FFA members in both team and individual environments. A subset of CDEs, Leadership Development Events (LDEs) focus on developing personal and leadership skills needed in the workforce and transfer across several career areas. These diverse competitions allow students to hone skills in a variety of contexts.

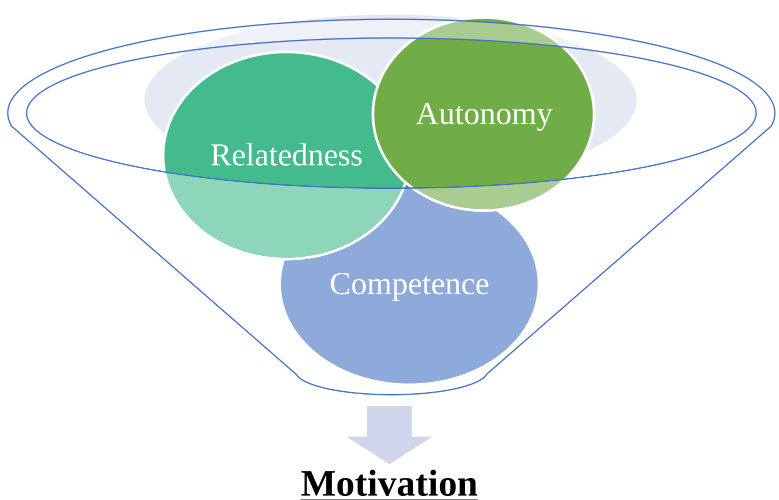
Talbert and Balschweid (2006) described the degree of CDE participation by FFA members, reporting 70% of FFA members participate in a CDE at some level and 60% were involved in a CDE focusing on leadership skills. With 649,355 FFA members on the national roster in 2016 (National FFA Organization, 2017), it is conceivable some 450,000 FFA members are competing in CDEs each year across the country. Further, in an investigation of enrollment factors, Reis and Kahler (1997) found students were most satisfied with the competitive aspects of the FFA program. Their popularity aside, CDE participation provides FFA members with important life skills such as goal setting, dedication to the completion of tasks, and a desire for excellence (Vaughn, Keith, & Lockaby, 1999). Marx, Simonsen, and Kitchel (2014) provided evidence that CDE participation is positively correlated with career decision self-efficacy, the premise that participation in a CDE increases the confidence in making career decisions.
Understanding which motivational factors offer the greatest outcome for students will allow coaches to be more time efficient. After all, experienced agriculture teachers spend up to 10% of their time training CDE teams (Torres, Ulmer, & Aschenbrener, 2008) and in the busy schedules of

an agriculture teacher, too much focus on CDE development can have consequences. King, Rucker, and Duncan (2013) identified "preparing CDE teams" as one the primary stressors of agriculture teachers. In light of current teacher shortage (Smith, Lawver, & Foster, 2017) the fact that CDE preparation, an expectation of agriculture teachers, was deemed a stressor of teachers instead of a source of rejuvenation is an alarming finding. Understanding more efficient and effective ways to motivate students can likely help ease this stress.

Theoretical Framework

Most contemporary theories of motivation are broadly categorized as cognitive motivational theories. Cognitive motivation theories differ from classical behavior theories, in that they implicate the importance of cognitions (mental processes) as having a causal relationship on motivation. Whereas behavior theories deduce that complex behaviors can be reduced to a series of simple behaviors (Schunk et al., 2014), cognitive theories recognize motivation toward a behavior reflects an individual's beliefs and goals. Examples of cognitive theories of motivation include: expectancy-value theory, social cognitive theory, achievement goal theory, and self-determination theory. Self-determination theory (SDT) is a broad cognitive motivation theory used to ground the many facets of motivation used in the present study. SDT indicates the motivations of individuals is predicated on three basic needs (see Figure 1) of competence, autonomy, and relatedness (Ryan & Deci, 2000). Gagné and Deci (2005) distinguish the psychological needs of competence, autonomy, and relatedness as they relate to SDT succinctly:

> SDT research focuses not on the consequences of the *strength* of those needs for different individuals, but rather on the consequences of the extent to which individuals are able to *satisfy* the needs within social environments (p. 337).



Amotivation Extrinsic Intrinsic

Figure 1. *Self-Determination Theory*

In the specific context of how SDT manifests into patterns of behavior, Ryan and Deci (2000) differentiate SDT into three "regulatory styles" (ways to be motivated): amotivation, extrinsic motivation, and intrinsic motivation. In this model they describe a continuum of motivation. To the far left are those who are unmotivated. To the far right are individuals who are entirely intrinsically motivated (internal personal reasons). The categories in between, range from those who are extrinsically motivated (external rewards), or in the case of integration, both extrinsically and intrinsically motivated. In this model, the drivers for why different students compete in FFA CDEs begin to surface. Although rare at national level competition, amotivated competitors, located on the left-hand side of the model, are those students who lack control of their regulatory process and do not value the outcomes of competition. Intrinsically motivated students, on the far-right of the model, are likely individuals who see their own ability and effort as contributors to their success and get great enjoyment out of competing. It is likely, however, most students engage in extracurricular CDE involvement because of a complex set of intrinsic and extrinsic rewards in the center of the model.

Literature Review

With an interest in why youth elect to participate in CDEs, Knobloch, Brady, Orvis, and Carroll (2016) initiated an effort to develop and validate a survey instrument to more reliably assess students' motivations to participate in competitive events. The research concluded self-efficacy explains 39% of the variance of youth motivation and thus is an important consideration for coaches when determining strategies to engage competitors (Knobloch et al., 2016). This research takes an important step in creating a questionnaire for use in CDE-specific contexts undergirded by cognitive motivational theory.

Croom, Moore, and Armbruster (2009) conducted a nationwide study of both coaches and competitors to determine factors influencing participation in CDEs. They found disagreement between coaches and competitors on the most important reason for participation. Students identified relatedness to career goals as the most important factor for participation, while coaches identified competition as the primary motivator. The researchers concluded that students may be interested in CDEs for potential career growth, while coaches may stay interested because of competition. Achievement goal theory may help understand this plausible hypothesis.

Lancaster, Knobloch, Jones, and Brady (2013) examined the motivational constructs of self-efficacy, task value, and career interest among participants of several livestock-based CDEs in Indiana. The study found competitors in the events displayed high intrinsic and extrinsic task value. Aligned with self-determination theory, this suggests the competitors in these events were motivated to compete for external awards as well as inherent cognitive processes/goals. Although they confirmed part of the findings from Croom et al., (2009) pertaining to students being interested in CDE for career aspirations, the authors encouraged future research to connect motivational constructs with performance in the event, an objective of the present study.

Interested in the influence of coaches, Falk, Masser, Palmer, and Foster (2014) examined the relationship between coaching behaviors and performance at the National FFA Parliamentary Procedure LDE. Results revealed several factors to have moderate positive correlations to student performance. Among them were coaching behavior constructs of social support and training, instruction, and the number of hours spent practicing. By measuring coaches’ motivation, one of the goals of the present research is to determine the influence of a coaches’ motivation as it compares to student motivation in a predictive model. In other words, does motivation to coach have a stronger influence on student outcomes than student motivation?

In an analysis of the training practices of the National FFA Livestock Judging CDE, Rayfield, Fraze, Brashears, and Lawver (2009) found “competitiveness” had the highest correlation (r = .342) of any other trait to performance. These were traits students identified as characteristics contributing to them being selected as a member of the team. When used in a linear regression to predict performance in the event, only two recruitment factors (“competitiveness” and “good study skills”) yielded statistically significant results. This finding suggests students who identify their competitive nature tend to outperform those who do not; a notion that will be tested by measuring achievement goals in the present study.

Achievement goal theory provides a conceptual understanding of motivational profiles to better understand what drives FFA CDE competitors to compete. Elliot and McGregor (2001) describe achievement goals in a 2x2 framework. The combined framework provides four achievement goal profiles describing the ways in which individuals are motivated in specific contexts: mastery-approach (MAp), performance-approach (PAp), mastery-avoidance (MAv), and performance-avoidance (PAv). Those who are mastery driven, tend to be motivated by aspects of being an expert, and knowing all there is to know about the task. Conversely, individuals who are performance driven are motivated to compete and achieve higher than their peers. These four achievement goals are not mutually exclusive, however, as individuals are able to have high (or low) degrees of any of the four orientations.

Prior research suggests mastery-approach (Elliot, McGregor, & Gable, 1999) and performance-approach goal orientations (Harackiewicz, Barron, Tauer, & Elliot, 2002; Lopez, 1999) are positive predictors of performance in classroom settings. In contrast, avoidance goals are negative predictors of performance (Harackiewicz et al., 2002; Vansteenkiste, Simons, Lens, Soenes, Matos, & Lacante, 2004; Wolters, 2004). These results are intuitive; approach-oriented individuals are those motivated because they wish to learn all there is to know about the topic (mastery-approach), or they strive to outperform others (performance-approach). However, performance-avoidance individuals are motivated by the fear of not achieving their full potential.

To classify a motivational construct more “global” and long-term than self-control, Duckworth, Peterson, Matthews, and Kelly (2007) proposed the term *grit* to the literature. They define *grit* as “the perseverance and passion for long-term goals (p. 1087)” careful to disassociate it with the cognitive abilities of individuals. Duckworth et al. (2007) argued talent alone does not achieve difficult goals, but that goal attainment requires sustained and focused application of talent over time. Studies have linked grit to performance in spelling bees (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011), performance and retention of novice teachers (Robertson-Kraft & Duckworth, 2014), and performance and graduation rates of United States Military Academy Cadets (Maddi, Matthews, Kelly, Villarreal, & White, 2012).

Researchers characterize personal interest as a stable and enduring disposition (Schiefele, 2009). While personal interest can be directed to a specific idea or topic, situational interest is the psychological state of being interested in a task (Renninger, Hidi, & Krapp, 1992) and considers the appeal of the task in a contextual way. Certainly, both personal interest and situational interest play a role in motivating competitors to select and persist in CDE competition. A livestock judging competitor, for example, is likely interested in the general topics of genetics, and animal science (personal interest), while being particularly intrigued with the idea of evaluating breeding swine for their fit in a farrowing house (situational interest). In the current study, situational interest was measured to gauge the level of motivation students have pertaining to the content and context when competing in a specific CDE.

Bandura (1997) describes self-efficacy as the cognitive process of an individual assessing their ability to perform a domain specific task. Having a high degree of self-efficacy means a person is confident they have what it takes to be successful in an appropriate context. A component of his social cognitive theory, Bandura (2001) asserts self-efficacy affects actions such as behavioral choice, performance, strategy selection, goal choice and commitment, and effort. Self-efficacy has demonstrated positive impacts on many outcome variables, including physical endurance (Lerner & Locke, 1995), golf performance (Beauchamp, Bray, & Albinson, 2002), competition anxiety (Hong, Hwang, Tai, & Lin, 2015), and enrollment decisions to enter a career (Bashir, Wee, Memon, & Guo, 2017). Meta-analyses concerning self-efficacy consistently show efficacy beliefs contribute significantly to both motivation and performance (Bandura & Locke, 2003). Self-efficacy is a predictor of other measures of motivation and performance in a wide variety of contexts, stretching across disciplines of agriculture and education and daily life as well.

Control beliefs characterize a student's expectation of their efforts to culminate into positive outcomes (Pintrich, Smith, Garcia, & McKeachie, 1991). Control beliefs specifically refer to beliefs that performance outcomes are predicated on the effort of the individual. A competitor with high control beliefs, for example, feels they can exert control on their placing among their peers in competition with efforts to study and prepare appropriately (Pintrich et al., 1991). Control beliefs are a vital measure in the present study because it extends the measures of self-efficacy (confidence in the task) and grit (effort) to include the locus of control for both aspects. In other words, the measure allows the present study to investigate the beliefs of a competitor separate from the influence of their coach. Items on the control beliefs construct such as, “It is my own fault if I don't learn the material in this CDE.,” delineate the influence of the competitor on their own performance and not external factors, such as their coach.

Purpose/Objective

The purpose of this study was to examine the relationship between motivation and performance in FFA CDEs. This research aligns with research priority 5 of the AAAE research agenda: efficient and effective agricultural education programs (Roberts, Harder, & Brashears, 2016).
The research question was “What combination of student motivation (goal-orientation, grit, self-efficacy, interest, control beliefs), coaches’ motivation (same as student measures), and demographic variables (gender, age, ethnicity, GPA) best predicts performance in FFA CDEs?”

Methodology

To obtain a representative sample of all National FFA CDE participants, the study employed a cluster sample design using the "genres" of CDEs as clusters. All CDEs were assigned to one of three clusters (see Table 1): team-based content (i.e. livestock evaluation), team-based leadership (i.e. agricultural issues forum), or individual leadership (i.e. prepared public speaking). Proportional to the number of CDEs in each cluster, five events from the team-based content cluster and two events each from the team-based leadership and individual leadership clusters were chosen at random. A census of all participants in each of the nine randomly chosen events was then conducted (see Figure 2). Clustering CDEs by content and randomly selecting nine of the 24 events, resulted in a sample representative of CDE competitors and coaches.

Table 10

Assignment of CDEs/LDEs to Genre Cluster

Genre	*N*	CDEs
Team-based content	15	Ag Mech., Agronomy, Dairy Eval., Env. & Nat. Res., Floriculture, Forestry, Horse Eval, Farm Bus. Man., Food Sci. & Tech, Livestock Eval., Nursery/landscape, Meats evaluation, Milk Quality & Products, Poultry Eval., Vet. Sci
Team-based leadership	5	Ag Comm., Ag Issues, Ag sales, Marketing Plan, Parly Pro
Individual Leadership	4	Creed, Extemp public speaking, Job Interview, Prepared public speaking

Note. Clusters were designed to reflect the core principles students engage in (content vs leadership) and the presence/absence of the team dynamic (team-based vs individual)

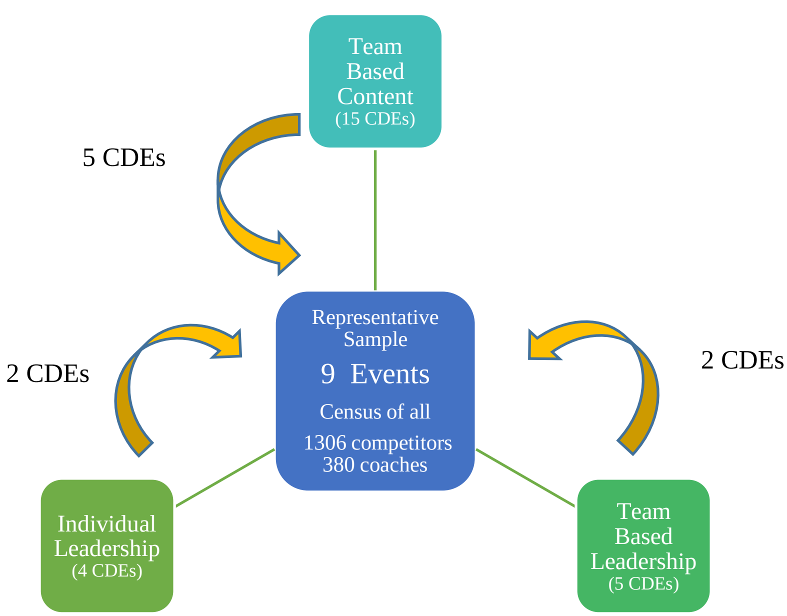


Figure 2. *Cluster Sample Design for Quantitative Surveys*

Data Collection

Permission was sought and granted by the [university] Institutional Research Board (IRB). An RFP was submitted to National FFA staff and approved in the spring of 2016. Afterward, each of the nine CDE event superintendents were contacted to inform them of the survey and discuss the logistics of implementation. All coaches and competitors from the nine CDEs were asked to complete the survey. Surveys were either completed online before the competition or completed hardcopy before the announcement of results. Incentives were provided to all competitors and coaches who completed the survey in full. Both audiences received a high-quality FFA decal, tailored to their CDE.

Coaches' emails were obtained from National FFA staff during the summer of 2016. Guided by recommendations of Dillman (2000) coaches were sent a pre-notification letter informing them of the coaches and competitor surveys. Up to three reminder emails were sent starting three weeks prior to convention. On the morning of data collection, the Qualitrics survey windows were suspended and a spreadsheet was created for each competition that detailed which states had completed the survey. Coaches who failed to complete the questionnaire by the morning of data collection were handed a hard copy of the instrument during the appropriate time at convention.

Due to logistical constraints of delivering the competitor survey digitally and the inability to gather student emails for pre-contest delivery, the majority of competitor questionnaires were administered via hardcopy. To ensure an adequate sample of students to compare between the two types of formats (digital and hardcopy) the poultry evaluation competition was chosen to receive the digital format. T-tests revealed no significant difference between delivery methods, so were considered as the same for the purposes of analyses. As a result of the pilot measures, it was determined the period just before the awards banquet (after the competition was over) was the optimal time for students to complete the survey. Where possible, data were collected during the time prior to banquet in each competition as either the sole source of data collection or as a follow-up to those that did not fill it out prior to the competition, online.

For hard copy questionnaire administration, members of the research team set up a station outside of the banquet hall one hour before the scheduled start of the program. As chapters arrived, a member of the team approached the group and checked to see if the coach had completed the online survey. If the coaches had completed the questionnaire, they were given the incentive. Their students were asked to complete the competitor questionnaire and return it for a similar incentive. The majority of competitors at each event completed the questionnaire as they waited for the banquet doors to open. A detailed survey administration protocol was developed to ensure consistent implementation of the questionnaire by members of the research team at each of the events. Competitor overall response was 91.7%. Coaches overall response rate was 89.5%.

Instrumentation

A panel of experts consisting of faculty members in educational psychology (1) and agricultural education (3) reviewed all measures of the two questionnaires to establish content validity. Panel members reviewed all measures on the instrument to ensure they elicited the responses they were intended to measure. Cronbach's alphas were adequate and not dissimilar from previously validated levels for all measures.

Goal orientation was measured using the Elliot and McGregor (2001) 2x2 achievement goal framework. The questionnaire involves subscales of mastery-approach (α = .87), mastery-avoidance (α = .89), performance-approach (α = .92), and performance avoidance (α = .83) with individuals asked to rate 12 items on a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Items were adapted to reflect the environment of a CDE competition rather than a "classroom." Examples items included "I just want to avoid doing poorly in this CDE." (PAv), "My goal is to perform better than the other students." (PAp), "I am striving to understand the content of this CDE as thoroughly as possible."(MAp), and "I worry that I may not learn all that I possibly could in this CDE." (MAv). As a measure of persistence, grit was measured with the short version Grit Scale (α = .83, Duckworth & Quinn, 2009). The instrument contained eight Likert-type items (1 = *not like me at all* to 5 = *very much like me*) measuring the two components of grit: consistency of interest and perseverance of effort. Sample items included "I am a hard worker." and "Setbacks don't discourage me. I bounce back from disappointments faster than most people." Competitors in the study received the "child adapted" version of the instrument.

Interest was measured with a modified version of the Initial Interest scale (α = .93, Hulleman, Godes, Hendricks, & Harackiewicz, 2010). The scale was modified by the researcher to reflect the context of CDE competition rather than a classroom. The measure was comprised of five items on a 7-point Likert-type scale (1 = *strongly disagree* to 7 = *strongly agree*) and were adapted to work in the context of a CDE competition. Sample items included "I find this CDE enjoyable.," and "This CDE just doesn't appeal to me." (reverse coded). Self-efficacy was measured with a modified version of the Educational Psychology Self-Efficacy Questionnaire (Nietfeld, Cao, & Osborne, 2006). The measure (α = .90) consisted of eight items on a 5-point Likert-type scale (1 = *nothing like me* to 5 = *a great deal like me*) adapted to work in a CDE context. Example items were, "I can perform well in this CDE." and "It takes me a long time to catch on to new topics in this CDE." (reverse coded). To measure students' perceived ability to exert control over their performance, the control beliefs construct of the Motivated Strategies for Learning Questionnaire (MSLQ, Pintrich et al., 1991) was utilized. This measure (α = .68) contained six items on a 7-point Likert-type scale (1 = *not at all true of me* to 7 = *very true of me*) adapted to the context of a CDE competition. Control beliefs were measured with competitors only. "It is my own fault if I don't learn the material in this CDE." was a sample items on this measure.

Demographic variables collected on competitors included self-reported measures of: gender, grade level, ethnicity, hometown classification, and unweighted GPA. Coaches were asked to provide their gender, ethnicity, years of teaching and coaching experience, and method of teacher certification. Performance was measured by individual emblem (when applicable) in the respective CDE. Coaches' performance was measured by team emblem. National FFA assigns each individual and/or team an emblem designation of gold, silver, or bronze, which was treated as an ordinal measure of performance.

Data Analysis

All hardcopy survey data were coded in a spreadsheet using Google Sheets© to allow for simultaneous data entry from multiple members of the research team. Surveys completed in Qualtrics were downloaded and added to the existing spreadsheet. After survey data entry was complete, performance data, obtained from National FFA, was integrated. National FFA provided the raw individual and team scores (if applicable) in addition to the emblem designation (gold/silver/bronze). Since each contest had its own unique scoring parameters, all individual and team scores were converted to a *z*-score to allow comparison between contests and input into the regression model. This variable of performance was not used, however since the "raw" scores for leadership events were arbitrary cutoff numbers for each flight or round of students that advanced. Therefore, the emblem designation was used to compare all events on a similar scale.

Data were analyzed using SPSS© version 24. *T*-tests were conducted to detect any difference between the online and hardcopy delivery options of coaches and competitors, as well as to detect any differences between competitor respondents and nonrespondents about performance. Ordered logistic regression (OLR) was conducted to produce a model to predict performance based on the motivational and demographic factors collected. OLR was chosen as a method of analysis for two primary reasons. First, the OLR model was able to quantify the amount of variation in performance attributable to motivation which provided a general indication of the impact motivation plays on student achievement in a CDE context. Second, OLR allowed the researcher to control for multiple independent variables in the analysis (Hosmer, Lemeshow, & Sturdivant, 2013). For the present study, by reporting the beta values of each regression coefficient in the model, each constructs relationship with performance is considered while simultaneously controlling for all other measures of motivation.

Results

All motivation measures for both competitors and coaches, along with student self-reported GPA, and demographics of the student were modeled in an ordinal logistic regression to predict performance in the event. The various measures of coaches' motivation were included as a student variable in the model. All factors not contributing significantly to performance were removed from the regression. The final model (see Table 2), $\chi^2_{(16)} = 163.64$, $p < .01$ reported a Nagelkerke pseudo R^2 of .22, indicating 22% of the variation in competitor performance was explained by the included explanatory variables. A parallel lines test ($\chi^2_{(16)} = 21.71$, $p = .15$) demonstrated the model meets the proportional odds assumption at all levels of the ordinal variable of performance. The model accurately predicts the log odds of moving from bronze to silver and from silver to gold emblem designation. Finally, the model reported acceptable goodness-of-fit measures ($\chi^2_{(1406)} = 14419.76$, $p = .39$) indicating data fit the model well.

Several positive, significant predictors of performance were found (see Table 11
Ordinal Logistic Regression of Motivational Factors on CDE Performance

		β *e*stimate	Odds Ratio	SE	Wald χ^2	p
Intercept	Bronze Emblem	10.05		1.23	66.70	< .01*
	Silver Emblem	12.12		1.26	92.71	< .01*

Variable	Competitor GPA	1.04	2.83	.22	23.27	< .01*
	Competitor PAp	.43	1.53	.12	13.43	< .01*
	Coach PAp	.67	1.95	.12	32.86	< .01*
	Coach PAv	-.18	.84	.09	4.43	.04*
	Coach Grit	.32	1.38	.15	4.42	.04*
	Coach Interest	.34	1.40	.11	9.87	< .01*
	Ethnicity					
	African American	-.17		.66	.07	.79
	American Indian	-.29		.85	.11	.74
	Asian	-.99		.80	1.54	.22
	Hispanic/Latino	-.77	.46	.39	3.91	.05*
	Two or more races	-.74	.48	.38	3.70	.05*
	Other race	2.27		1.35	2.84	.09
	Non-disclosed race	.65		.69	.88	.35
	Hometown size					
	Town	.20		.17	1.33	.25
	Suburban	.58	1.79	.25	5.6	.02*
	City	.57		.37	2.44	.12

Note. * = significant at p ≤ .05

The regression estimates represent the log odds of moving one level in the ordinal outcome of competitor emblem. With GPA, for example, a one-unit increase in competitor GPA (i.e. going from 3.0 to 4.0), results in a 1.04 increase in the ordered log odds of being in a higher emblem category (i.e. silver instead of bronze), assuming all the other variables in the model are held constant. Odds ratios for each of the significant beta estimates were calculated to provide a more practical interpretation of the findings. In the same example, for a one-unit increase in GPA, the odds of earning a gold emblem versus the combined silver and bronze emblems are 2.83 times greater, given all other variables are held constant in the model.

Demographic variables of ethnicity, gender, and hometown were dummy coded for analysis by entering each category of the variable individually in SPSS with a “1” if the competitor was of the baseline ethnicity/hometown, and “0” otherwise. Accordingly, “white” and “rural” are the baseline categories for the variables of ethnicity and hometown, respectively. As such, all other beta estimates in those variables are in relation to them. Other motivation measures (i.e. self-efficacy, control beliefs) and demographics (gender) were removed from the regression model, as they were not statistically significant predictors of performance. Only Hispanic and two or more races were significant predictors in the model. Both were negative, and indicate Hispanic competitors, and competitors of two or more races are .46 and .48 times more likely to earn a lower emblem category than white students. Likewise, suburban students are 1.79 times more likely to achieve a higher emblem status than competitors from a rural hometown.

The research question aimed to predict student performance based on a variety of motivational and demographic factors. Although measures of student motivation (grit, self-efficacy, interest, control-beliefs) and coaches’ motivation (grit, self-efficacy, and interest) were positively correlated with performance, when modeled in an ordinal regression, it was competitor GPA and PAp orientation, as well as a coach’s PAp orientation, PAv orientation, grit, and interest which were significant predictors of student outcomes.

), including: competitor GPA, one factor of student motivation [PAp goal orientation (β = .43)], three factors of coaches' motivation [PAp goal orientation (β = .67), grit (β = .32) and interest (β = .34)] and whether a student was from a suburban hometown (β = .58). Negative predictors of student performance included coaches PAv goal orientation (β = - .18), and whether a student was Hispanic (β = - .77) or of two or more races (β = - .74).

Table 11

Ordinal Logistic Regression of Motivational Factors on CDE Performance

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	Coach PAv	-.18	.84	.09	4.43	.04*
	Coach Grit	.32	1.38	.15	4.42	.04*
	Coach Interest	.34	1.40	.11	9.87	< .01*
	Ethnicity					
	African American	-.17		.66	.07	.79
	American Indian	-.29		.85	.11	.74
	Asian	-.99		.80	1.54	.22
	Hispanic/Latino	-.77	.46	.39	3.91	.05*
	Two or more races	-.74	.48	.38	3.70	.05*
	Other race	2.27		1.35	2.84	.09
	Non-disclosed race	.65		.69	.88	.35
	Hometown size					
	Town	.20		.17	1.33	.25
	Suburban	.58	1.79	.25	5.6	.02*
	City	.57		.37	2.44	.12

Note. * = significant at $p \leq .05$

The regression estimates represent the log odds of moving one level in the ordinal outcome of competitor emblem. With GPA, for example, a one-unit increase in competitor GPA (i.e. going from 3.0 to 4.0), results in a 1.04 increase in the ordered log odds of being in a higher emblem category (i.e. silver instead of bronze), assuming all the other variables in the model are held constant. Odds ratios for each of the significant beta estimates were calculated to provide a more practical interpretation of the findings. In the same example, for a one-unit increase in GPA, the odds of earning a gold emblem versus the combined silver and bronze emblems are 2.83 times greater, given all other variables are held constant in the model.

Demographic variables of ethnicity, gender, and hometown were dummy coded for analysis by entering each category of the variable individually in SPSS with a "1" if the competitor was of the baseline ethnicity/hometown, and "0" otherwise. Accordingly, "white" and "rural" are the baseline categories for the variables of ethnicity and hometown, respectively. As such, all other beta estimates in those variables are in relation to them. Other motivation measures (i.e. self-efficacy, control beliefs) and demographics (gender) were removed from the regression model, as they were not statistically significant predictors of performance. Only Hispanic and two or more races were significant predictors in the model. Both were negative, and indicate Hispanic competitors, and competitors of two or more races are .46 and .48 times more likely to earn a lower emblem category than white students. Likewise, suburban students are 1.79 times more likely to achieve a higher emblem status than competitors from a rural hometown.

The research question aimed to predict student performance based on a variety of motivational and demographic factors. Although measures of student motivation (grit, self-efficacy, interest, control-beliefs) and coaches' motivation (grit, self-efficacy, and interest) were positively correlated with performance, when modeled in an ordinal regression, it was competitor GPA and PAp orientation, as well as a coach's PAp orientation, PAv orientation, grit, and interest which were significant predictors of student outcomes.

Conclusion and Implications

It is important to note the sample is generalizable to all National FFA CDE competitors, but not all FFA CDE competitors nationwide. This is an important distinction to make since it is likely the population of national CDE competitors are a more highly motivated group than those at the state and local levels of competition. Another limitation to recognize is the self-reported measure of GPA. Although Kuncle, Credé, and Thomas (2005) recognized self-reported GPAs are good reflections of actual grades for high GPA students, they assert students with lower GPAs may be less precise and recommend researchers exercise caution when reporting. The average unweighted GPA for students in this sample was 3.7/4.0, so these high performers likely have high precision in estimating their actual GPA. Additionally, only 831 of the competitors sampled reported a usable unweighted GPA, indicating several students simply did not know their GPA and chose not to report. This introduces nonresponse bias that should be considered.

The most practical finding from this investigation for agriculture teachers in the field concerns the regression model and the amount of variance in performance that is attributable to motivation. Nearly one-fourth (22%) of the variation in performance was due largely to the motivational factors of both the coach and competitor. For coaches, their PAp goal orientation was a strong predictor of student success. This suggests being motivated to win as a coach will likely translate into positive performance outcomes for students. This finding reinforces the findings of Croom et al. (2009). Combined with measures of coaches' motivation that were positive predictors of student performance (grit and interest) it becomes evident that a coaches' motivation to coach has an impact on the bottom line for student performance. This is a powerful illustration to in-service and preservice teachers alike that the drivers for why they coach have a definite impact on students. If student performance is a priority (Ball, Bowling, & Sharpless, 2016), a coach's interest in the content area of the CDE and their drive to succeed in competition should be cultivated.

With a better understanding of why students are approaching these CDEs, the profession can better prepare preservice teachers on how to recruit and prepare their future teams. It is recommended preservice teacher preparation programs incorporate CDE coaching and motivational strategies into their coursework for future teachers. Some specific advice concerning the general findings of this study are as follows: If student success is a priority, teachers should a) coach teams with which they have a deep interest in the content area, b) seek ways to be performance-oriented (focused on winning), c) understand being driven by a fear of losing is detrimental to student success, and d) develop their personal grit.

It is further recommended that National FFA Organization review component structures of CDE/LDE competition. While weakly correlated with student performance, mastery-orientation of coaches and students were not significant predictors of student success, unlike performance-orientation. This speaks to the rewards systems in place given the types of students involved. The data presented here demonstrate student and coaches who are driven to perform and harness a spirit of competition are more likely to succeed in FFA events. Although this finding is intuitive, the simple fact that the competitions are called *career* development events and *leadership* development events suggests they should be structured such that students should be incentivized to master skills and knowledge. In this regard, one would anticipate mastery goal orientations to be a predictor of student emblem, which was not the case. National FFA staff should seek ways to incentivize mastery-orientated competitors, perhaps by looking to both individual and team based LDEs which demonstrated the highest levels of MAp orientation of the events measured.

The research can also serve as a springboard for other Career and Technical Student Organizations in CTE. Other content areas engage in CDE-like competitions, but it is unknown if students in those areas are motivated in similar ways. Do competitions in other CTE areas have students and coaches who are similarly performance and mastery-approach driven like those in FFA? DECA, for example, administers a diverse array of competitive events in finance, entrepreneurship, marketing, etc. (DECA, 2017). It is recommended similar motivational research be conducted in DECA, HOSA, Skills USA, FBLA, etc. to compare the motivations of competitors across different CTSOs.

References

Ball, A. L., Bowling, A. M., & Sharpless, J. D. (2016). An Observational Analysis of Coaching Behaviors for Career Development Event Teams: A Mixed Methods Study. *Journal of Agricultural Education*, *57*(3), 101-114. doi: 10.5032/jae.2016.03101

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*(1), 1-26.

Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, *88*(1), 87.

Bashir, M., Wee, C., Memon, N., & Guo, B. (2017). Profiling cybersecurity competition participants: Self-efficacy, decision-making and interests predict effectiveness of competitions as a recruitment tool. *Computers & Security*, *65*, 153-165.

Beauchamp, M. R., Bray, S. R., & Albinson, J. G. (2002). Pre-competition imagery, self-efficacy and performance in collegiate golfers. *Journal of Sports Sciences*, *20*(9), 697-705.

Croom, B., Moore, G., & Armbruster, J. (2009). An examination of student participation in national FFA career development events. *Journal of Southern Agricultural Education Research*, *59*(1), 112-124.

DECA. (2017). *Competitive Events*. Retrieved from https://www.deca.org/high-school-programs/high-school-competitive-events/.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (Vol. 2). New York: Wiley.

Duckworth, A. L., Kirby, T. A., Tsukayama, E., Berstein, H., & Ericsson, K. A. (2011). Deliberate practice spells success why grittier competitors triumph at the National Spelling Bee. *Social Psychological and Personality Science*, *2*(2), 174-181.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1087

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (GRIT–S). *Journal of Personality Assessment*, *91*(2), 166-174.

Elliot, A. J., & McGregor, H. A. (2001). A 2× 2 achievement goal framework. *Journal of Personality and Social Psychology*, *80*(3), 501.

Elliot, A. J., McGregor, H. A., & Gable, S. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology*, 91, 549 –563.

Falk, J. M., Masser, D. T., Palmer, H. R., & Foster, D. D. (2014). Describing the relationship between coaching behaviors and student performance at the national FFA parliamentary procedure career development event. *Proceedings of the National AAAE Research Conference*, Snow Bird, UT.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331-362.

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology*, *94*(3), 562.

Hong, J. C., Hwang, M. Y., Tai, K. H., & Lin, P. C. (2015). Self-efficacy relevant to competitive anxiety and gameplay interest in the one-on-one competition setting. *Educational Technology Research and Development*, *63*(5), 791-807.

Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). Logistic regression models for multinomial and ordinal outcomes. *Applied Logistic Regression, Third Edition*, 269-311.

Hulleman, C. S., Godes, O., Hendricks, B. L., & Harackiewicz, J. M. (2010). Enhancing interest and performance with a utility value intervention. *Journal of Educational Psychology*. doi: 10.1037/a0019506

King, D. L., Rucker, K. J., & Duncan, D. W. (2013). Classroom instruction and FFA/SAE responsibilities creating the most stress for female teachers in the Southeast. *Journal of Agricultural Education*, *54*(4), 195-205. doi: 10.5032/jae.2013.04195

Knobloch, N. A., Brady, C. M., Orvis, K. S., & Carroll, N. J. (2016). Development and Validation of an Instrument to Assess Youth Motivation to Participate in Career Development Events. *Journal of Agricultural Education*, *57*(4), 16-28. doi: 10.5032/jae.2016.04016

Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research*, *75*(1), 63-82.

Lancaster, K., Knobloch, N., Jones, A., & Brady, C. (2013). Youth motivation to participate in animal science-related career development events. *Journal of Extension*, *51*(2).

Lerner, B. S., & Locke, E. A. (1995). The effects of goal setting, self-efficacy, competition, and personal traits on the performance of an endurance task. *Journal of Sport and Exercise Psychology*, *17*, 138-138.

Lopez, D. F. (1999). Social cognitive influences on self-regulated learning: The impact of action-control beliefs and academic goals on achievement-related outcomes. *Learning and Individual Differences*, *11*, 301–319.

Maddi, S. R., Matthews, M. D., Kelly, D. R., Villarreal, B., & White, M. (2012). The role of hardiness and grit in predicting performance and retention of USMA cadets. *Military Psychology*, *24*(1), 19.

Marx, A. A., Simonsen, J. C., & Kitchel, T. (2014). Secondary agricultural education program and human influences on career decision self-efficacy. *Journal of Agricultural Education*, *55*(2), 214-229. doi: 10.5032/jae.2014.02214

National FFA Organization. (2017). *FFA Membership*. Retrieved from https://www.ffa.org/about/who-we-are/our-membership

Nietfeld, J. L., Cao, L., & Osborne, J. W. (2006). The effect of distributed monitoring exercises and feedback on performance, monitoring accuracy, and self-efficacy. *Metacognition and Learning*, *1*(2), 159-179.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ).* Ann Arbor, MI: National Center for Research to Improve Post-secondary Teaching.

Rayfield, J., Fraze, S. D., Brashears, M. T. & Lawver, D. E. (2009). An assessment of recruitment and training practices used in a National FFA Career Development Event. *Journal of Southern Agricultural Education Research, 59*(1), 81-93.

Reis, R., & Kahler, A. A. (1997). Factors influencing enrollment in agricultural education programs as expressed by Iowa secondary agricultural education students. *Journal of Agricultural Education*, *38*(2), 38-48

Renninger, A., Hidi, S., & Krapp, A. (1992). *The role of interest in learning and development*. Hillsdale, NJ: Erlbaum.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association of Agricultural Education national research agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication.

Robertson-Kraft, C., & Duckworth, A. L. (2014). True grit: Trait-level perseverance and passion for long-term goals predicts effectiveness and retention among novice teachers. *Teachers College Record (1970)*, *116*(3).

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68.

Schiefele, U. (2009). Situational and individual interest. In K. R. Wentzel & A. Wifgield (Eds.), *Handbook of motivation at school*, 197-222. New York: Routledge

Schunk, D. H., Meece, J. R., & Pintrich, P. R. (2014). *Motivation in education: Theory, research, and applications*. Upper Saddle River, NJ: Pearson Higher Ed.

Smith, A, Lawver, R., & Foster, D. (2017). *National agricultural education supply & demand study. 2016 executive summary*. Retrieved from http://www.naae.org/teachag/NSD2016Summary.pdf

Talbert, B. A., & Balschweid, M. A. (2006). Career aspirations of selected FFA members. *Journal of Agricultural Education, 47*(2), 67-80. doi: 10.5032/jae.2006.02067

Torres, R. M., Ulmer, J. D., & Aschenbrener, M. S. (2008). Workload distribution among agriculture teachers. *Journal of Agricultural Education*, *49*(2), 75-87. doi. 10.5032/jae.2008.02075

Vansteenkiste, M., Simons, J., Lens, W., Soenens, B., Matos, L., & Lacante, M. (2004). Less is sometimes more: Goal content matters. *Journal of Educational Psychology*, *96*, 755–764.

Vaughn P. R., Keith, L., & Lockaby, J. (1999) The FFA Organization: Needed then & now. *The Ag Ed Magazine, 71*(5), 4-5.

Wolters, C. A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology*, *96*, 236 –250.

Aiming for the Gold Emblem: An Examination of Factors Predicting Performance in National Career Development Events

Discussant Remarks

The author's are to be commended for providing additional information regarding CDE's and factors that influence motivation to participate. The theoretical framework was logically and intelligently identified, the attention to the various cognitive theories of motivation and then purposefully identifying Self-determination theory was a good fit for the study. The addition of a figure was helpful to visualize the basic needs of individuals.

The literature review is well done and should serve as a template for future manuscripts. The effort to introduce the essence of the literature while segmenting the different findings in identified papers increased the readability of the manuscript.

It's refreshing to see a study that has potential to impact a broad audience, the methodological approach of this study sought to be generalizable to National CDE Competitors. The methods and procedures followed were well designed and articulated in the manuscript. Those individual's intent on replicating this study or attempting a Cluster Sample Design would be well served to read this manuscript.

The conclusions and recommendations do not disappoint. Presentation is efficient and readable. The transparent approach to highlighting the findings and couching them in a way practitioners can apply them to the field is commendable; particularly, the recommendations to the National FFA.

Question:
As an Ag-Teacher, which would you prefer, Grit or GPA?

Lets' "unpack" the recommendation to pre-service teacher institutions. Should specific content be delivered? Should faculty be responsible for delivery? Is this an opportunity to include coaches from the field?

School-based FFA Advisors' Attitudes and Motivation to Provide FFA Membership Access for Homeschool Students

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The purpose of this study was to build on previous research regarding attitudes and motivations to provide FFA membership access for homeschool students by investigating these variables with school-based FFA advisors in three Midwestern states. Currently, the three states targeted in this study have homeschool students that participate in and are eligible for FFA membership through part-time public school enrollment. The National FFA Organization has a strategic goal of expanding access to non-traditional audiences, including homeschool students. Therefore, knowing the attitudes and motivations of school-based FFA advisors regarding various potential models of providing access to FFA membership for homeschool students could potentially help inform FFA membership eligibility access nationwide. A quantitative electronic questionnaire was theoretically framed using Expectancy-Value Theory, developed using original and previously validated items, and administered to school-based FFA advisors in Illinois, Indiana, and Minnesota. Results showed that attitudes and motivations differed by state, and that models focusing on integration of homeschool students garnered the most positive response from school-based FFA advisors. Additionally, advisors were agreeable to specific non-traditional models. Recommendations for further research include collecting qualitative data from school-based FFA advisors who have experience working with homeschool students and exploring logistics of non-traditional Agricultural Education participation models.

Introduction

School-based Agricultural Education (SBAE) has focused its strategic efforts to expand the SBAE to reach more students (e.g., strategic plans, 10x20). As such, SBAE has broadened its focus to increase relevance and inclusion of non-traditional audiences in response to demographics trending towards a more diverse and urban population (Conroy & Kelsey, 2000; Henry, Talbert, & Morris, 2014; Newcomb, McCracken, Warmbrod, & Whittington, 2004; Powell, Agnew, & Trexler, 2008). Learning and developing leadership and communication skills, which are desired by employers in potential employees, is one dimension of SBAE programs that can appeal to broader audiences (Crawford, Lang, Fink, Dalton, & Fielitz, 2011; Hoover, Scholl, Dunigan, & Mamontova, 2007; "Job Outlook 2014," 2013; Stephenson, Mayes, Combs, & Webber, 2015). SBAE program participants in the intracurricular component of FFA develop desirable 21st century skills while learning about agriculture, food, and natural resources.

The intracurricular youth organization for SBAE, the National FFA Organization, also has a stated goal of increasing program access to diverse and non-traditional audiences (Crutchfield, 2013). Additionally, the American Association for Agricultural Education (AAAE) stated the need to build highly effective programs that can appeal to all educational audiences and satisfy community needs as one of its research agenda priorities for 2016-2020 (Roberts, Harder, & Brashears, 2016). One of the challenges mentioned in the AAAE research agenda is school choice and Agricultural Education programs needing to appeal to all segments of the education population.

Homeschool students are one potential target audience for increasing enrollment in Agricultural Education and FFA membership. The homeschooling population has grown rapidly, increasing 62% from 2003 to 2012 (Snyder, de Brey, & Dillow, 2016). The current raw number of homeschool students is estimated at 1.8 million (Redford, Battle, & Bielick, 2016), and children are equally likely to be homeschooled in elementary, middle, and high school (Isenberg, 2017), thus representing a potential source of significant program growth for Agricultural Education programs.

Prior work describing homeschool students and Agricultural Education include Frick and Brennan (1998), who described opportunities for homeschool students to access a complete Agricultural Education experience, including all three integrated components of classroom instruction, FFA, and SAE (Supervised Agricultural Experience). In addition to potential student quality and overall program growth, another factor mentioned as a reason to explore a collaborative relationship between Agricultural Education and the homeschool community is an underlying common philosophy in providing an integrated and holistic education for students. Frick and Brennan (1998) suggested part-time public school enrollment as a potential FFA membership eligibility pathway for homeschool students. Indeed, there are documented examples of homeschool students enrolling part-time in a public school with an Agricultural Education program to receive classroom instruction that qualifies them for FFA membership (Brown, 2015; Johnson, 2012; Kittle, 2011; Weik, 2015) and the acceptability of this program participation pathway to state FFA leaders (Kararo & Knobloch, 2017).

Walls, Flowers, and Moore (2001) explored this concept further by surveying 187 home educators in North Carolina regarding their level of interest in Agricultural Education programming and found that the majority (77%) of home educators desired to have agriculture be part of their homeschooling program. The results did not vary by type of community; home educators from a rural, suburban, or urban area were similarly interested. It should be noted that at some point after this study was published, North Carolina became a state that offers homeschool students the opportunity to have a complete Agricultural Education program experience, currently including the existence of two homeschool FFA chapters (North Carolina FFA Association, 2016) and completion of a state-approved Agricultural Education curriculum, including an SAE component, at home, under the supervision of a certified Agricultural Education teacher. This model of homeschool student participation in classroom instruction in Agricultural Education and completion of an SAE by some means and having FFA membership in a chapter specifically for homeschool students is also currently observed in Alaska (Massey, 2015) and is being discussed as an option in other states (Weik, 2015).

FFA is the “show window” and publicly visible portion of a SBAE program (Bailey, 1979, p. 171). Although ultimately FFA members make an FFA chapter, the advisor can impact chapter culture (M. J. Martin & Kitchel, 2014), coach members (Jones, 2011), guide long-term chapter success (Cogdill & Reneau, 1986), and train chapter officers (Phipps & Osborne, 1988) providing continuity to FFA chapters.

This study focused on school-based FFA chapter advisors in three Midwestern states (Illinois, Indiana, and Minnesota). Although the limited amount of prior work provides insight into the desirability of Agricultural Education to home educators as well as current and potential models for program participation that may be agreeable to state FFA leaders, no studies were found that explore the motivational beliefs of school-based FFA advisors regarding homeschool students and their participation in the three integrated components of Agricultural Education (instruction, FFA, and SAE). Additionally, because there are specific requirements that must be met by students for FFA membership eligibility as defined in FFA constitutions, it is crucial to explore current and potential ways homeschool students can meet membership eligibility requirements to receive a complete Agricultural Education experience, as well as the willingness of school-based FFA advisors to work with homeschool students.

The three states (Illinois, Indiana, and Minnesota) were chosen because of differences in their educational policies (Table 1; Kararo & Knobloch, 2016) despite being in a similar area of the country and evidence of homeschool students participating in Agricultural Education through part-time public school enrollment (Johnson, 2012; Weik, 2015) or online curriculum use (Shipman, 2016a, 2016b).

Table 1
Policies on part-time public school enrollment, homeschooling regulations, and state FFA constitution membership language

State	Part-time public school enrollment	Homeschooling regulations	State FFA constitution membership language
Illinois	State required	None	Enrolled and/or planned course of study, SAE
Indiana	School determined	One-time notification only if withdrawing	Enrolled and SAE
Minnesota	District determined	High	Enrolled and/or planned course of study, SAE

Theoretical Framework

Motivational beliefs of school-based FFA advisors were framed by Expectancy-Value Theory (EVT; Eccles et al., 1983; Eccles & Wigfield, 1995, 2002; Wigfield & Eccles, 2000). Expectancies and task-values are defined as task-specific and directly influence task engagement through motivation (Eccles & Wigfield, 2002). EVT is rooted in a social cognitive perspective (Schunk, Pintrich, & Meece, 2008), therefore task values and expectancies are assumed to be influenced by past behavior, personal beliefs, and outside sources such as social interactions. EVT operates within a constructivist paradigm, which assumes a social construction of reality and differences in perceptions by individuals (Lincoln, Lynham, & Guba, 2011) although this does not necessarily result in relativism, but rather pluralism (Baxter & Jack, 2008).

Many modern EVT applications in education research investigate achievement motivations of youth (e.g., Jones, 2011; Martin & Dowson, 2009; Trautwein et al., 2012). However, college student motivations have also been studied (Feather, 1988; Flake, Barron, Hulleman, McCoach, & Welsh, 2015; Shepperd & Taylor, 1999), showing that EVT has been applied as a theoretical framework in educational settings with adults. Examples include measuring the utility value of the mentally ill engaging with activities (Choi, Fiszdon, & Medalia, 2010), and measuring the task engagement of teachers in professional development (Thomson & Kaufmann, 2013). This study will also apply EVT as a framing for an adult population, but in the unique context of school-based FFA advisors and their motivational beliefs regarding homeschooling, homeschool students, and their participation in the three integrated components of Agricultural Education (instruction, FFA, and SAE).

The task value construct of EVT contained four specific components: attainment value, intrinsic value, utility value, and cost (Eccles & Wigfield, 2002; Schunk et al., 2008). The four components' definitions were contextualized for this study (Table 2).

Table 2
Contextualized value components for school-based FFA advisors

Value component	Definition	School-based FFA advisor perspective
Attainment	Task relevance	Relevance of providing and expanding FFA membership eligibility access to homeschool students
Intrinsic	Subjective interest	Interest in providing and expanding FFA membership eligibility access to homeschool students
Utility	Task usefulness	Usefulness of providing and expanding FFA membership eligibility access to homeschool students
Perceived costs	Potential task negatives	Resource allocation (e.g., time, materials, spots on CDE teams) in providing and expanding FFA membership eligibility access to homeschool students

Attainment value was defined as the relevance of a task (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008), and was operationalized in this study as the relevance school-based FFA advisors place on providing and expanding FFA membership eligibility access to include homeschool students. *Intrinsic value* was defined as the subjective interest in a task (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008), and was operationalized in this study as the interest school-based FFA advisors have in providing and expanding FFA membership eligibility access to include homeschool students. *Utility value* was defined as the usefulness of a task for future goals (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008). In the context of this study, it was operationalized as the usefulness of homeschool students being FFA members as perceived by school-based FFA advisors. The final piece of task value was *cost*, which was defined as perceived downsides to task engagement (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008). Potential costs in this study, as perceived by school-based FFA advisors, could be related to resource allocation in providing and expanding FFA membership eligibility access to homeschool students.

Due to the target study population being school-based FFA advisors, expectancies regarding the specific task of expanding FFA membership access for homeschool students was not a measured variable. It was assumed that school-based FFA advisors are the local level "gatekeepers" regarding membership in FFA. Because ultimately school-based FFA advisors would likely be the people working directly with homeschool students, it is assumed that they would be able to influence policy interpretation regarding FFA membership eligibility requirements at the local level (i.e., local FFA constitution membership eligibility requirements) and therefore have a high expectancy with regards to whether or not homeschool students have access to Agricultural Education and FFA membership eligibility.

Purpose

The purpose of this study was to explore the attitudes and motivations of school-based FFA advisors to provide FFA membership access for homeschool students. Two research questions guided the study: (1) What were the attitudes of school-based FFA advisors in Indiana, Illinois, and Minnesota regarding potential models of homeschool student participation in the three integrated components of Agricultural Education and do these attitudes differ by state? (2) What were the motivations of school-based FFA advisors in Indiana, Illinois, and Minnesota with regards to providing homeschool students with access to participate in the three integrated components of Agricultural Education and do these motivations differ by state?

Methods & Procedures

The study was an exploratory census of school-based FFA advisors in three Midwestern states (Illinois, Indiana, and Minnesota). The study questionnaire was developed utilizing items adapted from previously validated instruments (Gray, 1998; Hendrix, 2003; McGraw, 1989) and original items developed by the researchers measuring context-specific task-values (Table 3).

Table 3
Examples items operationalized to measure school-based FFA advisors' motivation to provide access to FFA membership for homeschool students

Task-value construct	Example item
Attainment value	• It is important to include all members of the community in an FFA chapter, including homeschool students.
Intrinsic value	• I am passionate about reaching all students that are interested in FFA, including homeschool students.
Utility value	• Homeschool students being in FFA would be a valuable resource for FFA chapters.
Cost	• Homeschool students being in FFA would take away resources from public school students.

Items making up the task-value construct regarding providing access to FFA membership eligibility for homeschool students and items measuring attitudes of school-based FFA advisors regarding observed and potential models of classroom instruction, FFA membership, and SAE completion for homeschool students were utilized having been validated in a previous study (Kararo & Knobloch, 2017). Cronbach's *alpha* was assessed for all study constructs (Attainment = .78; Intrinsic = .83; Utility = .96; Cost = .93) and were acceptable (>0.7) (Field, 2009).

School-based FFA advisors were identified by contacting state FFA leaders in the three states (IL, IN, and MN) and using email listservs created from publicly available annually updated directories of Agricultural Education teachers. Multiple points of contact were used to maximize response rate (Dillman, Smyth, & Christian, 2014). State FFA leaders initially sent out an email on their teacher listserv providing a link to an anonymous Qualtrics© questionnaire. Anonymity was maintained to minimize risks for school-based FFA advisors completing the questionnaire. Follow-up emails were sent out by the researcher on a weekly basis for three weeks. This occurred during the three weeks prior to winter break. An additional round of personalized emails asking for participation occurred weekly for three weeks after classes resumed in the new year to maximize response rate.

The overall "click" rate of school-based FFA advisors was approximately 44% with a completion rate of 27%, meaning that 17% clicked the questionnaire link but either did not consent to taking the questionnaire or did not complete the entire questionnaire. A possible explanation for the difference between click rate and completion rate was the apparently sensitive nature of the study topic to the population. As such, the researcher was contacted by multiple subjects regarding their apprehension in completing the questionnaire.

The total population was 922 Agricultural Education teachers in the three states (258 in Indiana, 410 in Illinois, and 254 in Minnesota). The overall response rate was 27% (N = 244) and 30% for Indiana (n = 77), 25% for Illinois (n = 102), and 26% for Minnesota (n = 65). This study was designed as a census of school-based FFA advisors in three states and results are not intended to be generalized nationwide because participant selection was targeted and not random. However, non-response bias and its threat to external validity was addressed by regressing study constructs against the date of questionnaire completion. This regression was not significant, meaning that the study constructs variance was stochastic with regards to date of questionnaire completion. Thus, non-response bias was determined to not be a threat to external validity and results can be generalized to school-based FFA advisors in Indiana, Illinois, and Minnesota (Lindner, Murphy, & Briers, 2001).

Data were analyzed using SPSS (v.23) and included descriptive statistics, such as percentage agreement for items, and grand means for the task-value constructs. Kruskal-Wallis *H* tests were conducted on non-parametric data to determine if there were statistically significant differences in responses among school-based FFA advisors based upon the state in which they teach. The three states have differing educational policies and therefore, theoretically, attitudes and motivations should be different among states.

Demographics collected include gender, age, and years in current position. There were 243 valid answers to the item asking participants to indicate their gender. There were 143 (58.8%) males and 100 (41.2%) females and the mean age was 43 years old. Respondents had been teaching for an average of 16 years.

Results

School-based FFA advisors overall held positive motivational beliefs (Table 4) about providing homeschool students with access to participate in the three components of Agricultural Education (M = 4.40, SD = 0.94). Attainment value (task relevance) (M = 5.14, SD = 0.88) and intrinsic value (task interest) (M = 4.96, SD = 1.04) were higher than utility value (M = 4.03, SD = 1.32), but all were positive. The responses overall regarding perceived costs (M = 3.49, SD = 1.21) being a barrier to providing access for homeschool students fell between agree and disagree, but had a high standard deviation, meaning that there was a range of agreement and disagreement among respondents.

Table 4
School-based FFA advisors' motivation towards providing FFA membership access for homeschool students

Task-value construct		Indiana	Illinois	Minnesota	Overall
Attainment value	M (SD)	n = 77 5.00	n = 101 5.00	n = 65 5.55	N = 253 5.14

		(.93)	(.89)	(.65)	(.88)
Intrinsic value	*M* (*SD*)	*n* = 76 4.81 (1.11)	*n* = 101 4.85 (1.07)	*n* = 65 5.31 (.85)	*N* = 248 4.96 (1.04)
Utility value	*M* (*SD*)	*n* = 74 3.80 (1.40)	*n* = 99 3.90 (1.32)	*n* = 64 4.46 (1.12)	*N* = 240 4.03 (1.32)
Perceived costs[a]	*M* (*SD*)	*n* = 76 3.26 (1.27)	*n* = 98 3.34 (1.15)	*n* = 64 3.98 (1.10)	*N* = 239 3.49 (1.21)
Overall motivational beliefs	*M* (*SD*)	*n* = 74 4.21 (.98)	*n* = 96 4.27 (.91)	*n* = 63 4.83 (.80)	*N* = 234 4.40 (.94)

Note. Items were measured on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree). Numbers presented are grand means.

[a]Items were reverse coded negatively worded items, higher number means lower importance on perceived costs.

Questionnaire items regarding school-based FFA advisors' attitudes towards observed and potential models of classroom instruction (Table 5), FFA membership (Table 6), and SAE completion (Table 7) for homeschool students were measured using a 6-point Likert-type scale (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree). Results were divided according to component and presented as percentage agreement for interpretation purposes. Answers of "Slightly Agree," "Moderately Agree," and "Strongly Agree" were combined to indicate percentage agreement.

Table 5

School-based FFA advisors' attitudes towards models of instruction for homeschool students

Items		Indiana	Illinois	Minnesota	Overall
Homeschool students should be permitted to meet classroom instruction eligibility requirements for FFA membership by…		*n* = 77	*n* = 102	*n* = 65	*N* = 279
Completing an online Agricultural Education course.	% Agree	35.1% (*n* = 27)	59.8% (*n* = 61)	72.3% (*n* = 47)	54.8% (*n* = 153)
Attending Agricultural Education courses at their local public school.	% Agree	90.9% (*n* = 70)	93.1% (*n* = 95)	98.5% (*n* = 64)	93.9% (*n* = 262)
Completing a state-approved Agricultural Education curriculum taught by the homeschool parent.	% Agree	35.1% (*n* = 27)	51% (*n* = 52)	56.9% (*n* = 37)	47.7% (*n* = 133)
Completing any Agricultural Education curriculum chosen by a homeschool parent.	% Agree	19.5% (*n* = 15)	24.8%[a] (*n* = 25)	38.5% (*n* = 25)	26.7%[b] (*n* = 74)

Note. Items were measured on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

A majority of school-based FFA leaders from all three states agreed (93.9%, *n* = 262) that homeschool students should be permitted to meet classroom instruction eligibility requirements for FFA membership by attending Agricultural Education courses at their local public school. A majority of school-based FFA advisors from Illinois (59.8%, *n* = 61), Minnesota (72.3%, *n* = 47), and overall (54.8%, *n* = 153) agreed that homeschool students should be permitted to meet classroom instruction eligibility requirements for FFA membership by completing an online Agricultural Education course. Another model of homeschool instruction that a majority of school-based FFA advisors in Illinois (51%, *n* = 52) and Minnesota (56.9%, *n* = 37) agreed with was completing a state-approved Agricultural Education curriculum taught by the homeschool parent. Although not a majority, nearly half of school-based FFA advisors overall (47.7%, *n* = 133) agreed the homeschool parent could teach a state-approved curriculum model. The majority of school-based FFA advisors in all three states did not agree that homeschool students should be permitted to meet instruction eligibility requirements for FFA membership by completing any Agricultural Education curriculum chosen by a homeschool parent. However, one in four school-based FFA advisors overall agreed (26.7%, *n* = 277) with this model. A Kruskal-Wallis *H* test showed that there was a statistically significant difference in agreement among states regarding all potential models of instruction.

Table 6
School-based FFA advisors' attitudes regarding models of FFA membership for homeschool students

Items		Indiana	Illinois	Minnesota	Overall
Homeschool students who meet current FFA membership requirements should be permitted to…		*n* = 77	*n* = 102	*n* = 65	*N* = 272
Participate in FFA events independently without chapter affiliation	% Agree	15.6% (*n* = 12)	24.5% (*n* = 25)	6.2% (*n* = 4)	17.3% (*n* = 47)
Join a homeschool FFA chapter advised by a homeschool parent and participate in FFA events	% Agree	31.2% (*n* = 24)	43.1% (*n* = 44)	33.8% (*n* = 22)	39% (*n* = 106)
Join a homeschool FFA chapter advised by a certified Agricultural Education teacher and participate in FFA events	% Agree	57.1% (*n* = 44)	67.6% (*n* = 69)	69.2% (*n* = 45)	66.5% (*n* = 181)
Join the FFA chapter of their local school and participate in FFA events	% Agree	70.1% (*n* = 54)	72.3%[a] (*n* = 73)	93.8% (*n* = 61)	78.2%[b] (*n* = 212)

Note. Items were measured on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

Approximately three out of four school-based FFA advisors from all three states agreed (78.2%, *n* = 212) that homeschool students who meet FFA membership requirements should be permitted to join the FFA chapter of their local school. Two out of three school-based FFA advisors overall agreed (66.5%, *n* = 181) that homeschool students who meet current FFA membership requirements should be permitted to join a homeschool FFA chapter advised by a certified Agricultural Education teacher. One out of three school-based FFA advisors also agreed (39%, *n* = 106) that homeschool students should be permitted to join a homeschool FFA chapter advised by a homeschool parent. A Kruskal-Wallis *H* test revealed a statistically significant difference in agreement among states regarding two models of homeschool student FFA membership. The first difference was regarding homeschool students participating independently without chapter affiliation, and the second difference was regarding homeschool students joining the FFA chapter of their local school.

Table 7

School-based FFA advisors' attitudes towards models of SAE completion for homeschool students

Items		Indiana n = 77	Illinois n = 102	Minnesota n = 65	Overall N = 266
All students participating in FFA should be required to complete a SAE	% Agree	68.8% (n = 53)	73.5% (n = 75)	76.9% (n = 50)	74.1% (n = 197)
A SAE should be considered instruction that qualifies a student for FFA membership	% Agree	66.2% (n = 51)	65.7% (n = 67)	70.8% (n = 46)	66.5% (n = 177)
A SAE should only be supervised by a certified Agricultural Education teacher	% Agree	83.1% (n = 64)	70.6% (n = 72)	73.8% (n = 48)	76.3% (n = 203)
A SAE by a homeschool student should be permitted to be supervised by a homeschool parent partnering with a local Agricultural Education teacher	% Agree	57.1% (n = 44)	72.5% (n = 74)	80% (n = 52)	71.4% (n = 190)
A SAE by a homeschool student should be permitted to be supervised by a homeschool parent as long as they follow the approved requirements for SAEs	% Agree	28.6% (n = 22)	53.5%[a] (n = 54)	52.3% (n = 34)	45.3%[b] (n = 120)

Note. Items were measured on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

[a]n = 101.

[b]N = 265.

Three out of four school-based FFA advisors overall agreed that all students participating in FFA should be required to complete a SAE (74.1%, n = 197). Two out of three school-based FFA advisors overall agreed that a SAE should be considered instruction that qualifies a student for FFA membership (66.5%, n = 177). Three out of four school-based FFA advisors agreed that a SAE should only be supervised by a certified Agricultural Education teacher. Nearly three out of four school-based FFA advisors agreed that a SAE by a homeschool student should be permitted to be supervised by a homeschool parent partnering with a local Agricultural Education teacher (71.4%, n = 190). Additionally, a slight majority of advisors from Illinois (53.5%, n = 54) and Minnesota (52.3%, n = 34) agreed that a SAE by a homeschool student should be permitted to be supervised by a homeschool parent as long as they follow the approved requirements for SAEs. A Kruskal-Wallis *H* test revealed a statistically significant difference in agreement among states regarding a SAE by a homeschool student being supervised by a homeschool parent as long as they follow the approved SAE requirements.

Conclusions, Implications & Recommendations

School-based FFA advisors in all three states had positive motivational beliefs regarding homeschool students and their participation in the three integrated components of Agricultural Education. The four dimensions of the specific task-value motivational beliefs informed by EVT (Eccles et al., 1983; Eccles & Wigfield, 1995, 2002; Wigfield & Eccles, 2000) provide additional insight and implications for future research. Attainment value (task relevance) and intrinsic value (task interest) showed the highest mean responses for all three states of school-based FFA advisors, while utility value responses had a lower mean yet was still positive. This implies that school-based FFA advisors may have seen the relevance of and had an interest in providing FFA membership eligibility access to homeschool students, although they may not have seen as much usefulness in that task. Higher attainment and intrinsic values could be due to the raw numbers of homeschoolers being seen as potential program enrollment growth. However, relatively lower utility values may imply that school-based FFA advisors did not know if homeschool families in their area were interested in Agricultural Education program participation and FFA membership or if the quality of homeschool students were high enough to improve their program and chapter.

School-based FFA advisors were open to homeschool student participation models that involve a partnership between home educators and a certified Agricultural Education teacher. Almost half of school-based FFA advisors agreed with the instruction model where a home educator teachers a state-approved curriculum to their child. Although not explicitly defined as a partnership, this could logistically involve a partnership between home educators and local school-based Agricultural Education teachers for record-keeping and assessment purposes. A majority of school-based FFA advisors agreed with the model where homeschool students join a homeschool FFA chapter advised by a certified Agricultural Education teacher and the homeschool student SAE completion model where a home educator partners with a local school-based Agricultural Education teacher. When combined with the positive motivational beliefs, this result implies that school-based FFA advisors may be willing to advise a homeschool FFA chapter. While school-based FFA advisors may be willing to partner with home educators, there were additional models that appear to be acceptable possibilities.

There is evidence that homeschool students are participating in the three components of Agricultural Education through part-time public school enrollment in multiple states (Brown, 2015; Johnson, 2012; Kittle, 2011; Weik, 2015). However, there have not yet been in-depth investigations on an individual FFA advisor-FFA member level. Case studies should be conducted to further study homeschool student participation in these or similar scenarios and explore how these relationships were formed. This information could help other school-based FFA advisors develop similar relationships with the homeschooling community.

While school-based FFA advisors indicated openness towards homeschool student participation models that involve a partnership between a home educator and a certified Agricultural Education teacher, there was also an openness indicated for models that qualified instruction by homeschool parents through common alternative teacher certification pathways (Zirkle, Martin, &

McCaslin, 2007). Alternative certification pathways for career and technical education subjects differ by state, therefore future research should investigate the number of home educators in various states that meet alternative certification requirements. If there is a significant segment of the homeschool parent population that could pursue alternative certification in Agricultural Education, this could be marketed as a potential non-traditional model for homeschool student participation.

A final recommendation for future research is the feasibility of various non-traditional models of homeschool student participation in Agricultural Education. More specifically, online curriculum was an agreeable model of classroom instruction for the majority of school-based FFA advisors. The Nelson Academy of Agricultural Sciences Online (2017) in Montana has been discussed previously as a possible source of online instruction (e.g., Shipman, 2016a, 2016b), but future research should investigate the sources of concerns regarding online curricula, which could include the policy logistics of reciprocal teacher certification across state lines.

Overall, results showed that on average the most acceptable model of Agricultural Education program participation and FFA membership for homeschool students to school-based FFA advisors in Indiana, Illinois, and Minnesota is part-time public school enrollment, membership in the school FFA chapter, and completion of an SAE that is directly supervised by the local school-based Agricultural Education teacher. This aligns with participation models currently observed where part-time public school enrollment is legal and there is no existing separate option for homeschool Agricultural Education programs and FFA chapters as exist in Alaska and North Carolina (Johnson, 2012; Massey, 2015; North Carolina FFA Association, 2016; Weik, 2015). However, there appeared to be an openness to non-traditional participation models, including those that include a partnership between home educators and school-based Agricultural Education teachers. Although the results implied that school-based FFA advisors placed value on providing access to FFA membership for homeschool students, more stakeholders must be involved in any change process. School-based FFA advisors must be willing to work with homeschool students in order for any participation model to be successful. Additionally, future research should investigate the attitudes and motivations of homeschool parents in these and other states. This and additional future research regarding potential homeschool student participation models would give the Agricultural Education community a better insight as to the best course of action moving forward with pursuing the National FFA Organization goal of expanding access to Agricultural Education programs and FFA membership eligibility.

References

Bailey, J. W. (1979, February). The FFA-an integral part of vocational agriculture. *The Agricultural Education Magazine*, *51*(8), 171–177.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, *13*(4), 544–559.

Brown, M. (2015, November 18). Local students shine at FFA convention. *Tri-City Times*. Retrieved from http://www.tricitytimes-online.com/Articles-News-i-2015-11-18-222056.112113-Local-students-shine-at-FFA-Convention.html

Choi, J., Fiszdon, J. M., & Medalia, A. (2010). Expectancy-value theory in persistence of learning effects in schizophrenia: Role of task value and perceived competency. *Schizophrenia Bulletin*, *36*(5), 957–965. https://doi.org/10.1093/schbul/sbq078

Cogdill, K., & Reneau, F. W. (1986). Guidelines for Illinois superior FFA chapters as perceived by successful superior chapter advisors. *Journal of the American Association of Teacher Educators in Agriculture*, *27*(3), 40–45. https://doi.org/10.5032/jaatea.1986.03040

Conroy, C. A., & Kelsey, K. D. (2000). Teacher education response to reinventing agricultural education for the year 2020: Use of concept mapping to plan for change. *Journal of Agricultural Education*, *41*(1), 8–17.

Crawford, P., Lang, S., Fink, W., Dalton, R., & Fielitz, L. (2011). *Comparative analysis of soft skills: What is important for new graduates?* Washington, DC: Association of Public and Land-grant Universities. Retrieved from https://ag.purdue.edu/oap/career/Documents/2012%20Soft%20Skills%20Survey%202011%20Crawford%20Lang%20Fink%20Dalton%20Fielitz.pdf

Crutchfield, N. R. (Ed.). (2013). National research priority interests: National FFA Organization's research priority areas for 2013-2018. Indianapolis, Indiana: National FFA Organization, Partner Services Division. Retrieved from https://www.ffa.org/SiteCollectionDocuments/about_nffa_research_agenda.pdf

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: Wiley & Sons.

Eccles, J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 75–146). San Francisco, CA: W.H. Freeman.

Eccles, J. S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin*, *21*(3), 215–225.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, *53*(1), 109–132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Feather, N. T. (1988). From values to actions: Recent applications of the expectancy-value model. *Australian Journal of Psychology*, *40*(2), 105–124. https://doi.org/10.1080/00049538808259076

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.).

Flake, J. K., Barron, K. E., Hulleman, C., McCoach, B. D., & Welsh, M. E. (2015). Measuring cost: The forgotten component of expectancy-value theory. *Contemporary Educational Psychology*, *41*, 232–244. https://doi.org/10.1016/j.cedpsych.2015.03.002

Frick, M., & Brennan, J. (1998, June). Agricultural education opportunities with home schoolers. *The Agricultural Education Magazine*, *70*(6), 6–7.

Gray, T. A. (1998). *Public school perceptions of home schooled children* (Unpublished doctoral dissertation). Northern Arizona University.

Hendrix, K. M. (2003). *Home school education in Mississippi as perceived by public school district superintendents* (Unpublished doctoral dissertation). The University of Mississippi.

Henry, K. A., Talbert, B. A., & Morris, P. V. (2014). Agricultural education in an urban charter school: Perspectives and challenges. *Journal of Agricultural Education*, *55*(3), 89–102. https://doi.org/10.5032/jae.2014.03089

Hoover, T. S., Scholl, J. F., Dunigan, A. H., & Mamontova, N. (2007). A historical review of leadership development in the FFA and 4-H. *Journal of Agricultural Education*, *48*(3), 100–110. https://doi.org/10.5032/jae.2007.03100

Isenberg, E. J. (2017). Using survey data sets to study homeschooling. In M. Gaither (Ed.), *The Wiley handbook of home education* (1st ed., pp. 32–58). John Wiley & Sons.

Job Outlook 2014. (2013, November). Retrieved from http://career.sa.ucsb.edu/files/docs/handouts/job-outlook-2014.pdf

Johnson, A. (2012, January 23). Students thrive in United South Central FFA program. *Minnesota Farm Guide*. Retrieved from http://www.minnesotafarmguide.com/news/regional/students-thrive-in-united-south-central-ffa-program/article_a091d192-4550-11e1-9614-001871e3ce6c.html

Jones, A. J. (2011). *Motivational factors related to youth performance in a horticultural career development event* (Unpublished master's thesis). Purdue University.

Kararo, M. J. & Knobloch, N. A. (2016, October). *State FFA constitution membership language regarding private and homeschool students.* Paper presented at the North Central American Association for Agricultural Education conference, West Lafayette, IN.

Kararo, M. J. & Knobloch, N. A. (2017, May). *State FFA leaders' attitude towards and motivation to provide FFA membership access for homeschool students.* Paper presented at the national annual American Association for Agricultural Education meeting, San Luis Obispo, CA.

Kittle, C. (2011, November 21). Agriculture losing state support, but Alvirne program fights to continue education. *The Nashua Telegraph*. Retrieved from http://www.nashuatelegraph.com/news/940798-196/agriculture-losing-state-support-but-alvirne-program.html

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (4th ed., pp. 97–128). Thousand Oaks, CA: Sage Publications.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, *42*(4), 43–53. https://doi.org/10.5032/jae.2001.04043

Martin, A. J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research*, *79*(1), 327–365. https://doi.org/10.3102/0034654308325583

Martin, M. J., & Kitchel, T. (2014). Barriers to participation in the National FFA according to urban agriculture students. *Journal of Agricultural Education*, *55*(1), 120–133.

Massey, J. (2015, July 6). FFA program still tiny in big Alaska. *The Country Today*.

McGraw, R. K. (1989). *Selected aspects of home-schooling as reported by home-schooling parents and reported with perceptions of Indiana public school superintendents and principals of home-schooling in Indiana* (Unpublished doctoral dissertation). Ball State University.

Nelson Academy of Agricultural Sciences Online. (2017). Retrieved from http://allagonline.com/

Newcomb, L. H., McCracken, J. D., Warmbrod, J. R., & Whittington, M. S. (2004). *Methods of teaching agriculture*. Upper Saddle River, NJ: Pearson/Prentice Hall.

North Carolina FFA Association. (2016). Retrieved from https://ncffa.org/about-us/teachers-directory/

Phipps, L. J., & Osborne, E. W. (1988). *Handbook on agricultural education in public schools* (5th ed.). Danville, IL: Interstate.

Powell, D., Agnew, D., & Trexler, C. (2008). Agricultural literacy: Clarifying a vision for practical application. *Journal of Agricultural Education*, *49*(1), 85–98. https://doi.org/10.5032/jae.2008.01085

Redford, J., Battle, D., & Bielick, S. (2016). *Homeschooling in the United States: 2012* (NCES 2016-096). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, D.C.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds.). (2016). *American Association for Agricultural Education national research agenda: 2016-2020*. Gainsville, FL: Department of Agricultural Education and Communication.

Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications*. Upper Saddle River, NJ: Pearson/Merrill Prentice Hall.

Shepperd, J. A., & Taylor, K. M. (1999). Social loafing and expectancy-value theory. *Personality and Social Psychology Bulletin*, *25*(9), 1147–1158. https://doi.org/10.1177/01461672992512008

Shipman, K. (2016a, September 27). Illinois high school keeping ag ed alive online. *FarmWeekNow.Com*. Retrieved from http://farmweeknow.com/story-illinois-high-school-keeping-ag-ed-alive-online-0-147092

Shipman, K. (2016b, October 6). Demand, need growing online high school ag classes. *FarmWeekNow.Com*. Retrieved from http://farmweeknow.com/story-demand-need-growing-online-high-school-ag-classes-1-147593

Snyder, T. D., de Brey, C., & Dillow, S. A. (2016). *Digest of education statistics 2015* (NCES 2016-014). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Retrieved from https://nces.ed.gov/pubs2016/2016014.pdf

Stephenson, T. J., Mayes, L., Combs, E. M., & Webber, K. (2015). Developing communication skills of undergraduate students through innovative teaching approaches. *NACTA Journal*, *59*(4), 313–318.

Thomson, M. M., & Kaufmann, E. (2013). Elementary teachers' views of their science professional development attendance: An expectancy-value approach. *Eurasia Journal of Mathematics, Science & Technology Education*, *9*(1), 45–58.

Trautwein, U., Marsh, H. W., Nagengast, B., Lüdtke, O., Nagy, G., & Jonkmann, K. (2012). Probing for the multiplicative term in modern expectancy-value theory: A latent interaction modeling study. *Journal of Educational Psychology*, *104*(3), 763–777. https://doi.org/10.1037/a0027470

Walls, J., Flowers, J., & Moore, G. (2001). North Carolina home school providers' perceptions of agricultural education. In H. N. Boone Jr. (Ed.), *Annual AAAE Eastern Regional Research Conference* (Vol. 55, pp. 459–470). Baltimore, MD. Retrieved from http://files.eric.ed.gov/fulltext/ED463435.pdf

Weik, T. (2015, March 24). Homeschoolers may be able to create FFA chapter. *The Courier-Times*. Retrieved from http://www.thecouriertimes.com/news/article_ec9207cc-d25d-11e4-a57c-63c05467b2aa.html

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25*(1), 68–81. https://doi.org/10.1006/ceps.1999.1015

Zirkle, C., Martin, L., & McCaslin, N. L. (2007). *Study of state certification/licensure requirements for secondary career and technical education teachers*. National Research Center for Career and Technical Education, University of Minnesota.

School-based FFA Advisors' Attitudes and Motivation to Provide FFA Membership Access for Homeschool Students

Discussant Remarks

Homeschool students are a growing in number. A study of this nature is an important contribution to the knowledge base of school-based agricultural education advisors.

The authors did a good job of identifying relevant literature that sets the stage for the study. I am intrigued by the literature featuring homeschool students, we are seeing more and more homeschooled students at the university level. The literature review reflects an appropriate spectrum of literature found in agricultural education featuring work completed in 1998 to 2017.

The effort to expand the scope of the study to include three Mid-western states is commendable and strengthens the study.

The theoretical framework is spot on for this study. The investigation of advisors motivational beliefs regarding homeschooled students is a great lens for this work. The effort to visually represent the contextualized value components is a great, "value-add" to the study.

The methods section is readable and concise, future researchers will be able to replicate the study efficiently. I am intrigued by the notion regarding "Click" rate vs. completion rate. I am interested to learn more about this measure. The description of the population along with the description of the analysis was well done.

Results were displayed in a clean, concise manner. The authors did a nice job of efficiently blending a narrative while displaying the results.

The authors crafted appropriate conclusions and complemented them with recommendations that were within the scope of the study.

Questions:

Beyond program growth, did advisors report other "value" to integrating homeschool students into programs?

Should pre-service teachers be introduced to models that include homeschoolers'?

The Influence of Extracurricular Involvement on High School Students' Academic Achievement and Engagement in School

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Abstract

The purpose of this study was to examine the relationship between specific extracurricular activities and the outcomes of student achievement and student engagement. The target population was 11th -12th grade student enrolled in high schools purposely selected for having FFA. Total study participants included 237 (N) student from a purposive sample. Participants completed an instrument that combined the Student Engagement Instrument (Appleton, Christenson, Kim, & Reschly, 2006), the Student Engagement versus Disaffection: Student Report (Skinner, Kindermann, & Furrer, 2009), and self-reported extracurricular involvement and Grade Point Average(s) GPAs and ACT scores. The results of the study indicate that students who participated in Career and Technical Student Organizations (CTSOs) have practically the same self-reported engagement and achievement as students who participated in non-CTSO activities.

Introduction

Most American schools have a trophy case full of plaques, trophies, and awards proclaiming the sporting and academic accomplishments past students have achieved. There is no doubt those students must have devoted considerable time and energy to earn those recognitions. The key here is that these honors are for school-sponsored student work done outside the classroom, i.e., they are extracurricular. Currently, this paradigm of student engagement through extracurricular activities is under assault from the need to teach to test-driven standards and from diminishing budgets. While these constraints are both real and ongoing, the effect of removing these popular avenues on student learning engagement inside the classroom is only now being explored.

Extracurricular activities are defined as activities, either school or community sponsored, that students can be part of outside of the regular school day (Eccles, Barber, Stone, & Hunt, 2003). However, while the student must take the time to participate in these activities outside of the regular school day, the activity may be directly related to a class in which the student is currently enrolled (Eccles, Barber, Stone, & Hunt, 2003). For example, the student may be enrolled in band as a class; however, the student would need to also participate in an activity outside of the normal school day such as marching band, jazz band, or pep band for the activity to be extracurricular activity. These activities that have a direct relationship to classroom content are thought to be intracurricular activities (Johnson, 1991; Ricketts, Duncan, & Peake, 2006; Wingebach & Kahler, 1997). While research has shown that extracurricular activities have a positive effect on student engagement and achievement, the research is less clear when extracurricular and intracurriclar activities are being compared to one another (Eccles, Barber, Stone, & Hunt, 2003; Farb & Matjasko, 2012; Fredricks, 2012).

A sector of intracurriclar activities that has largely been ignored by researchers examining extracurricular activities and student engagement and achievement is Career and Technical Student Organization(s) (CTSOs) (Dare, 2006; Plank, DeLuca, & Estacion, 2008). CTSOs are intracurricular organizations that are directly related to course content in Career and Technical

Education (CTE). A CTSO that is of interest in this study is the National FFA Organization. The National FFA Organization has cited this lack of data in FFA engagement and academic performance as a potential problem and has made the issue a priority area of interest in research (Crutchfield, 2013). Having research to support the National FFA Organization's quest in student success as stated in its mission statement would help the organization's decision-making process to ensure the mission is becoming a reality for its members (Crutchfield, 2013).

Review of Literature

Engagement

Student engagement is a measure of how invested a student is in his or her learning (Axelson, 2010) behaviorally, emotionally, and cognitively (Fredricks, Blumenfeld, & Paris, 2004). These facets, although separated categorically, represent different layers of the learning process, and thus each facet is needed for a student to achieve what could be considered model student engagement (Jimerson, Campos, & Greif, 2003; Klem & Connell, 2004; Skinner, Furrer, Marchand, & Kindermann, 2008). However, the student's engagement is also influenced by internal factors, such as motivation (Barkley, 2010), and external factors, such as socioeconomic status, cultural background (Newman, 1991), gender (Thijs & Verkuyten, 2009), and grade level (Marks, 2000). While motivation's internal influence primes students for engagement (Ryan & Deci, 2000) the most important external factor for engagement is the teacher because he or she is responsible for ensuring that the classroom environment fosters student engagement (Klem & Connell 2004). When the teacher is successful in developing an engaging learning environment, this environment fosters student success (Klem & Connell, 2004).

Another important influence on student engagement in the classroom is the way in which students spend their time outside of the classroom. Extracurricular involvement has been found to foster student success because students who participate in extracurricular activities have higher student achievement and engagement in school than students who do not participate in extracurricular activities (Eccles & Barber, 1999; Eccles, Barber, Stone, & Hunt, 2003; Kronholz, 2012; Lipscomb, 2007; Massoni, 2011). For example, extracurricular activities help advance soft skill development such as "leadership, teamwork, problem solving, and time management" as well as contribute to higher academic achievement (Massoni, 2011, p. 86). In addition, the skills and behaviors learned in extracurricular activities can be positively correlated to student achievement, as measured by grade point average, because extracurricular activities prime students for engagement in school (Eccles & Barber, 1999; Eccles, Barber, Stone, & Hunt, 2003). Furthermore, extracurricular involvement increases student motivation to attend and succeed in school partly due to positive peer pressure from other students in those extracurricular activities (Reeves, 2008). When students are part of a team, the fear of disappointing their peers has more weight than disappointing an adult (Reeves, 2008). For example, a student may find that being assigned to after-school detention a bit amusing because ultimately, the teacher has to give up his or her time to watch the student. However, if that same student is assigned to after-school detention, and it interferes with a sports practice, the student is now affecting his or her teammates' practice and potentially the success of the team. The student's fear of being chastised or ostracized and affecting the student's social standing among peers is the source of motivation for the student to refrain from receiving after-school detention, not the actual act of receiving detention. Extracurricular activities dependence on teamwork and peer accountability ultimately help keep the students accountable for their actions and decisions within the classroom which can ultimately lead to their engagement and achievement in school.

Extracurricular Activity

Extracurricular activities include a plethora of choices that students can participate in beyond the immediate school hours (Eccles & Barber, 1999; North Dakota Department of Career and Technical Education, 2016; North Dakota High School Activities Association, 2016). Benefits of student participation in extracurricular activities include physical and mental health, character development, and a larger social network of peers and adults as compared to students who do not participate in extracurricular activities (Eccles, Barber, Stone, & Hunt, 2003; Massoni, 2011).

In addition, extracurricular activities are not housed solely within the school system. Churches, community centers, and other organizations that are not tied directly to the school can sponsor extracurricular activities. However, researchers should not be concerned with where the activities are housed because, as Eccles and colleagues found (1999; 2003), academic success is consistent in both school- and community-related extracurricular activities, as well as in the categories within these two venues, such as team sports, service organizations, performing arts, and academic clubs (Eccles & Barber, 1999; Eccles, Barber, Stone, & Hunt, 2003). In addition, the type of activity is not the only influence on how extracurricular activities impact engagement outcomes. The "breadth" (meaning number of activities) and "intensity" (meaning number of hours spent in the activity weekly) of extracurricular activities affect the degree of influence extracurricular involvement has on achievement and engagement (Farb & Matjasko, 2012, p. 5). This is because a greater time commitment is required of the participants in the extracurricular activity that has "breadth" and/or "intensity" as compared to those extracurricular activities that do not (Farb & Matjasko, 2012, p. 5). However, research is still unclear on what specific characteristics or components of extracurricular activities lead to student engagement and student achievement (Eccles, Barber, Stone, & Hunt, 2003; Farb & Matjasko, 2012; Fredricks, 2012).

Extracurricular Activities and Engagement Research in the FFA

An extracurricular activity of particular interest for this study is the student National FFA Organization, a Career and Technical Student Organization (CTSO) that focuses on agriculture. However, it is important to note that FFA is also considered intracurricular because it is directly associated with agricultural education classes. Students who participate in FFA develop leadership skills, life skills, job skills, and content knowledge related to other school subjects (Johnson, 1991; Ricketts, Duncan, & Peake, 2006; Wingebach & Kahler, 1997). Student involvement in FFA fulfills some basic human needs associated with Maslow's Hierarchy of Needs such as self-confidence and self-esteem (Rose et al., 2016). Students who actively participated in FFA reported that involvement in the organization gave them the feeling of being accepted into a group, provided meaningful experiences such as public speaking that boosted their self-confidence, and allowed them to explore possible areas of interest that could influence their future career decisions(Rose et al., 2016). The National FFA Organization strives to provide students with opportunities that will benefit the student in the future (National FFA Organization, 2017).

These research findings align with the National FFA's goal for their students, which are found in the FFA Code of Ethics. The FFA Code of Ethics states that students will "develop [their] potential for leadership, personal growth, and career success;" "communicate in an appropriate, purposeful and positive manner;" and "strive to establish and enhance my skills through agricultural education in order to enter a successful career" (National FFA Organization, 2017, p. 26). Indeed, agricultural education advocates often point to the National FFA Organization as the source of their students' successes (e.g., FFA Mission, National FFA Organization, 2017, p. 7). However, although the FFA and its advocates claim a positive relationship between FFA involvement and subsequent student success, the reality is that little empirical evidence exists that specifically links student engagement or academic success to student involvement in the National FFA Organization. Because previous research reports the positive relationship of extracurricular activities to positive student engagement (Eccles, Barber, Stone, & Hunt, 2003; Fredricks, 2012) and because of these claims to this positive relationship by the FFA, this lack of empirical data needs to be addressed.

Theoretical Framework

This study utilized the Expectancy-Value Theory (Wigfield & Eccles, 2000). Expectancy-Value Theory indicates that past experiences and perceptions drive people's motivation to perform certain tasks and not others. This drive ultimately leads to the individual having success in a specific area, which then further motivates the individual to continue to strive to achieve more with that particular area. For example, perhaps a student has high expectancy-value for his or her ability to read. This value may have first been instilled in the child by the parent reading to the child at a young age. By reading to the child, the parent is setting the example that reading is important. Perhaps the parent reads the child a bedtime story every night before bed. This routine becomes a fond memory for the child as a way to spend valuable time with the parent (affective memory). The more the parent reads to the child, the more the child values reading. Eventually the child begins to read on his or her own. As the child advances in his or her ability to read, the child expects to be successful at reading harder material. Successfully reading difficult material continues to increase the child's expectation for reading. As the child continues to read, he or she also develops a stronger love for reading, and becomes somewhat of a bookworm. At this point, the child would have a high expectancy value for reading.

Expectancy-Value Theory (Wigfield & Eccles, 2000) provides insight into the relationship between student participation in extracurricular activities and engagement and achievement in school. Within the present study, the researcher is interested whether or not long-term engagement and achievement in school is affected by extracurricular activities. The researchers propose that different types of activities provide different levels of either value or expectancy in school because of the difference in connection to classroom material. For instance, sports have relatively no direct connection to classroom material, band and choir can connect directly to those classes (band and choir) and some humanity type classes, and Career and Technical Student Organization(s) (CTSOs) can connect to science, math, humanities, Career and Technical (CTE), and even some areas in the humanities such as public speaking. Using the Expectancy-Value model of achievement, "goals and self-schemata, subjective task value, and expectation of success" are the focus of this study (Wigfield & Eccles, 2000, p.69).

Purpose and Objectives

The purpose of this study was to examine the relationship between specific extracurricular activities and the outcomes of student achievement and student engagement. The following research objectives guided this study:

1. Describe student involvement in extracurricular activities at selected schools

2. Describe student emotional, behavioral, and cognitive engagement at the selected schools

3. Compare student self-reported achievement and engagement scores between students involved in Career and Technical Student Organization (CTSO) extracurricular activities and other groups of extracurricular activities.

Methods

This study examined the relationship between the dependent variables of achievement and engagement and independent variable of student extracurricular involvement using the lens of the expectancy-value theory (Wigfield & Eccles, 2000). Student engagement was informed by the work of Appleton, Christenson, Kim, and Reschly (2006) and their Student Engagement Instrument (SEI) as well as through Skinner, Kinderman, and Furrer (2009) and their Engagement vs. Disaffection with Learning: Student-report Instrument. Student engagement is examined through the constructs of behavioral engagement, emotional engagement, and cognitive engagement. The Student Engagement Instrument examined the constructs of emotional engagement and cognitive engagement while the Engagement vs. Disaffection with Learning: Student-report instrument examined emotional and behavioral engagement. Although both instruments included emotional engagement, it was retained in the Engagement versus Disaffection instrument, but excluded from the SEI. The researcher chose not to merge and average due to slightly different scales. Student achievement is measured by the students' self-reported overall grade point average(s) (GPAs) and highest self-reported ACT scores. Students were asked to self-report both of these scores in the demographic portion of the instrument; however, the researcher were not able to verify the accuracy of the self-reported scores.

For the independent variable of student extracurricular involvement, students were asked to self-report activities outside of the regular school day that they devoted at least 20 hours within the past year by placing an "X" next to those activities from the master list. Participants were able to include those activities not included in the master list by writing them on the line provided as "other". This list is compiled by activities recognized by the North Dakota High School Activities Association as well as the North Dakota Career and Technical Education student organizations. The only extracurricular activity that was included in the master list that is not school sponsored was 4-H. While students were able to include other outside activity on the space provided, it is reasonable to assume that other outside activities were possibly overlooked because they were not included in the master list.

Because this was an exploratory study, the researchers opted to utilize a survey design that asked participants to complete a paper questionnaire to gain participants' perceptions of their extracurricular activities, engagement, and academic success. This questionnaire compiled previous instruments, all of which use a four-point Likert-scale, to examine each construct of engagement.

Instrumentation

The Student Engagement Instrument (SEI) was first developed by Appleton & Christenson (2004) in an unpublished manuscript, which was then adopted by Appleton, Christenson, Kim, and Reschly (2006). This study utilized the four factor model as reported by Appleton et al. (2006) in order to reduce total number of items while retaining reliability. The four factor model includes 14 cognitive engagement items (control and relevance of school work and future aspirations and goals) and 15 emotional engagement items (teacher-student relationships and peer support for learning). The reliability coefficient of this instrument is as follows: Teacher-Student Relationships $r\alpha= 0.80$, Control and Relevance of School Work $r\alpha= 0.80$, Peer Support for Learning $r\alpha= 0.82$, and Future

Aspirations and Goals rα= 0.78. This instrument utilizes a 4-point Likert-type scale ranging from 1 (strongly disagree) to 4 (strongly agree).

For the Engagement vs. Disaffection with Learning: student report developed by Skinner, Kindermann, and Furrer (2009), we utilized the five behavioral engagement items and five behavioral disaffection items and report the mean, as well as the five emotional engagement items and the twelve emotional disaffection and reported the mean. This instrument utilizes a 4-point Likert-type scale ranging from 1 (not at all true) to 4 (very true). The reliability coefficient was reported as follows: Behavioral Engagement rα= 0.71, Behavioral Disaffection rα= 0.65, Emotional Engagement rα= 0.83, and Emotional Disaffection rα= 0.84.

Subject Selection

The participants for this research project are 16 to 19-year-old high school students in their junior or senior year that resided in North Dakota. Only junior and senior students were asked to participate because the researchers believed that most students would only be involved in the extracurricular activities they truly enjoyed and no longer participate in activities they did not enjoy. The sample selected is a sample of convenience because schools more than four hours away from the land grant university were not asked to participate (Vogt & Johnson, 2011). The study is also a purposive sample because the researchers selected the sites based on the criteria of school population size, established FFA program with a certified agricultural teacher for the last three years, and "Class B" school because the researchers believe these criteria were important for the validity of this study (Vogt & Johnson, 2011). Class B is a classification given by the North Dakota Athletic Association to help sort schools so that similar sized schools play each other. Currently, these school's enrollment is 324 or fewer students. These selection criteria were used to ensure a variety of extracurricular activities were available to be sampled, to ensure selection of a variable of interest were included, and because this is considered the normal school size for this state. In the three schools selected, the parents were sent a letter which asked them to contact the school if they wish that their child not participate. All juniors and seniors within the selected high schools who consented to participation within the selected schools are included in this study. Among the three schools selected, 237 students were asked to participate.

Data Collection

The Student Engagement Instrument (SEI), Student-report Instrument, and demographic questions were combined into one instrument entitled Student Engagement and Success and was administered to all secondary junior and senior students that attend the selected schools. The North Dakota State University Institutional Review Board (IRB) reviewed the study, and upon approval, data collection began in May at each school. After IRB approval was obtained, of the six schools that were asked to participate, only three school administrators agreed to participate in the study.

Active parental consent was not sought; however, with administration help, letters were sent to the students' parents to inform them of the study and allowed the parents to opt their child out of the study. Participants were also provided the opportunity to opt out of the study the day of the instrument administration The data was collected at each school during the spring 2017 semester. Among the three schools selected, 237 students were asked to participate. The data was analyzed using the SPSS software and included means, and standard deviations, as well as t-tests.

Findings

From the three research sites, 191(*n*) students completed the survey from the available sample of 237 students, and a total of four surveys were excluded from the results of the study due to completion errors or response set. Non-response error was not calculated or considered in accordance with the design of the study. Therefore, the results of this study are not generalizable beyond the sample discussed herein.

The sample consisted of 49.70% juniors (*n* = 95) and 43.50% seniors (*n* = 83), and 49.70% males (*n* = 88), 47.50% females (*n* = 84), and 2.8% other *n* = 5). Among the students who reported having FFA membership at some point in time, the largest category for years in FFA was 5 years (*n* = 27, 14.10%), followed by four years (*n* = 24, 12.60%), and three years (n = 23, 12.00%). Those reporting FFA membership, most reported participating in Career Development Events (CDE) on a state level (46.10%, *n* = 41), followed by never (32.60%, *n* = 32.6), and chapter (7.90%, *n* = 7). Those reporting FFA membership, most of the sample's highest FFA degree obtained was the Chapter Degree (45.30%, *n* = 34), followed by Greenhand Degree (28.0%, *n* = 21), and State Degree (25.30%, *n* = 19).

Research Objective One

Research objective one was to describe student involvement in extracurricular activities. The extracurricular activities were condensed into different categories for the purposes of analysis (Table 1). The three categories with the most participants were one CTSO (*n* = 82, 42.90%), multiple sports (*n* = 73, 38.20%),and FFA (37.70%, *n* = 72). However, it is important to note that these categories are not mutually exclusive; therefore, some participants fell in multiple extracurricular activity categories.

Table 1
Student Involvement in Extracurricular Activities

Extracurricular Activity Category	***n***	**%**
One Sport	43	22.50
Multiple Sports	73	28.20
One CTSO	82	42.90
Multiple CTSO	8	4.20
FFA	72	37.70
4-H	17	8.90
School Academic Clubs	58	30.40
The Arts	49	25.70
Other	16	8.40
Sports Statistician	11	5.80
Rodeo	2	1.00
No Involvement Indicated	26	13.60

Research Objective Two

Research objective two was to describe student emotional, behavioral, and cognitive engagement (Table 2). Respondents reported emotional engagement as the lowest (*M* = 2.63, *SD* = 0.59), cognitive engagement (*M*= 2.75, SD = 0.52) next, and the highest being behavioral engagement (*M*= 3.02, *SD* = 0.51) for the entire sample (*n* = 186).

Table 2
Student Engagement Levels (n=186)

			Range	
Variable	***M***	***SD***	**Min**	**Max**
Cognitive	2.75	0.52	1.00	4.00
Emotional	2.63	0.59	1.00	3.80
Behavioral	3.02	0.51	1.00	4.00

Note. The emotional and behavioral constructs used a four-point Likert scale (1= not at all true, 2= not very true, 3= sort of true, 4= very true). Cognitive engagement used a different four-point Likert scale (1= strongly disagree, 2= disagree, 3 = agree, 4= strongly agree).

Research Objective Three

Research objective three was to compare student self-reported achievement and engagement scores between students involved in CTSO extracurricular activities and other groups of extracurricular activities (Table 3). Using Levene's test for equality of variances, equal variances were assumed because the 2-tailed significance test indicated a normal distribution ($p > 0.05$). Students who did not indicate involvement in a CTSO activity reported slightly higher GPA scores (M= 3.33, SE= 0.49) than students who reported involvement in a CTSO activity (M= 3.29, SE= 0.65). This difference was not significant n $t(164) = 0.36$, $p> 0.05$. However, students who reported involvement in a CTSO activity reported higher ACT scores (M= 22.17, SE= 4.03) than students who did not report involvement in a CTSO activity (M= 21.84, SE= 0.40). This difference was not significant $t(157) = -0.51$, $p> 0.05$.

Table 3
Comparison Between CTSO And non-CTSO Achievement Scores

	N	**M**	**SD**	**SE**	**T**	**df**	**Sig. (2-tailed)**
GPA					0.36	164.00	0.72
CTSO	87	3.29	0.65				
No CTSO	79	3.33	0.49				
ACT					-0.51	157.00	0.61
CTSO	85	22.17	4.03				
No CTSO	74	21.84	3.99				

Students who did not indicate participation in a CTSO activity reported higher emotional (*M*= 2.64, SD= 0.58), behavioral (*M*= 3.05, SD= 0.55), and cognitive engagement (*M*= 2.76, SD= 0.54) than students who did indicate participation in a CTSO activity (emotional *M*= 2.62, SD= 0.61; behavioral *M*= 2.99, SD= 0.46; and cognitive *M*= 2.75, SD= 0.49). However, according to the independent samples *t*- test, the practical differences in the groups' were not statistically significant ($p > 0.05$) for all constructs (Table 4). Therefore, within the present sample, students were equally engaged in school no matter the type of activity they were involved.

Table 4
Perceived Engagement for Students With and Without Participation in CTSO Activity

	n	**M**	**SD**	**SE**	**t**	**Df**	**Sig. (2.tailed)**
Emotional					0.21	184	0.83
CTSO	89	2.62	0.61				
No CTSO	97	2.64	0.58				
Behavioral					0.79	184	0.43
CTSO	89	2.99	0.46				
No CTSO	97	3.05	0.55				
Cognitive					0.09	186	0.93
CTSO	90	2.75	0.49				
No CTSO	98	2.76	0.54				

Conclusions

Although the results were not statistically significant and the limitations of the study only apply to the time period and population utilized in this study, the findings are still relevant within Career and Technical Education (CTE) and CTSOs. For this sample, CTSO participation produced similar engagement and achievement results as participation in non-CTSO activities within these high school systems. Therefore, students from these schools should not be discouraged from participating in CTSO activities for fear of lack of student engagement or achievement. Though the results are not generalizable across the population of high school students, they highlight a difference between a larger percentage of students who participate in multiple sports versus a small percentage of students who participate in multiple CTSO activities. A larger number of the respondents who indicated participation in sports reported participation in multiple sports (n = 73, 62.93% of sports participation); however, very few of the students who indicated participation in a CTSO activity, reported participation in multiple CTSO activities (n = 8, 8.88% of CTSO participation). This difference could be attributed to the smaller number of CTSO activities available to students. However, 70% of the students who indicated involvement in a CTSO activity also indicated being involved in a sport (n = 63). This is interesting because it sheds light on the amount of overlap between extracurricular involvement. Small schools lack the student numbers that larger school have, and consequently, depend on student involvement in multiple areas in order to compete in the various extracurricular activities. Had this study included larger schools, perhaps the students would not have been involved in as many extracurricular activities.

Another possible reason for the discrepancy in the number of students reporting involvement in sports and the number of CTSO activities is the intracurriular relationship with agricultural education classes. The researchers noticed some discrepancies in the data caused the researchers to question whether or not students reported their extracurricular involvement as outlined in the study protocol. Some participants indicated involvement in FFA, but did not indicate participation in any Career Development Events (CDE), completion of an FFA degree, or immersion in a Supervised Agricultural Education Experience (SAE). While there are other aspects of FFA that students could have participated in that were not included in the survey (chapter meetings, community service, and fundraising), this discrepancy raises the question as to how many hours these students actually participated in FFA activities and the relevance of that participation to this research. However, if participants did indeed associate learning activities in the agricultural education classroom as hours spent in the extracurricular activity FFA, this would result in an unfair comparison in engagement and achievement between activities that truly require the student to willingly participate in the extra activity outside of the normal school day and activities required by a class that is dictated by the teacher. Because research has already shown that involvement in extracurricular activities (which is defined as activities outside of the regular school day) is positively correlated to student engagement (Eccles & Barber, 1999; Eccles, Barber, Stone, & Hunt, 2003; Kronholz, 2012; Lipscomb, 2007; Massoni, 2011), theoretically, including students who are not involved in an extracurricular activity outside of the regular school day would lower the engagement level for that type of activity. Furthermore, if the sampling procedure was not consistently identifying the students who valued the extracurricular activity, the data is not going to fit as anticipated into the theoretical framework using expectancy-value theory. This could potentially skew the results and lower the overall engagement score for that particular type of activity.

When examining Expectancy-Value Theory's role in extracurricular activities, the intracurricular relationship between CTSOs and the classroom had little effect on the students' engagement and achievement. It seems more rational that students select extracurricular activities based on their interest, and how students identify themselves and the availability of an extracurricular activity that is similar to this interest or identification. Therefore, a marginal level of difference of engagement and achievement between the two types of extracurricular activities (CTSO and non-CTSO) were found. While it does not completely fit for CTSO, it did demonstrate for the broader group that participation in extracurricular activities showed a difference. Nevertheless, this research does highlight the impact that all extracurricular activities can have for the students that participate in them.

Recommendations

We recommend that future research look at how students decide which extracurricular activities to participate in. Because the results were not statistically different, both CTSO and non-CTSO activities are beneficial for student engagement and achievement, but the balance of the types of activities offered do not reflect these findings. While there are a number of reasons this discrepancy could be occurring, such as fewer CTSO organizations, the amount of activities is important because it shows where the school system's priorities exist. Although schools may not be telling students the only extracurricular activity that is worth their time is sports, the amount of resources and time that are spent on sports alone demonstrates the schools' priorities. More information on how students decide which extracurricular activities to participate in could help inform research why there was such a difference in the number of students who participated in sports versus those who participated in CTSOs.

We also recommend that future research be conducted that further sets apart positive attributes acquired by students from participating in different types of extracurricular activities because it could help improve the educational outcomes for students. While this study focused on student engagement and achievement, research on other outcomes such as interpersonal skills, or teamwork would give a clearer picture of extracurricular activities that provide meaningful experiences to their students. Setting apart student outcomes in the different types of extracurricular activities is valuable because it allows those activities to evaluate whether or not they are accomplishing their goals and would provide examples on how possibly to improve student outcomes. Furthermore, this research would also allow organizations to build on areas of strength and fix areas of weakness so that all extracurricular activities are providing the best possible outcomes for their students. Future research should also look to broaden the scope of the current study so that the results could be generalizable for the entire population.

This research does open the conversation as to what the goals of extracurricular activities are and should be. It also can begin the conversation within the agricultural community as to what can be done to set the National FFA organization apart from other extracurricular activities besides career exploration that has an immediate benefit for students who do not have an interest in agriculture. While it is unrealistic for every student in every school that offers CTSO activities to have 100 percent school membership, this research does beg the question as to what sets FFA or CTSO apart from other extracurricular activities.

References

Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. *Journal of School Psychology, 44*(5), 427-445. doi:10.1016/j.jsp.2006.04.002

Axelson, R. D., & Flick, A. (2010). Defining student engagement. *Change: The Magazine of Higher Learning*, *43*(1), 38-43. doi:10.1080/00091383.2011.533096

Barkley, E. F. (2010). *Student Engagement Techniques: A Handbook for College Faculty*. San Francisco, California: John Wiley & Sons.

Crutchfield, N. R. (2013). National research priority interests: National FFA Organization's research priority areas for 2013-2018. Indianapolis, Indiana: National FFA Organization, Partner Services Division.

Dare, D. E. (2006). The role of career and technical education in facilitating student transitions to postsecondary education. *New Directions for Community Colleges*, *2006*(135), 73-80. doi:10.1002/cc.249

Eccles, J. S., & Barber, B. L. (1999). Student council, volunteering, basketball, or marching band what kind of extracurricular involvement matters?. *Journal of Adolescent Research*, *14*(1), 10-43. doi:10.1177/0743558499141003

Eccles, J. S., Barber, B. L., Stone, M., & Hunt, J. (2003). Extracurricular activities and adolescent development. *Journal of Social Issues*, *59*(4), 865-889. doi:10.1046/j.0022-4537.2003.00095.x

Farb, A. F., & Matjasko, J. L. (2012). Recent advances in research on school-based extracurricular activities and adolescent development. *Developmental Review*, *32*(1), 1-48. doi:10.1016/j.dr.2011.10.001

Fredricks, J. A. (2012). Extracurricular participation and academic outcomes: Testing the over-scheduling hypothesis. *Journal of Youth and Adolescence*, *41*(3), 295-306. doi:10.1007/s10964-011-9704-0

Fredricks, J., Blumenfeld, P., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59-109.

Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *The California School Psychologist*, *8*(1), 7-27.

Johnson, D. M. (1991). Student achievement and factors related to achievement in a state FFA agricultural mechanics contest. *Journal of Agricultural Education*, *32*(3) 23-28. doi: 10.5032/jae.1991.03023

Klem, A. M. & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health*, *74*(7), 262-273. doi:0.1111/j.1746-1561.2004.tb08283.x

Kronholz, J. (2012). Academic value of non-academics: The case for keeping extracurricular. *Education Next*, *12*(1), 8-15.

Lipscomb, S. (2007). Secondary school extracurricular involvement and academic achievement: A fixed effects approach. *Economics of Education Review*, *26*(4), 463-472. doi:10.1016/j.econedurev.2006.02.006

Marks, H. (2000). Student Engagement in Instructional Activity: Patterns in the Elementary, Middle, and High Schools Years. *American Educational Research Journal*, 37(1), 153-184. doi:10.3102/00028312037001153

Massoni, E. (2011). Positive effects of extracurricular activities on students. *ESSAI*, *9*(27) 84-87.

National FFA Organization. (2017). *Official FFA Manual*. Retrieved from https://www.ffa.org/SiteCollectionDocuments/2016_official_ffa_manual.pdf

Newmann, F. M. (1991). Student engagement in academic work: Expanding the perspective on secondary school effectiveness. In J. R. Bliss, W. A. Firestone, & C. E. Richards (Eds.), *Rethinking Effective Schools: Research and Practice* (pp. 58-76). Englewood Cliffs, NJ: Prentice-Hall.

Plank, S. B., DeLuca, S., & Estacion, A. (2008). High school dropout and the role of career and technical education: A survival analysis of surviving high school. *Sociology of Education*, *81*(4), 345-370.

Reeves, D. B. (2008). The Learning Leader/The Extracurricular Advantage. *Learning*, *66*(1), 86-87.

Ricketts, J. C., Duncan, D. W., & Peake, J. B. (2006). Science achievement of high school students in complete programs of agriscience education. *Journal of Agricultural Education*, *47*(2), 48. doi: 10.5032/jae.2006.02048

Rose, C., Stephens, C. A., Stripling, C., Cross, T., Sanok, D. E., & Brawner, S. (2016). The Benefits of FFA membership as part of agricultural education. *Journal of Agricultural Education, 57*(2), 33-45. doi: 10.5032/jae.2016.02033

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*(1), 54-67. doi:10.1006/ceps.1999.1020

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic?. *Journal of Educational Psychology*, *100*(4), 765-781. doi:10.1037/a0012840

Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement*, *69*(3), 493-525. doi:10.1177/0013164408323233

North Dakota Department of Career and Technical Education. (2016). Career and technical student organizations. Retrieved from https://www.nd.gov/cte/students/ctso.html

North Dakota High School Activities Association. (2016). Welcome to the North Dakota High School Activities Association. Retrieved from http://www.ndhsaa.com/

Thijs, J., & Verkuyten, M. (2009). Students’ anticipated situational engagement: The roles of teacher behavior, personal engagement, and gender. *The Journal of Genetic Psychology, 170*(3), 268-286. doi: 10.1080/00221320903218323

Vogt, W. P., & Johnson, R. B. (2011). *Dictionary of Statistics and Methodology.* Washington, D.C.: Sage Publications.

Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. *Contemporary Educational Psychology*, *25*(1), 68-81. doi:10.1006/ceps.1999.1015

Wingebach, G. J., & Kahler, A. A., (1997). Self-perceived youth leadership and life skills of Iowa FFA members. *Journal of Agricultural Education 38*(3) 18-27 doi:10.5032/jae.1997.03018

The Influence of Extracurricular Involvement on High School Students' Academic Achievement and Engagement in School

Discussant Remarks

The authors are to be commended for identifying an important research topic that should resonate with teachers and teacher educators. The challenge to remain "relevant" is ongoing and research of this nature helps identify important implications for delivery of the AGED Program through the lens of the National FFA Organization.

I appreciate the effort to identify an appropriate theoretical framework, the effort to explain its application to the study was well done. Regarding the methodology utilized by the researchers I found the selection of an exploratory, survey design to be appropriate. The researchers correctly identified and reported the limitations of the study. Procedurally, subject selection and data collection were a good fit for the study.

It was interesting to see the researchers wrestle with the findings, I believe their effort to make meaning of the findings through the conclusions was transparent to the reader. I valued their effort to highlight the theoretical framework in the conclusions.

I encourage the researchers to consider a "Recommendations for Practice" section along with focusing more effort on interjecting supporting literature when appropriate and tying the conclusions back to the introductory literature as frequently as possible.

Questions:
Is FFA Extracurricular?

When students enroll in agricultural education classes, do you think they are focused on FFA? Or something else?

Why did you separate FFA from CTSO? (Table 1)

Does "Counselor Influence" factor into the Non CTSO students increased GPA Scores?

How does the culture in smaller schools impact the findings?

Perceptions of Barriers Limiting FFA Agriscience Fair Participation

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Abstract

A STEM enabled workforce is needed to meet the demands of the agriculture industry. The FFA Agriscience Fair allows students to showcase their scientific inquiry and learn by doing. Unfortunately, not all students participate in the competition. In an effort to increase participation in the event, a survey was sent to Kansas agriculture teachers (N = 223) in order to better understand the perceived barriers to participating in the FFA Agriscience Fair. A response rate of 35% was obtained (n = 79). Teachers responded to four open-response questions. Responses were analyzed for common themes using the constant comparison method. Major findings included: a lack of time to facilitate, complete, and teach the components of agriscience research, lack of experience with the event, lack of knowledge in regards to research, and lack of resources. Teachers offered advice including increased awareness of the competition, a need for professional development, and curriculum revisions. Recommendations include encouraging more research-based SAEs, inclusion of inquiry-based projects into the existing curriculum, and training preservice teachers. Further research is needed to investigate the expectations and values tied to conducting agriscience research and participating in the FFA Agriscience Fair in an effort to meet the demand for agricultural scientists.

Introduction/Literature Review

Agricultural companies are reporting a shortage of graduates in STEM fields while the number of positions in the STEM fields is expected to grow (Goecker, Smith, Fernandez, Ali, & Theller, 2015). Agricultural education teachers are in the position to positively influence students to pursue a career in a STEM field, especially one connected to agriculture. There is a need to emphasize and enhance STEM curriculum to help bridge the gap and encourage students to consider a STEM career.

Science fair projects have the potential to influence students' career choice into a STEM related field (Dutton & Sorenson, 2016; Sahin 2013; Schmidt, 2014). In addition to increasing career interest, competing in a science fair project may help in areas such as creative thinking, public speaking, and organizational skills (Murie, 2015).

A method of teaching students to think like a scientist and a way to add scientific rigor in an agricultural science classroom is through scientific inquiry. Washburn and Myers (2010) stated scientific inquiry is when students perform their own experiments and derive their own conclusions and explanations based on their own data. Students taught via inquiry-based instruction had higher scientific reasoning scores (Thoron & Myers, 2012).When interviewing students, Thoron and Burleson stated most students would prefer to take classes with inquiry-based instruction and eighty percent of students stated they enjoyed doing lab activities (2014).

One of the best ways to facilitate scientific inquiry is with the completion of a research project. The FFA Agriscience Fair is "designed for students interested in scientific principles and emerging technologies in the agricultural industry" (Agriscience Fair Program 2017-2021, 2016, p. v). Students enjoy completing science fair projects because it helps satisfy curiosity (Dionne et al., 2012) and they enjoy the competition (Dutton & Sorenson, 2016).

A form of inquiry-based learning is conducting an independent science fair research project, whether it be for the FFA Agriscience Fair or for other science fair competitions. Jinx stated a science fair project consists of three major components which differentiate a science fair project from a more traditional homework assignment: it takes place over an extended time period, it encompasses a variety of sources of information, and it culminates in some sort of presentation, either oral or written (2003). In a survey of the judges at the Intel International Science and Engineering Fair, over 90% of the respondents said a majority of the projects were inquiry-based (Rillero & Zambo, 2011). Most of these projects are open inquiry, where students design their own procedures to try and provide an answer to a question (Chatterjee, Williamson, McCann, & Peck, 2009). Another study showed science fair were beneficial as it allowed students to apply the main elements of argumentation in their projects (Chen, Lin, Hsu, & Lee, 2011).

Teacher motivations play a key role into student’s participation in competition and leadership activities. Russell, Robinson, and Kelsey (2009) found teachers motivate students to participate in CDE’s in several ways, including by tradition and success of the chapter, opportunities to compete, life skill development, opportunities for fun, and active recruitment. Previous experience with the CDE and the tradition of a successful chapter are primary motivations for why a program participates in a certain event (Voigt, Talbert, McKinley, & Brady, 2012). When selecting students for a CDE, teachers were found to usually pick the competitive students to participate on their CDE teams (Ball, Bowling, & Bird, 2016). In Kansas, there is not an established tradition of success with the FFA Agriscience Fair. The state has had four projects recognized as a national finalist in the last four years (National FFA Organization, n.d.).

Student motivation to participate in activities outside the classroom is influenced by several factors. In a study by Jones (2013), both extrinsic and intrinsic motivation played a primary role in motivating a student to participate in a Career Development Event. He also stated the FFA advisor plays a key role in recruiting potential students to participate in a CDE (Jones, 2013). Another study reported that extrinsic motivations and keeping the tradition of an FFA chapter are reasons why students participate in a particular CDE (Ball, Bowling, & Bird, 2016). The studies cited above all deal with CDEs and not specifically the FFA Agriscience Fair program.

There are many mixed findings on why students participate in a science research project. A study of Utah state science fair participants suggested students participated in the science fair because they thought it was fun and wanted to learn new things, followed next by the idea of competition with other students. Extrinsic rewards ranked tenth out of the twelve survey subjects (Abernathy & Vineyard, 2001). A study of the Canadian national science fair showed students were compelled to compete because a science fair project could satisfy their curiosity and they had an interest in scientific research (Dionne et al., 2012). However, in a study of FFA Agriscience Fair participants in Utah, Dutton and Sorenson (2016) found enjoyment in competitive events and being motivated by the teacher as primary reasoning for competing in the event.

There are some potential negatives of science fair projects and students completing an individual science research project. In a study of science fair participants, Schmidt (2014) found most science fair participants had a positive attitude about STEM coursework and careers in STEM; however, a group in the study developed negative perceptions of STEM coursework. Those students felt burned out and the task of developing an independent research project and the stress associated with it was too daunting. Science fair research can also be viewed as favoring elite, wealthy students. Most science fair projects contain a very meticulous methodology and procedure, and often these projects take place in a college laboratory with the guidance of professors (Murie, 2015). The ability to access university professors and to work in professional laboratories can lead to uneven playing field where wealthy, elite students have clear advantages than others (Korkmaz, 2012).

AAAE research priority #3 states the need to have a “sufficient scientific and professional workforce that addresses the challenges of the twenty-first century” (Stripling & Ricketts, 2016, p. 29.) This emphasizes the need for scientists and researchers in STEM fields. A possible way to help address this need is through inquiry-based education and completion of an agriscience research project.

Theoretical Framework

The expectancy-value theory of motivation (Wigfield & Eccles, 2000) served as the theoretical framework for this study. As we examine barriers to participation, the expectations people have for success is a frame of interest. “Expectancies are people’s beliefs and judgments about their capabilities to perform a task” (Schunk, Pintrich, & Meece, 2008, p. 44). The value piece of the theory focuses on the rationale a person may have for participating in a certain activity (Schunk et al., 2008).

The expectancy-value theory connects to this study as the major component of this study is to examine barriers prohibiting participation in the Kansas FFA Agriscience Fair. There has not been much participation or success in the Kansas FFA Agriscience Fair. Wigfield and Eccles (2000) state that a major construct for motivation is the expectancy for success. With little success, motivation to participate in the event could be a barrier to participation.

Purpose and Objectives

Despite the benefits of the FFA Agriscience Fair, Kansas has had very low participation in this event. In an effort to better understand the barriers and rationale for not participating, a research study was conducted in Kansas. There were three specific objectives for this research study.

1. Investigate the barriers limiting agriscience research by Kansas agriculture programs.
2. Investigate the reasons why Kansas agriculture teachers do not have students participate in the FFA Agriscience Fair.
3. Identify ways to increase participation in the Kansas FFA Agriscience Fair.

Methodology

This study examined barriers to participation in agriscience research and the FFA Agriscience Fair by Kansas agriculture teachers. A researcher developed survey was distributed to all Kansas agricultural science teachers (N = 223) via Qualtrics in January 2017. Follow-up emails were sent based on Dillman’s Total Design Survey Method (Dillman, 1978). One follow-up email was sent to non-respondents one week after the initial release, while a follow-up was sent again three weeks later. A response rate of 35% was obtained (n = 79). Of the survey participants, 51.9% were male (n = 41), and 48.1% were female (n = 38). The majority of participants were between the ages of 26 and 30, with an average teaching experience between 0 to 5 years (n = 34, 43%). Those teaching between 6-10 years (n = 15, 19%) and 11-15 years (n = 11, 14%) rounded out the top three with all those teaching 16-31+ years made up the remaining 19 respondents. This demographic data is provided to provide a better conceptualization of the participants.

The survey consisted of qualitative and quantitative components. The qualitative responses are the focus of this research paper. Teachers responded to four open-response questions in regards to their perceptions of barriers toward agriscience research and the FFA Agriscience Fair. The responses were analyzed for common themes using the constant comparison method.

Research rigor (trustworthiness) in qualitative research is established through credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). The findings of this research were gathered via open-ended questions as a piece of a larger survey. Efforts were made to establish trustworthiness, but there are limitations due to the data collection tool used. Triangulation occurred through comparing participant responses with participation data. Think, rich descriptions was utilized to establish transferability. Participant responses are provided verbatim. Dependability and confirmability was achieved by their respective audits to track the research process. Also, the results may not be generalized as only Kansas agriculture teachers were surveyed.

Findings

Research Objective 1

Research objective 1 investigated the barriers limiting agriscience research by Kansas agriculture programs. This research objective resulted in four themes: *lack of time to facilitate, write, and present the research, struggle to get students motivated to complete a project, experience, and lack of appropriate resources.*

The major finding for this objective was the lack of time to facilitate, write, and present the research. One respondent stated, "*It takes a lot of time. Everyone involved needs to commit to spending a great deal of time planning the study, gathering data, writing the report and preparing the presentation.*" Another commented that *"The time dedicated to following through with the project"* [is a struggle]. Another teacher stated that the time necessary to insert agriscience research into their curriculum and having enough participants is an issue, as they stated:

> *Time within my curriculum. Having a large enough population to justify a research project. This would almost certainly need to be an individualized study for a few students. I would not be able to justify having a separate semester just for research. Selling this type of a class is difficult as most students would prefer to not take another "science" class.*

Another theme was the struggle to get students motivated to complete a project. "*Keeping kids motivated to continue on a project that has delayed gratification*" [is a struggle]. This theme ties into student motivation with their time commitments. One teacher responded, "*Time, and adding more to a very full program and over committed students."* Another teacher commented on their previous experience and the struggles to get students to be motivated, as they state*, "I have tried a research project--Since students only put the bare minimum into researching, I feel as if they aren't getting adequate information about the topic."*

This finding tied into the third theme of experience. "*I don't know enough about it. It's hard to get kids motivated to do it if I don't know how to help them."* The lack of experience of agriculture teachers to assist their students with a research project was a major finding. *"I am not sure where to start, or how to get students interested."* This theme was echoed by another respondent, who stated, *"The obstacles would be knowing what I am doing and then helping my students to do research* *correctly. Also keeping them focused and moving in the right direction."* This obstacle was connected to knowledge and teacher confidence. One teacher stated, "*Confidence in adequately preparing students to conduct research and then display it."*

In the experience area, some respondents went further in describing where they lacked specific knowledge to support their students' research endeavors. These areas included problems with "*selecting valid topics*" that students can research and how to execute the research project through its entirety. One teacher commented, "*Finding a student that wants to complete the paperwork that follows the conclusion of the research project."*

Within the experience theme, a lack of student experience and lack of supporting curriculum in other departments presented barriers to agriscience research. One teacher explained that, "*No statistics courses offered or taught within existing math classes. Limited understanding of Excel spreadsheets for collecting and analyzing data."* Additionally, one responded that a challenge exists in *"bridging the gap between my knowledge and the kids understanding of scientific method."*

The final theme in regards to barriers is the lack of appropriate resources. Several teachers commented on the struggle to *"[Find] the equipment to complete something."* Another teacher stated, "*most high school Ag programs are not equipped to perform scientific research, lacking incubators, lab supplies etc."* Other teachers responded about the lack of specific equipment, *"At times I do not have the equipment to conduct the research they want for their experiment."* Additionally, some teachers commented on the fact that their lack of resources prevented them from developing topic ideas. One teacher stated, *"We struggle with ideas that interest the students and are feasible to conduct - either lack resources, time or motivation by the student."* Teachers commented that the lack of facilities, space, and materials necessary to facilitate student projects were all barriers limiting their ability to conduct agriscience research.

Funding of projects also became a potential barrier for some of the teachers, both on the facets of funding for their program and the potential lack of funding that would come from parents. One teacher stated that, *"The biggest barrier is the cost factor. With over 47% of our school at risk I don't know how to ask students to conduct their own research because many do not have the funds to do so on their own."*

Research objective 2

Research objective 2 investigated the reasons why Kansas agriculture teachers do not have students participate in the FFA Agriscience Fair. This research objective yielded four themes: *lack of interest; timing of the event; lack of knowledge; projects are not high enough quality; years of teaching; and lack of agriscience research in the program.*

Many of the reasons agriculture teachers do not have students participate in the FFA Agriscience Fair were the same as why they are not conducting research in their programs. The reasons given can be categorized as a "lack of interest" in the program, but teachers responded that the lack of time, "*It takes a great deal of time"* was a major reason why they do not participate in the

Agriscience Fair. *Students tend to burn out and loose interest in the middle of the experience";* low student motivation, *"desire to conduct research is not evident"* and little or no experience with the event, "*don't know much about it*" were all reasons why they have not participated in the competition.

Other teachers commented that the timing of the event is the biggest reason why they did not participate in the FFA Agriscience Fair. Currently, the Kansas FFA Agriscience Fair is held in early June during state FFA Convention. One teacher commented that *"timing is the biggest problem. I would like to see it at state CDE's,"* which are currently held in May. Another teacher commented that there is too much going on that time of the year as *"it gets to be a very busy time of year for our district."*

Several teachers explained lack of knowledge about the event and not knowing *"how to go about getting started"* and "*how to get a project done with students*" kept them from participating. Another commented, *I simply haven't looked at the expectations because I am busy with other obligations."* This lack of awareness about the fair, included where and when it occurred: "*New to the state and didn't know what, when or where [the event is held]."*

Another theme that emerged is that they do not participate due to the teacher's feelings that their projects are not high enough quality. One teacher commented, *"Since I don't have students that complete agriscience projects during my courses, the quality of projects completed on the student's own time, would not be of the quality I would like to present at the agriscience fair.* Other teachers commented that, *"I do not feel projects have been quality for state contest."* Others were concerned about the presentation piece, as one teacher elaborated, *"Not sure how to make the presentation correctly. I have seen posters that are so professionally done, that I don't feel that we can even compete."*

The fifth theme that emerged related to years of teaching. A few teachers indicated they were in new programs or in their first few years of teaching and were still trying to acclimate to teaching and running their program. *This is only our second year as a program, so we are still learning about all of the ways to participate."*

The final theme involved the lack of agriscience research in the program and therefore they are not interested in competing in the FFA Agriscience Fair. One teacher commented, *"I don't incorporate research projects in class and have yet to have students show interest in the agriscience fair."* Other programs do have research integrated, but are not able to present the research at the state competition for a variety of reasons including the lack of interest "*in following through with the [agri]science fair."*

Research Objective 3

Research objective 3 sought to identify ways to increase participation in the Kansas FFA Agriscience Fair. Analysis of this research objective resulted in three themes: *need to increase awareness; need professional development;* and *focus on preservice teachers.*

While many teachers did not have advice to offer due to never participating in the event, others did provide suggestions. Several teachers addressed the need to increase the awareness of the event in an effort to increase participation. Teachers suggested, *"increased visibility"* of the event, *"make* *sure you get students up to see it. That way it might spark an interest."* The respondents suggested the need for increased marketing of the program and more communication as to "*deadlines*."

The need for professional development for both teachers and FFA members was mentioned. "*I'd like to see inservice at our summer and mid-winter conferences on how to implement into our classrooms."* One teacher suggested, *"workshops at district FFA contests for students to learn more information about it."*

Teachers requested assistance with "*helping develop ideas for students that are unique as well as challenging."* They also wanted to be reassured of the basics such as knowing "*that 'cheap' poster board will work."*

Teachers also recommended that a push needs to be made with preservice teachers if participation is to be increased in the Kansas FFA Agriscience Fair. One teacher commented that, *"Start with the young teachers. Emphasize research projects in block classes."*

One teacher observed, *"If we want participants, we have to make research projects a much bigger part of our agriscience curriculums."* The need to emphasize how it can be integrated into the curriculum, rather than added onto, was mentioned by several teachers.

> *I think the perception is that it is harder to do than it really is. It is easy to incorporate in to classes and not be another "thing to do". I would suggest have trainings for teachers, particularly new instructors, on how to help students with the projects.*

Additional comments ranged from offering "*student grants to be involved*," "*more prizes*," and creation of "*How To*" videos. A few teachers commented that the timing of the event was not conducive to participation and suggested it be moved to be a "*stand alone event*" or held "*at state CDEs*."

Conclusions/Recommendations

'Lack of time' was the most commonly noted barrier in regards to both conducting agriscience research and participating in the FFA Agriscience Fair. It takes an extended period of time for a student to develop their project, test their research question, and write up the results. A majority of that time must come outside of a regularly scheduled class period. A few teachers responded that due to their school's small enrollment, most of their students are involved in many activities. This makes it hard to motivate students to develop a project in addition to all of their other commitments. Encouraging more research-based SAEs can help to communicate how a research project can also serve as a student's SAE. (Swinehart, 2014). This could also help increase the number of students who have a high-quality SAE program.

Another aspect of the "lack of time" is in regards to the curriculum already taught in the program. In order to address a lack of time in the curriculum and take advantage of the strengths of conducting agriscience research there is a need for more focus on scientific inquiry and allowing a student to develop a project that interests them (Schmidt, 2014; Washburn and Myers, 2010). A teacher needs to budget time in their curriculum to teach the scientific method, how to conduct agriscience research, and analyzing/reporting the results. Utilization of the Curriculum for Agricultural Science Education (CASE) serves as a way to integrate more inquiry-based methods into the agriculture education classroom (2017). In addition, the agriscience fair is an individual or two-person team project; therefore, it requires the teacher to dedicate time advising students in a more individualized manner than typically done in a classroom setting. This additional time requirement serves as a barrier, especially to teachers who are not experienced with facilitating research projects.

Teacher motivation is an essential part of supporting and encouraging student participation in agriscience research (Dutton and Sorenson, 2016; Jones, 2013). Targeted programs to increase interest, motivation, and ability of both teachers and students are necessary. Myers, Thoron, and Thompson (2009) investigated the needs of the National Agriscience Teacher Ambassadors to teach STEM concepts more effectively in their classrooms. The teachers identified the need for (1) curriculum, (2) professional development, and (3) collaboration. Participants in this study recommended each of those items. Work should be done to address the need for new or revised curriculum to better integrate agriscience concepts and projects. Additionally, professional development and opportunities for teachers (and their students) to collaborate could help motivate teachers to make time for this program.

Many teachers noted their lack of knowledge about agriscience research and the FFA Agriscience Fair. This inability to establish a tradition of excellence in the FFA Agriscience Fair decreases both teacher and student motivation to compete in this program (Ball et al., 2016; Russell, Robinson, & Kelsey, 2009; Voigt, Talbert, McKinley, & Brady, 2012). Due to the low participation in the event, there is not pressure in the state for teachers to prepare students to conduct research. This lack of a subjective norm forms a perceived barrier to participation, which leads to low participation in the Kansas FFA Agriscience Fair. Professional development should be offered to improve teacher’s ability to teach the scientific method and motivate their students to conduct research.

There is a need to train preservice teachers to supervise and support agriscience research projects. In 2016, there were 772 graduates in agricultural education across the nation, with 569 of them entering an agricultural science program (Smith, Lawver, & Foster, 2017). Educating preservice teachers on the different aspects of conducting agriscience research could prove valuable in slowly increasing the number of projects in the FFA Agriscience Fair. Teaching future teachers how to facilitate research could also help them write inquiry-based lessons and assignments as well as assist them in becoming more comfortable teaching inquiry-based curriculum.

Teachers in this study commented on the costs associated with conducting agriscience research. There are many potential costs ranging from sophisticated equipment to having the lab space needed for a project. This is a noted issue in science fair literature (Korkmaz, 2012; Murie, 2015). Efforts need to be made to reduce the costs and provide a more level playing field for all students to participate in agriscience research.

A potential way to decrease costs for an agriscience project is to collaborate with school science departments. Science departments may have the equipment and the space needed to perform these experiments. However, even though both science and agriscience teachers believe that collaboration between the two departments is beneficial, it is seldom done (Stephenson, Warnick, & Tarpley, 2008).

We need to continue to address the expectations and values tied to conducting agriscience research and participating in the FFA Agriscience Fair in an effort to meet the demand for agricultural scientists. As we work to increase the number of students who pursue STEM careers, the integration of agriscience research in our agriculture programs is a possible avenue to meet the demands of the industry (Dutton & Sorenson, 2016; Sahin, 2013; Schmidt, 2014). More research is needed to determine the best interventions and methods for increasing the number of students who pursue a STEM career after graduation. Additionally, research is needed to determine the impact of participating in the FFA Agriscience Fair in regards to career choice, scientific reasoning, and critical thinking.

References

Abernathy, T. V., & Vineyard, R. N. (2001). Academic Competitions in Science: What Are the Rewards for Students? The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 74(5), 269-276. doi:10.1080/00098650109599206

Agriscience Fair Program: 2017-2021.(2016). National FFA Organization. Indianapolis, IN. 2017. Retrieved from https://www.ffa.org/SiteCollectionDocuments/asf_2017_2021_agriscience_fair_handbook.pdf

Ball, A., Bowling, A., & Bird, W. (2016). A case study of learning, motivation, and performance strategies for teaching and coaching CDE teams. (Career Development Events)(Case study). *Journal of Agricultural Education, 57*(3), 115. doi:10.5032/jae.2016.03115

Chatterjee, S., Williamson, V. M., McCann, K., & Peck, M. L. (2009). Surveying students' attitudes and perceptions toward guided-inquiry and open-inquiry laboratories. Journal of Chemical Education, 86(12), 1427. Retrieved from http://search.proquest.com/docview/211942385

Curriculum for Agricultural Science Education (CASE) (2017). *Curriculum Development Philosophy*. Curriculum for Agricultural Science Education. Retrieved from: http://www.case4learning.org/index.php/about-case/the-case-difference/lesson-development-philosophy.

Dillman, D. A. (1978). Mail and telephone surveys: the total design method. New York: New York: Wiley.

Dionne, L., Reis, G., Trudel, L., Guillet, G., Kleine, L., & Hancianu, C. (2012). Students' Sources of Motivation for Participating in Science Fairs: An Exploratory Study within the Canada-Wide Science Fair 2008. *International Journal of Science and Mathematics Education, 10*(3), 669-693. doi:10.1007/s10763-011-9318-8

Dutton, C., & Sorenson, T. (2016). To the Fair! Exploring the Influence of the FFA Agriscience Fair on Career Aspirations. *Western Region Agricultural Education Research Conference Proceedings.*

Goecker, A. D., Smith, E., Fernandez, M. J., Ali, R., & Goetz, R. (2015), *Employment opportunities for college graduates in the food, renewable energy, and the environment 2015-2020*. United States Department of Agriculture and Purdue University. Retrieved from: https://www.purdue.edu/usda/employment/

Jones, A. D. (2013). *Assessing student motivation to participate in FFA career development events* (Order No. 3586136). Available from ProQuest Dissertations & Theses Global. (1513599555). Retrieved from http://search.proquest.com.er.lib.k-state.edu/docview/1513599555?accountid=11789

Korkmaz, H. (2012). Making Science Fair: How Can we Achieve Equal Opportunity for All Students in Science? *Procedia - Social and Behavioral Sciences, 46,* 3078-3082. doi:10.1016/j.sbspro.2012.06.014

Lincoln, Y. S., & Guba, E. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

Murie, K. (2015). In McComas W., Endacott J., Wavering M. and Wissehr C.(Eds.). *A Cross Case Study of Excellence in Science Fair Program Design.* ProQuest Dissertations Publishing.

Myers, B.E., Thoron, A.C., & Thompson, G.W. (2009). Perceptions of the National Agriscience Teacher Ambassador Academy toward integrating science into school-based agricultural education curriculum. Journal of Agricultural Education, 50(4), 120-133. doiL10.5032/jae.2010.02070

National FFA Organization. (n.d.). Agriscience Fair. Retrieved from: https://www.ffa.org/participate/awards/agriscience-fair

Russell, C. R., Robinson, J. S., & Kelsey, K. D. (2009). Motivating agriculture students to participate in career development events. *Career and Technical Education Research, 34*(2), 103-118. Retrieved from: http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ889530&site=ehostlive&scope=site;http://acter.metapress.com/content/b78g023151t41585/?p=d0c2975bd8014e0db539be4a45c51e54&pi=3

Sahin, A. (2013). STEM Clubs and Science Fair Competitions: Effects on Post-Secondary Matriculation. *Journal of STEM Education: Innovations and Research, 14*(1), 5. Retrieved from http://search.proquest.com/docview/1349180552

Schmidt, K. (2014). In Kelter P., Cudworth K. and Flynn J.(Eds.), *Science fairs and Science Olympiad: Influence on student science inquiry learning and attitudes toward STEM careers and coursework* ProQuest Dissertations Publishing.

Schunk, D. H., & Pintrich, P. R. Meece. (2008). Motivation in education: Theory, research, and applications.

Smith, A. R., Lawver, R. G., & Foster, D. D. (2017). National Agricultural Education Supply and Demand Study, 2016 Executive Summary. Retrieved from: www.aaaeonline.org/Resources/Documents/NSD2016Summary.pdf

Stephenson, L. G., Warnick, B. K., & Tarpley, R. S. (2008). Collaboration between Science and Agriculture Teachers. Journal of Agricultural Education, 49(4), 106-119.

Stripling, C. T. & Ricketts, J. C. (2016). Research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education National Research Agenda: 2016-2020* (pp. 29-35). Gainesville, FL: Department of Agricultural Education and Communication.

Swinehart, K.A. (2014, May/June). Preparing students for a successful future: Experiential Learning and the 21st century student. *The Agricultural Education Magazine, 86*(6), 22-23.

Thoron, A. C., & Burleson, S. E. (2014). Students' perceptions of agriscience when taught through inquiry-based instruction. *Journal of Agricultural Education, 55*, 66. doi:10.5032/jae.2014.01066

Thoron, A. C., & Myers, B. E. (2012). Effects of inquiry-based agriscience instruction on student scientific reasoning. *Journal of Agricultural Education, 53*, 156. doi:10.5032/jae.2012.04156

Voigt, M. A., Talbert, B. A., McKinley, S. K., & Brady, C. M. (2012). *Promising practices of dairy, horse, and livestock evaluation Career Development Event coaches* Available from ProQuest Dissertations and Theses Professional

Washburn, S., & Myers, B. (2010). Agriculture Teacher Perceptions of Preparation to Integrate Science and Their Current Use of Inquiry Based Learning. *Journal of Agricultural Education, 51,* 99-112. doi:10.5032/jae.2010.01088

Wigfield, A., & Eccles, J. (2000). Expectancy-Value Theory of Achievement Motivation. *Contemporary Educational Psychology, 25,* 68-81. doi:10.1006/ceps.1999.1015

Perceptions of Barriers Limiting FFA Agriscience Fair Participation

Discussant Remarks

The potential for Agricultural Education programs to highlight STEM related fields is an important and timely research endeavor. The investigation of barriers to participation in the FFA Agriscience fair is a worthy effort. The authors are to be commended for developing a well done, easy to read manuscript. The narrative provided by qualitative researcher pulls the reader into the study.

Nice job of identifying a variety of literature to support the study, the connection to employability skills, motivation for both students and teachers set the stage nicely. The selection of the expectancy-value theory of motivation was appropriate along with the description and connection to the study.

The methods section was clear, I appreciate the effort to highlight the qualitative data of the study.

The authors crafted appropriate conclusions and complemented them with recommendations that were within the scope of the study.

Questions:

Is their potential for including volunteers in the Agriscience fair?

Is the CASE curriculum a viable option?

Is their “room” in the teacher education program curriculum for “Course work in Block classes”?

Session C – Friday 8:30-10:00

Discussant – Brian Myers; Timekeeper – Brianna Shanholtzer

Philosophical and Historical
Finding Common Ground: A Philosophical Perspective Revisiting Teaching "In" and "About" Agriculture *Blake C. Colclasure, Brianna N. Shanholtzer, Andrew C. Thoron, R. Kirby Barrick*
Identifying the First Generation Leaders in Agricultural Education: The Lost Stimson Manuscript *Gary Moore*
Social Change Movements and Agricultural Education: Offering an Alternative Lens and Framework for Our Future *Adam A. Marx, M'Randa R. Sandlin, Mary T. Rodriguez, Hannah H. Scherer*
Competition as an Instructional Approach in School-Based, Agricultural Education (SBAE): A Historical Review *Mason C. Jones, Dr. M. Craig Edwards*

Finding Common Ground: A Philosophical Perspective Revisiting Teaching "In" and "About" Agriculture

Blake C. Colclasure, University of Florida
Brianna N. Shanholtzer, University of Florida
Andrew C. Thoron, University of Florida
R. Kirby Barrick, University of Florida

Abstract

School-based agricultural education has evolved considerably in the last century. This philosophical perspective examines the history of agricultural education in the United States and explores how early contributions to agricultural education shaped the structure of modern SBAE. The divergent roles of agricultural education to 1) provide a qualified agricultural workforce for the 21st century, and 2) educate students about agriculture are discussed. Furthermore, a conceptual framework for the structure of K-12 agricultural education is proposed, which attempts to provide a solution to gaps in agricultural career readiness and agricultural literacy.

Introduction

The modern agricultural industry in the United States looks far different from the farming operations that provided the country with food, fiber, and natural resources during the 20th century. Today's agricultural industry has become more complex and globally interconnected, utilizing technological advancements to meet the demands of a growing global population, while being confronted with social, political, and environmental challenges (National Research Council [NRC], 2009). The new era of a technological advanced and industrialized agricultural landscape offers solutions to global food shortages (Food and Agriculture Organization [FAO], 2015), while taking steps to become more sustainable and environmentally sensitive. The transformational shift in agriculture production has redefined the once blue-collar American farmer. The next generation of agriculturalists requires an advanced skillset beyond a general knowledge in agriculture. Twenty-first century "farmers" need to be interdisciplinary problem solvers and critical thinkers who can work collaboratively with diverse groups of people (NRC, 2009). Furthermore, the new era of agriculture requires workers who are able to apply science and technology to confront challenges that are not yet known. There has been no other time in history when the requirements of the agricultural worker have been more complex, nor the supply of qualified agricultural workers so low (Whittaker & Williams, 2016). The pipeline of qualified agricultural workers appears to be corroding. The changing agricultural landscape requires a new definition for the agriculture worker, and, concurrently, how we prepare the future agriculture worker requires a new approach.

To add to these challenges, as the agricultural industry battles the shortage of qualified workers (Whittaker & Williams, 2016), it is also being confronted with a society that lacks a connection to agriculture (Kover & Ball, 2013). As individuals become more displaced from the farm, an appreciation for agriculture production appears to be diminishing. The unfortunate phenomenon of a growing population that doesn't understand agriculture, yet is quick to buy into rhetoric against modern agriculture, is evident. Ironically, there seems to be a growing number of individuals expressing concern about their food and where it comes from, but who have never set foot on an actual farm, nor studied agriculture at a rudimentary level. In a democratic society, where popular opinion impacts legislative changes, the future of agriculture in our country is at stake. Due to the public's expanding knowledge gap in agriculture, K-12 education in the United States needs to be well positioned to teach all students about agriculture in order for them to become informed consumers of agricultural goods and who possess a basic understanding of where food comes from and how it is produced.

This philosophical paper explores the role and structure of school-based agricultural education (SBAE) in the United States to confront the need for a modern agricultural workforce and an agriculturally literate society. The historical development of agricultural education that has led to divergent pathways is discussed: teaching *about* agriculture and teaching *in* agriculture. A 21st century model for the structure of SBAE is proposed which attempts to conceptualize agricultural education as a solution to gaps in agricultural career readiness and agricultural literacy.

Development of Agricultural Education in the United States

The first account of agriculture being formally taught in the United States occurred in Georgia in 1733 when three men were hired to instruct individuals how to produce raw silk (Moore, 1987). Since then vocational education, and specifically agricultural education, has been evolving. The first major push for vocational education occurred in the early twentieth century when the nation's growing industrial and agricultural societies called for a more practical education beyond liberal arts (Moore & Gaspard, 1987). Hallmark legislative actions, such as the 1862 and 1890 Morrill Acts, along with the 1917 Smith-Hughes Act, provided the foundation for formal education in agriculture and mechanical arts across the United States (Barrick, 1989). The passage of the Morrill Act of 1862 supplied each state with funding to establish colleges for higher education in agriculture and mechanical arts, which placed importance on the need for public vocational education in higher education (Moore, 1987).

The 1917 Smith-Hughes Act directly impacted public vocational education at the secondary school level by providing federal funding for vocational programs. The Federal Government believed that vocational education was essential to the nation's welfare and established the act to allow states to develop a system to design and deliver vocational education (Federal Board for Vocational Education, 1917). The resources provided by the Smith-Hughes Act inspired swift changes in secondary school vocational education and established state boards of vocational education. The Smith-Hughes Act of 1917 had many rules for the allocation of federal funding. One rule in particular stated that "if a high school student was taught one class by a teacher paid in full or in part from federal vocational funds, that same student could receive no more than fifty percent academic instruction" (Prentice Hall Documents Library: Smith-Hughes Act 1917, para 8). As a result, the Federal Vocational Board divided the time of students enrolled in vocational education into three segments, 50 percent in shop work, 25 percent in closely related subjects, and 25 percent in academic course work. The division of student enrollment became known as the 50-25-25 rule (Prentice Hall Documents Library: Smith-Hughes Act 1917). The Smith-Hughes Act and the 50-25-25 rule guided agricultural education towards a more vocational approach, which emphasized agricultural trade skills and the preparation of students to become farmers (NRC, 1988).

For the next half century, vocational education remained nearly the same. Vocational education emphasized job-specific skills, nearly eliminating theoretical content, and became increasingly segregated by subject matter (e.g. agriculture, industrial arts, home economics) (Prentice Hall Documents Library: Smith-Hughes Act 1917). As vocational careers began to evolve with technical changes, students lacked the skills needed in the new workplace and were not effectively trained to adapt to the changing environment. The need for a new paradigm in agricultural education was evident, yet the practice of teaching in SBAE remained stagnant, resulting in declining student enrollment and poor student career preparation.

As a result of declining enrollment in agricultural education in the 1980s, and subsequently a larger population becoming further removed from agriculture, the National Research Council sought to identify a new paradigm for agricultural education programs. The 1988 NRC publication, *Understanding Agriculture - New Directions for Education*, provided recommendations to broaden the scope of agricultural education as an effort to foster a renewed urgency for a society familiar with the workings of agriculture. In *Understanding Agriculture – New Directions for Education*, the NRC defined the term agriculture literacy as an “understanding of the food and fiber system [that] includes its history and current economics, social, and environmental significance to all Americans” (NRC, 1988, p. 8). The NRC (1988) claimed that the focus of agricultural education must change, stating that agricultural education is more than vocational agriculture. The NRC also recommended that students should receive education *about* agriculture from kindergarten through twelfth grade, suggesting the integration of agricultural content into existing core courses. Lastly, the NRC claimed that vocational education in agriculture must be continuously adapting to stay current with the evolving field of agriculture. The new paradigm of SBAE established that agricultural education must be comprehensive in coverage, scientific in method, and practical in impact and focus (NRC, 1988).

Agricultural Education Today

Among the career and technology education disciplines established in the United States during the formative years of school-based vocational training, agricultural education has fared considerably well compared to the rest of its counterparts. Programs in industrial arts, technology education, and home economics have waned (Lynch, 1996; Volk, 1993), while enrollment in SBAE is at an all time high, recruiting an increasingly diverse student population (Brown & Kelsey, 2013; Warner & Washburn, 2009). Like other programs in career and technical education, SBAE continues to face a shortage of qualified teachers, expressing concern for the sustainability and growth of agricultural education across the country (Boone & Boone, 2009; Kantrovich 2010; Myers, Dyer, Washburn, 2005).

The complete agricultural education program has long been represented by the three-circle model, consisting of classroom instruction, Supervised Agricultural Experience (SAE), and FFA (Phipps, Osborne, Dyer & Ball, 2008). Each of the three components seen within the model continues to play an integral part of agricultural education across the United States today, despite individual programs reporting varying emphasis on each component (Shoulders & Toland, 2017).

Classroom Instruction

The three-circle model suggests that contextual learning should take place in a laboratory or classroom setting. SBAE has experienced a strong history of experiential learning, stemming from vocational preparation through hands-on and problem-based learning (Parr & Edwards, 2004). Modern instruction in SBAE has become blended in both vocational and academic pursuits. Although active learning strategies, such as experiential learning, have been central to the vision of SBAE, it has been documented that instruction using active learning teaching methods is currently utilized far less by agriculture teachers than what is recommended (Smith, Rayfield, McKim, 2015).

The emphasis of hands-on learning and skill-based learning in SBAE has provided an opportunity to make science topics applicable and relevant to students, all the while reinforcing academic content (Despain, North, Warnick, & Baggaley, 2016; Phipps et al., 2008). The integration of Science, Technology, Engineering, and Math (STEM) education into agricultural curricula has become central in modern SBAE (Roberts, Harder, & Brashears, 2016), and has been shown to increase student learning (Parr, Edwards, & Leising, 2006; Spindler, 2015).

Student acquisition of content knowledge and skills remains the critical component of education programs. In an era of standard-based testing, measures of student content knowledge are used to provide accountability of student learning. It has been suggested that learning objectives across all disciplines be tied to federal and state learning standards and linked to assessment (Darling-Hammond & Bransford, 2005). For modern SBAE, the National Council for Agricultural Education (NCAE) developed national learning standards for agricultural education, promoting eight educational pathways that include: agribusiness systems; animal systems; biotechnology systems; environmental service systems; food products and processing; natural resource systems; plant systems; and, power, structural and technical systems (NCAE, 2015). Many states have also created their own agricultural learning standards and have developed industry certifications for students completing course pathways and passing industry certification exams. The goal of industry certification is to produce highly qualified graduates who are career ready for specific entry-level positions. Industry certifications have established a more concrete link between industry needs and the content that is taught in some SBAE programs.

SAE

The SAE provides students planned, sequential agricultural instruction that applies classroom topics to student-invested applications that students can understand (Phipps et al., 2008). Through the completion of an SAE, students can gain knowledge in workplace skills, explore different careers in the agricultural industry, and conduct projects that make learning meaningful, inspiring future learning. Despite positive outcomes of SAE, many SBAE programs fall short in successfully incorporating SAE programs, which creates a clear deviation from the three-circle model (Lewis, Rayfield, & Moore, 2012a).

Unfortunately, a continuous trend in declining levels of SAE participation has been documented (Lewis, Rayfield, & Moore, 2012b). Despite declining trends in the use of SAE, teachers generally still support the concept of SAE programs (Osborne, 1988; Retallick, 2010). According to Retallick (2010), the most emergent cause of low student SAE enrollment is teacher difficulty in implementing SAE programs. This phenomenon is not new. Foster (1986), found factors associated with why SAE programs are not implemented that include: lack of teacher time; lack of facilities (e.g. land-labs); lack of student desire; and student demands from other school activities. Adding to these factors, student demographics in SBAE have changed considerably, causing perceived opportunities for quality SAEs to decline (Phipps et al., 2008). A lack of comprehensive preservice teacher training in SAE implementation may also contribute to declining SAEs. In a study on perceived teacher self-efficacy, Wolf (2011), found that novice teachers had lower self-efficacy scores for SAE domains compared to domains for both classroom and FFA. Rubenstein, Thoron, Colclasure, and Gordon (2016) found that engaged teachers were a primary indicator of students developing and implementing successful SAE programs. Programs that are exemplary for SAEs require every student to conduct an SAE (Rubenstein & Thoron, 2015) and have strong administrative support (Rayfield & Wilson, 2009).

FFA

The remaining component of the three-circle model is student participation in FFA. FFA provides students with opportunities for personal growth, career exploration, and leadership at local, state, and national levels. Today, FFA membership has become more diverse, consisting of student membership from all 50 states, Puerto Rico and the U.S. Virgin Islands, which include a record number of over 653,000 student members (National FFA Organization, 2015). FFA members are provided with opportunities to apply what they have learned in the classroom through competitions that mimic real-world agricultural skills. FFA provides students these opportunities through Career Development Events (CDEs). CDEs not only test students' knowledge about agriculture, but also provide students with opportunities to showcase their experience and skills in agriculture.

K-8 Agricultural Education

While a foundational level or introductory agriculture course promoting agricultural literacy continues to be a staple in most secondary SBAE programs, middle school agricultural education programs have emerged in some states throughout the country. Although the purpose of SBAE at the middle school level continues to be refined, some states have created guides for middle school agricultural education programs that include basic agricultural literacy and opportunities for students' agricultural career exploration (Flanders & Bell, 2005). Further efforts to promote agricultural literacy in public education is evident. In 1981, the USDA established the Agriculture in the Classroom campaign, creating educational programs for K-12 students across the country to learn about agriculture (USDA, 2007). The Agriculture in the Classroom campaign established agricultural learning standards for K-12 public education that range from basic agricultural knowledge to specific knowledge of the agricultural industry (Spielmaker & Leising, 2013). The Agriculture in the Classroom campaign continues to promote agricultural literacy for K-12 students today.

Preparing an Agriculturally-Literate Society: Teaching "About" Agriculture

The cohesive design and delivery of SBAE across the country has become splintered by varying ideologies of the purpose of agricultural education. The creation of national and state learning standards and industry certification programs that are linked to career-specific pathways have attempted to re-align SBAE to vocational approaches of education. Concurrently, in the last decade, SBAE has seen a large push for increased agricultural literacy and curriculum integration (e.g. STEM), further expanding the mission of agricultural education beyond career readiness. The purpose of agricultural education seems to be split between preparing an agriculturally-literate society and preparing students for careers in agriculture.

The importance of agricultural literacy has been well noted in the literature. Pope (1990) expressed that agricultural literacy is fundamental to a society that lacks direct connection to production agriculture, so that well informed individuals can make educated decision regarding agriculture. Igo and Frick (1999) claimed that an agriculturally literate society is needed if the agriculture industry in the United States is to remain successful. Furthermore, in a synthesis of literature examining agricultural literacy, Kovar and Ball (2013) suggested that agricultural literacy is imperative to maintain a sustainable and viable agricultural system that is capable to feed a growing global population.

In 1910 farmers accounted for 31% of the population, while today farmers consist of less than 2% of the population (USDA, 2012). The decline in the number of individuals being raised on a farm creates a void for the appreciation of agriculture and the public's understanding of agriculture. The public has become numb to the importance of the production of food, fiber, and natural resources. The public's growing disconnection from agriculture has created a need for SBAE programs to education students about basic agriculture and its importance.

Preparing a Workforce in Modern Agriculture: Teaching "In" Agriculture

Career and Technical Education (CTE) has provided a necessary link between workforce readiness, commercial industry, and public education (McNamara, 2009). School-based agricultural education (SBAE), as part of the umbrella of CTE programming, has had an early history rooted within the sole purpose of preparing students for vocational careers within production agriculture (NRC, 1988). Curricula within vocational programs were designed to meet the needs of industry-related employers. From the 1920s to the mid-1980s, curriculum within secondary agricultural education was designed with the purpose to train students to become farmers (NRC, 1988). As production agriculture changed during the age of industrial technology, agricultural education curriculum partially developed to reflect such changes, teaching industrial methods of technical agriculture.

Despite efforts across CTE programs to establish a career-ready workforce, a recent trend indicating deficiencies of the number of graduating students who have the knowledge and skills required by industry has led to a nation-wide skills gap (Whittaker & Williams, 2016). Evidence of the skills gap has sparked a recent return to the investment of CTE programs in the United States (Springfield & Stone, 2017). Governing agencies within CTE have promoted the use of career pathways and industry certifications within secondary education to advance students' acquisition of skills and successful transition from high school into the workplace (Springfield & Stone, 2017). In an analysis of U.S. job growth post the "great recession" of 2008, Carnevale, Smith, and Strohl (2013) found that the new jobs created after the recession look far different than the jobs that were lost.

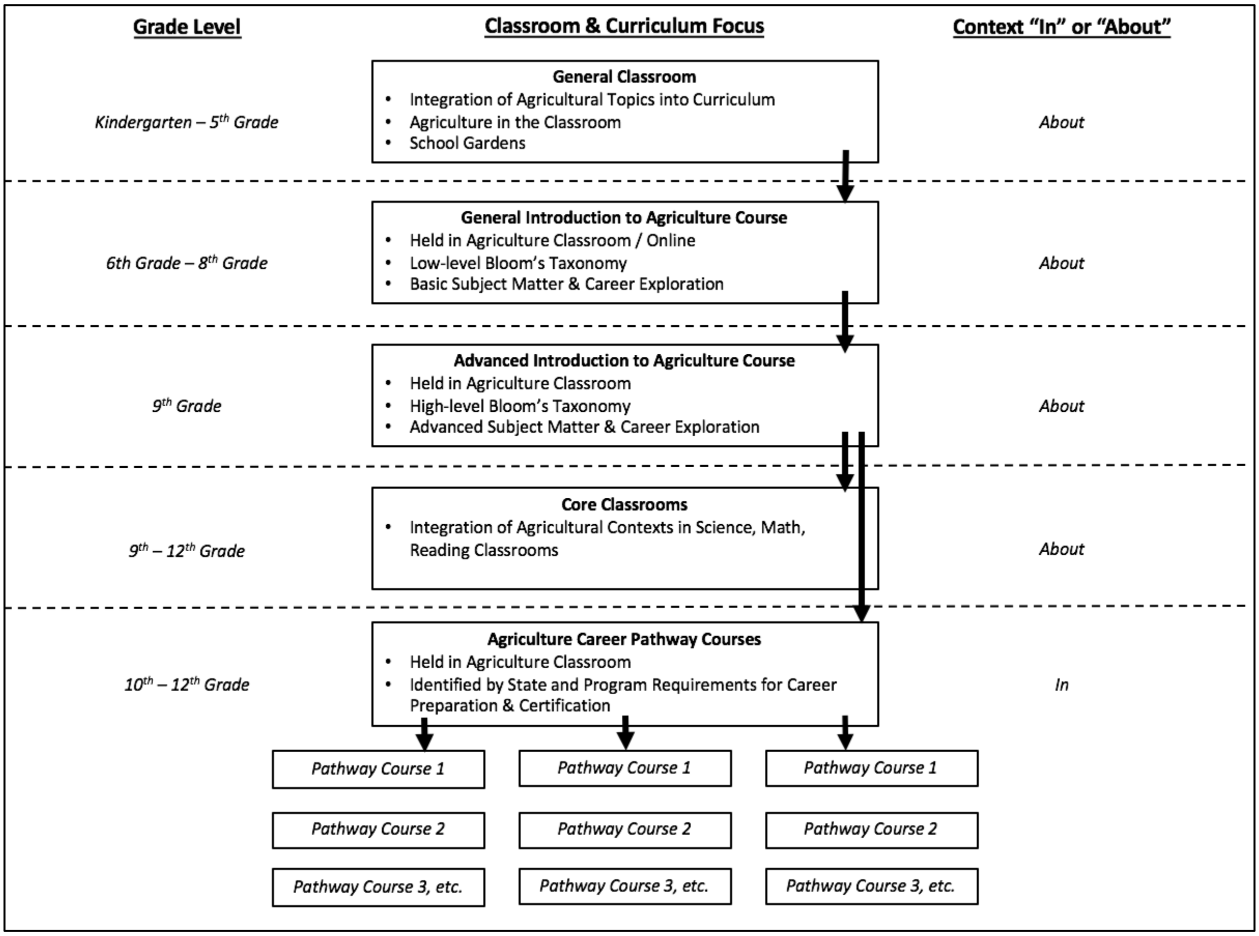
Implications for School-based Agricultural Education

The question if agricultural education curricula should be focused *in* or *about* agriculture has been debated over the last several decades. Proponents who support either side of the debate have identified valid arguments and have advocated for the advancement of agricultural educational to align with their belief of the purpose of agricultural education. It is hard to disagree with the notion that agricultural education should provide students with a foundational understanding of the production of food, fiber, and natural resources. Increasing the agricultural literacy of our society has never been of greater importance, as today's youth have become more disconnected from the farm (USDA, 2012). However, if the primary goal of agricultural education lies within improving students' agricultural literacy, we must question if we are drifting too far from the historical roots of agricultural education, where the initial purpose was to prepare the next generation of agricultural workers. If SBAE in secondary school education becomes too centered in teaching *about* agriculture, we must ask ourselves if we are still considered a member of the career and technical education community.

Furthermore, focusing on anything less than preparing students for careers could contribute to an increasing skills gap in the United States. There is clearly a need for agricultural education to be positioned to teach *about* agriculture and to teach *in* agriculture. In order to achieve both of these tasks, the structure of agricultural education must be critically examined and evaluated, and alternative structures of agricultural education should be considered. As can be seen in figure one, a conceptual framework is proposed that illustrates an example structure for K-12 public education that allows for the effective delivery of agricultural education programs to teach students *about* and *in* agriculture.

Figure 1

A conceptual framework for teaching "in" and "about" agriculture in K-12 education.



The conceptual framework illustrates that teaching about agriculture should occur in grades K-9, with agricultural curriculum integration into core curriculum high school courses. Once students obtain a basic understanding of agricultural concepts, they can elect to enter a pathway for career readiness identified by state boards of curriculum and individual schools. The sections below describe the basis of this framework.

Kindergarten – 5th Grade

The first stage in a holistic effort to improve the agricultural literacy among the public is to teach agricultural topics in grades K-5. The importance of agricultural education programs in grades K-5 should not be undervalued, as this formative stage of cognitive development is central to establish a life-long appreciation and interest in agriculture. Programs such as the Agriculture in the Classroom campaign should continue to strive to make sure that every child is exposed to educational applications that involve engaging agricultural topics. Opportunities for children to be exposed to agriculture should extend beyond the classroom, increasing the exposure of children to school gardens and working farms. Every child should know where food comes from at the most basic level, and public education at lower levels should be the primary mechanism to ensure this occurs.

6th Grade – 8th Grade

If decreasing public agriculture literacy is a serious concern to the well-being of our country, then federal and state efforts requiring a basic agricultural education course in public education is well warranted. This framework proposes that students in grades sixth through eighth should be required to enroll in at least one agricultural education course. Courses at this level should focus on teaching students *about* agriculture on a foundational level. Coursework should be oriented toward agricultural literacy, consisting of subject matter that is rich in consumer knowledge that explores food production from field to fork. Ideally, students will take more than one agricultural education course at the middle school level. However, the teacher shortage in agricultural education (Camp, Broyles, & Skelton, 2002; Kantrovich, 2010; Roberts & Dyer, 2004), and the current status of agricultural education, which is focused at the high school level, creates difficulties in providing agricultural education to every middle school student. Innovative solutions, such as additional middle school agricultural endorsement programs for core curriculum teachers, and offering online agriculture courses, could provide every middle school student with at least one agriculture course. Agriculture courses at the middle school level should focus on basic agriculture content knowledge and literacy.

9th Grade

This framework also proposes that every student should take an advanced introduction to agriculture course during their first year of high school. This course will expand upon the required middle school agriculture course by exposing students to complex agricultural issues that emphasize students' use of higher order thinking. However, the focus of the advanced introduction to agriculture course will still be centered in teaching *about* agriculture and will allow students to explore agricultural careers.

9th-12th Grade

Contrary to the integration of core subjects into agriculture courses, this framework highlights the need to integrate agricultural topics into core classes. It is believed that this method will expand agricultural literacy for students who elect to not go into agricultural career pathways. Furthermore, the integration of real-life applications is needed in core curriculum. Stakeholders of agriculture and key organizations in agricultural education should design lessons that have an agricultural context for core curriculum classes that teachers can use to supplement their current lessons.

10th-12th Grade

In order to prepare a specialized and highly qualified agricultural workforce for the 21st century, this framework proposes that programs should strategically implement a series of career pathway courses that are uniquely tailored to the occupational needs of each state. Such courses should be designed to allow students to obtain the skills needed in localized agricultural careers. The implementation of career certifications in SBAE, which are currently found in some states, provide a necessary link between industry and education. Furthermore, the design of career preparation courses should expand beyond the immediate skill sets needed in the industry and should promote students' social, critical thinking, problem solving, and communication skills that are needed in the 21st century workforce.

Conclusion

The development of agricultural education was first established in efforts to prepare individuals for the skills they needed to work on a farm. The advancement of vocational education occurred as the industrial revolution swept the nation, leading to federal acts that expanded vocational education in secondary schools and post-secondary institutions. The focus in trade-based learning was evident in agricultural education until the reinvention of agricultural education during the 1990's. Agricultural education expanded its mission to teach beyond agricultural trades, emphasizing agricultural knowledge, as opposed to specific career skills. The new paradigm of agricultural education may have been essential for the growth of SBAE. However, the purpose of secondary school agriculture education to teach *about* agriculture has led to deficiencies in students' career preparation, while also not fully reaching its potential to educate society about agriculture.

The conceptual framework provided in this paper was developed to offer a solution for agricultural education to be better positioned to teach both *about* and *in* agriculture. The framework expands upon existing efforts for agricultural education to reach K-8 students. An expansion of agricultural education at the middle school level is necessary to fully expose students *about* agriculture. An additional course at the 9th grade level, which exposes students to higher level thinking *about* agriculture, is necessary. These courses along with the integration of agriculture contexts into core curriculum will aim to decrease the public's knowledge gap of agriculture. Courses beyond an advanced introductory course will focus on specific agricultural careers and will exist for the purpose of providing students with the advanced skills they need in specific agricultural industries. The authors of the proposed framework understand the complexities associated with the redevelopment of the structure of agricultural education programs; however, in order for agricultural education to simultaneously provide solutions to both career readiness and agricultural literacy, the structure and purpose of agricultural education at each level should be discussed and refined on a national level.

The implementation of the provided conceptual framework would have dramatic implications for SBAE. An enormous increase in the number of students enrolled in agriculture education courses would be seen. The expansion of middle school agricultural education programs would educate all students about agriculture, putting less pressure for high school agriculture courses to teach both about and in agriculture. Furthermore, it would be expected that agricultural literacy would increase in society, resulting in a new generation that appreciates and understands the basic components of food production. A renewed focus on advanced career preparation for specific career pathways could potentially reduce the number of students being taught career-specific agricultural skills. However, students completing specific career pathways that are tailored to the demands of industry would be adequately prepared to enter the workforce or continue advanced training in a specific field. The investment in this educational design could contribute to closing the large skills gap identified in industry. Agricultural education has advanced in many ways to become a model for career and technical education. Despite its many successes over the last century, the current structure of agricultural education is beginning to experience unintended strain from pressures asking agricultural education to do too much with its existing structure. The current structure of SBAE is not appropriately designed to teach both *about* and *in* agriculture, where both purposes are given the attention they need and deserve. The proposed conceptual framework included in this paper is one of many potential designs to offer alternatives for the structure of agricultural education to meet challenges that are currently being faced in agriculture.

References

Barrick, R. K. (1989). Agricultural education: Building upon our roots. *Journal of Agricultural Education, 30*(4), 24-29. doi: 10.5032/jae.1989.04024

Boone, H. N., & Boone, D. A. (2009). An assessment of problems faced by high school agricultural education teachers. *Journal of Agricultural Education*, *50*(1), 21-32. doi: 10.5032/jae.2009.01021

Brown, N. R., & Kelsey, K. D. (2013). Sidewalks and city streets: A model for vibrant agricultural education in urban American communities. *Journal of Agricultural Education, 54*(2), 57-69. doi: 10.5032/jae.2013.02057

Camp, W. G., Broyles, T., & Skelton, N. S. (2002). *A national study of the supply and demand for teachers of agricultural education in 1991-2001*. Blackburg: Virginia Tech, College of Agriculture and Life Science.

Carnevale, A. P., Smith, N., & Strohl. J. (2013). *Recovery: Job growth and education requirements through 2020*. Washington, D.C.: Georgetown University, Georgetown Public Policy Institute.

Darling-Hammond, L. & Bransford, J. (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do.* San Francisco, CA: Jossey-Bass.

Despain, D., North, T., Warnick, B. K., & Baggaley, J. (2016). Biology in the agriculture classroom: A descriptive comparative study. *Journal of Agricultural Education*, *57*(1), 194-210. doi: 10.5032/jae.2016.01194

Federal Board of Vocational Education (1917). *Statement of policies. (Bulletin No. 1)*. Washington: Government Printing Office.

Food and Agriculture Organization of the United Nations [FAO]. (2015). *The State of Food Insecurity in the World*. Retrieved from http://www.fao.org/3/a4ef2d16-70a7-460a0a9ac-2a65a533269a/i464e.pdf

Foster, R. M. (1986). Factors limiting vocational agriculture student participation in supervised occupational experience programs in Nebraska. *Journal of the American Association of Teacher Educators in Agriculture*, *27*(4), 45-50.

Igo, C., & Frick, M. (1999). A case study assessment of standard benchmarks for implementing food and fiber systems literacy. *Proceedings of the 18th Annual Western Region Agricultural Education Research Meeting*. Corpus Christi, TX.

Kantrovich, A. J. (2010). *The 36th volume of a national study of the supply and demand for teachers of agricultural education from 2006-2009.* American Association of Agricultural Educators, West Olive, MI: Michigan State University.

Kovar, K. A., & Ball, A. L. (2013). Two decades of agricultural literacy research: A synthesis of the literature. *Journal of Agricultural Education*, *54*(1), 167-178. doi:10.5032/jae.2013.01167

Lewis, L. J., Rayfield, J., & Moore, L. L. (2012a). An assessment of students' perceptions toward factors influencing supervised agricultural experience participation. *Journal of Agricultural Education, 53*(4), 55-69. doi: 10.5032/jae.2012.04055

Lewis, L. J., Rayfield, J., & Moore, L. L. (2012b). Supervised agricultural experience: An examination of student knowledge and participation. *Journal of Agricultural Education, 53*(4), 70-84. doi: 10.5032/jae.2012.04070

Lynch, R. L. (1996). In search of vocational and technical teacher education. *Journal of Career and Technical Education, 13*(1), 5-16. doi: 10.21061/jcte.v13i1.508

McNamara, B. R. (2009). The skill gap: Will the future workplace become an abyss. *Techniques: Connecting Education and Careers, 84*(5), 24-27.

Moore, G. E., & Gaspard, C. (1987). The quadrumvirate of vocational education. *Journal of Technical Education, 4*(1).

Myers, B. E., Dyer, J. E., & Washburn, S. G. (2005). Problems facing beginning agriculture teachers. *Journal of Agricultural Education, 46*(3), 47-55. doi: 10.5032/jae.2005.03047

National Council for Agricultural Education (NCAE). (2015). *Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards*, 1-142. Retrieved from https://www.ffa.org/SiteCollectionDocuments/council_afnr_career_cluster_content_standards.pdf

National FFA Organization. (2015). *Statistics.* Retrieved January 15, 2018, from https://www.ffa.org/about/who-we-are/our-membership

National Research Council. (1988). *Understanding agriculture: New directions for education*. Washington, D.C.: National Academy Press.

National Research Council. (2009). *A new biology for the 21 century*. Washington, D.C.: National Academy Press.

Osborne, E. W. (1988). Planning and supervision strategies for SOE programs in agriculture. *Journal of American Association of Teacher Educators in Agriculture, 29*(4), 49-56.

Parr, B. A., & Edwards, M. C. (2004). Inquiry-based instruction in secondary agricultural education: Problem-solving – an old friend revisited. *Journal of Agricultural Education, 45*(4), 106-117. doi: 10.5032/jae.2004.04106

Parr, B. A., Edwards, M. C., & Leising, J. G. (2006). Effects of a math-enhanced curriculum and instructional approach on the mathematics achievement of agricultural power and technology students: An experimental study. *Journal of Agricultural Education, 47*(3), 81-93. doi: 10.5032/jae.2006.03081

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. (2008). *Handbook of agricultural education in public schools* (6th ed.). Clifton Park, NY: Thomson Delmar Learning.

Pope, J. (1990). Agricultural literacy: A basic American need: *The Agricultural Education Magazine, 62*(9), 8.

Rayfield, J., & Wilson, E. (2009). Exploring principals' perceptions of supervised agricultural experience. *Journal of Agricultural Education, 50*(1) 70-80. doi: 10.5032/jae.2009.01070

Retallick, M. S. (2010). Implementation of Supervised Agricultural Experience Programs: the agriculture teachers' perspective. *Journal of Agricultural Education, 51*(4), 59-70. doi: 10.5032/jae.2010.04059

Roberts, T. G., & Dyer, J. E. (2004). Inservice needs of traditionally and alternatively certified agriculture teachers. *Journal of Agricultural Education, 45*(4), 57-70. doi: 10.5032/jae.2004.0457

Roberts, T. G., Harder, A., & Brashears, M. T. (eds.) (2016). *American Association for Agricultural Education national research agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication.

Rubenstein, E. D., & Thoron, A. C. (2015). Supervised agricultural experience programs: An examination of committed teachers and student-centered programs. *Journal of Agricultural Education, 56*(4), 75-89. doi: 10.5032/jae.2015.04075

Rubenstein, E. D., Thoron, A. C., Colclasure, B. C., & Gordon, J. A. (2016). Supervised agricultural experience programs: An examination of the development and implementation of urban programs. *Journal of Agricultural Education, 57*(4), 218-234. doi: 10.5032/jae.2016.04217

Shoulders, C. W., & Toland, H. (2017). Millennial and non-millennial agriculture teachers' current and ideal emphasis on the three components of the agricultural education program. *Journal of Agricultural Education, 58*(1), 85-101. doi: 10.5032/jae.2017.01085

Smith, K. L., Rayfield, J., & McKim, B. R. (2015). Effective practices in STEM integration: Describing teacher perceptions and instructional method use. *Journal of Agricultural Education, 56*(4), 182-201. doi: 10.5032/jae.2015.04183

Spielmaker, D. M., & Leising, J. G. (2013). *National agricultural literacy outcomes*. Logan, UT: Utah State University, School of Applied Sciences & Technology. Retrieved from http://agclassroom.org/teacher/matrix

Spindler, M. (2015). Science integrating learning objectives: A cooperative learning group process. *Journal of Agricultural Education, 56*(1), 203-220. doi: 10.5032/jae.2015.01203

Stringfield, S., & Stone, J. R. (2017). The labor market imperative for CTE: Changes and challenges for the 21st century. *Peabody Journal of Education, 92*(2), 166-179. doi: 10.1080/0161956X.2017.1302209

United States Department of Agriculture. (2007). *Education overview*. Retrieved from http://www.csrees.usda.gov/nea/education/education_all.html

United States Department of Agriculture. (2012). *Census Highlights: Farm Demographics*. Retrieved from https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Farm_Demographics/#how_many

Volk, K. S. (1993). Enrollment trends in industrial arts/technology teacher education from 1970-1990. *Journal of Technology Education, 4*(2), 46-59. doi: 10.21061/jte.v4i2.a.4

Warner, W. J., & Washburn, S. G. (2009). Issues facing urban agriscience teachers: A Delphi study. *Journal of Agricultural Education, 50*(1), 105-115. doi: 10.5032/jae.2009.01105

Whittaker, J. G., & Williams, G. (2016). Skills gap – a strategy for increasing knowledge worker supply and demand. *Journal of Business, 1*(4), 13-24. doi: 10.18533/job.v1i4.42

Wolf, K. J. (2011). Agricultural education perceived teacher self-efficacy: A descriptive study of beginning agricultural education teachers. *Journal of Agricultural Education, 52*(2), 163-176. doi: 10.5032/jae.2011.02163

Finding Common Ground: A Philosophical Perspective Revisiting Teaching "In" and "About" Agriculture

A Critique

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The authors present an argument that the structure of today's school-based agricultural education is incapable of meeting the stated goals of creating an agriculturally literate citizenry and preparation of the future workforce in agriculture. A framework for a new structure of SBAE is provided that the authors contend will more fully and adequately meet these goals. Within this framework, the authors provide a well thought out plan for each stage of the educational progression of students through the K-12 school system.

Below I've provided a few questions/thoughts for you to consider:

7. The authors mention current programs and practices used to address the goals of SBAE, one of those mentioned is Agriculture in the Classroom. How do the authors propose this group's work be incorporated into the proposed model? Would any organizational structure changes need to be made to incorporate Agriculture in the Classroom more formally into SBAE?

8. The three-component model of SBAE is discussed. The framework provided appears to focus mainly on the classroom component. How do the authors envision the FFA and SAE components being implemented in the proposed framework? Is the three-component model still included?

9. The proposed framework suggests career pathways for grades 10-12. The authors suggest student selection of pathways at this level would allow for instruction related directly to careers in the industry. Are there any concerns regarding student readiness to make career selections at this age? If so, how should these be addressed?

10. Education in general is often a topic in political conversations. Much of the conversation revolves around the need to meet national concerns vs. local control of educational institutions and decisions. How would these concerns be addressed in this suggested national framework for SBAE?

11. One of the underpinnings for the need for a structural change presented by the authors is a knowledge gap in the general population regarding food production. Some could argue that today's citizen is more concerned and seeks more information regarding the production of the food they eat than ever before. Are there any challenges or concerns from approaching the need for an agriculturally literate pubic from only a knowledge gap perspective?

Identifying the First Generation Leaders in Agricultural Education:
The Lost Stimson Manuscript

Gary Moore, North Carolina State University

Abstract

Agricultural Educators are typically pragmatic and have generally neglected to document the history of the profession. This is unfortunate because educated, well-rounded professionals should have an understanding and appreciation for the history of their profession.

Other than two journal articles in which the authors (Camp and Crunkilton, 1985; Foor and Connors, 2010) attempted to identify the early leaders of the profession and a random assortment of biographical sketches in The Agricultural Education Magazine, there has been little effort to identify the historically significant leaders in agricultural education.

However, there was one systematic effort to identify the early leaders of the profession. In the mid-1940s Rufus Stimson worked at compiling a book on the early leaders in agricultural education. The agricultural education leadership in each state was asked to identify five historically important leaders in their state. Photographs and biographical sketches were then collected from these early leaders.

Unfortunately, before the book could be published Stimson died. He had collected the information but the book was never published. This historically important work was lost to the profession. This paper describes the effort to find the lost Stimson manuscript and thus identify the early leaders in agricultural education.

Introduction

The August, 1947 issue of *The Agricultural Education Magazine* carried an article about the death of Rufus Stimson. An excerpt from the article reads (Lathrop, 1947, p. 29):

At the time of his passing, Doctor Stimson had nearly completed work on a volume which includes biographical sketches of leaders in agricultural education with samples and excerpts from their writings. I have promised Doctor Stimson that I would complete this work. Dr. H. M. Hamlin of the University of Illinois will edit this material.

When I first read this passage in T*he Agricultural Education Magazine* I was mildly puzzled. I had been in the profession for a number of years and had completed graduate work at a leading university, but I had not been exposed to this book. Why didn't I know about this book?

I decided to get the book and read it. This was easier said than done. I could not find a copy of the book. It was not in my university library. Whenever I was on the campus of another university I would go to the library in an attempt to find the book. The book proved to be elusive. Over a span of years searching university libraries and having conversations with the leaders of the profession, the Stimson book was not to be found. Did this mean the book did not exist or did it mean I had not looked in the right place?

Research Questions

1. Was the Stimson manuscript ever published?

2. If the Stimson manuscript was not published, did it still exist and could it be found?

3. If the Stimson manuscript could be found, who were identified as the early leaders in agricultural education?

Why Is This Important – The Framework

Every discipline has a body of knowledge with which professionals in the field should be familiar. This provides individuals a better understanding of the practices and leadership of the field, helps them to appreciate their discipline, and may guide their practice. It is the mark of an educated individual to be aware of the philosophical and historical underpinnings of his/her discipline. Hirsch (1988) in his landmark book, *Cultural Literacy*, reinforces this thinking.

In *Understanding Agriculture: New Directions for Education* (National Research Council, 1988), the Committee on Agricultural Education in Secondary Schools stated "…that an agriculturally literate person's understanding of the food and fiber system would include its history and its current economic, social and environmental significance to all Americans" (p. 8-9). The concept of agricultural literacy framed this research as applied to professionals in agricultural education. We need to know who our early leaders were and what they accomplished.

Priority 1 of the AAAE Research Agenda calls for an understanding of agricultural and natural resources by the public and policy makers (Roberts, T. G., Harder, A. & Brashears, M. T, 2016). The importance of an agriculturally literate person is recognized. Likewise, professionals in agricultural education should be literate in regards to their own discipline. That is also important.

In the early years of the profession, biographical sketches of the founders and leaders of agricultural education were featured in *The Agricultural Education Magazine.* In Volume 1, Issue 3 of *The Magazine*, H. M. Hamlin, the editor wrote (1929, p. 2):

Leadership in agricultural education has not been an easy role. Particularly in the early days were the labors hard and rewards few. Some of our first and ablest leaders have already passed on without having received recognition of their work at all commensurate with its merits. May we deal more fairly with those who survive!

The first person to be featured in the "Our Leadership in Agricultural Education" feature was Rufus Stimson (Heald, 1929). Not only was Stimson an early leader, he realized the importance of recognizing and documenting the efforts of other pioneer leaders.

Stimson, in a letter (June 24, 1943) to the contributors of the book wrote "I am devoutly determined not to fail either you, or the future generations who must depend on such cooperative efforts as ours for reliable records." Stimson had just moved and was physically exhausted at the age of 76 but was committed to documenting the efforts of the first generation of leaders in agricultural education. This manuscript enables Stimson to keep his promise.

Review of Literature

There have been periodic attempts to identify the historically important leaders in agricultural education. The “Our Leadership in Agricultural Education” feature started in *The Agricultural Education Magazine* in 1929 and continued off and on for decades and featured more than 124 individuals.

It was not hard to be identified as a leader in *The Agricultural Education Magazine*. Basically, a colleague or friend had to take the initiative to write such an article. There was no set criteria that had to be met for those featured. Publishing biographical sketches of the leaders was a common occurrence up through the 1970s. However virtually no articles about leaders in the profession have been printed in the last couple of decades.

In 1985 Camp and Crunkilton attempted to identify the top 10 leaders in the profession. Their effort was published in the *Journal of the American Association of Teacher Educators in Agriculture* in an article titled "History of Agricultural Education in America: The Great Individuals and Events." They conducted a Delphi study that involved purposively selected teachers, teacher educators, state supervisors and retirees. A total of 30 individuals from all parts of the country comprised the sample for this research.

The ten individuals identified in the Camp and Crunkilton (1985) study were Ralph Bender, Clarence Bundy, Harold Crawford, Henry Groseclose, Carsie Hammonds, H. M. Hamlin, H. N. Hunsicker, Lloyd Phipps, W. A. Spanton, and A. W. Tenney.

One of the problems in conducting historical research is the factor of time. The more removed an event or individual is from the present, the less likely people are to remember or recognize the significance of that individual or event. Of the 10 individuals in the Camp and Crunkilton study, eight were active in the 1940-1980 era. It appears the respondents probably identified people they personally knew.

More recently (2010) Foor and Connors undertook to identify the pioneers in the field. They conducted an exhaustive search of the existing literature in agricultural education and then identified the individuals they deemed to have been important leaders in the profession. The researchers used their judgement to determine who should be identified. They identified five teacher educators or supevisors (Rufus Stimson, Kary Davis, Walter French, Ashley Storm, and A. W. Nolan). They also identified four high school teachers.

In the Foor and Connors study (2010), they relied primarily on biographical sketches published in *The Agricultural Education Magazine* to select the individuals for inclusion in their list. Selecting five individuals could be a daunting task when one considers that over 124 biographical sketches have been published over the years in *The Agricultural Education Magazine*. Someone had to take the initiative to write a biographical sketch and it is possible that some individuals who should have been featured in the *Magazine* were not.

If the Stimson manuscript could be located, this might give the profession additional insight into the professional leadership in agricultural education.

Methodology

The research is basically historical; but not in the commonplace sense. Some of the current historical research in agricultural education involves nothing more than a quick Google search and a review and synthesis of the documents found online. This historical research effort was different because the major goal was to find a primary historical document that has been lost for decades and retrieve the information it contained. It took over 10 years to accomplish, consisted of personal and phone interviews with numerous individuals, involved travel to six different states, and required countless hours in libraries and archives (and attics).

As with any historical research, both external criticism and internal criticism are critical concerns. (Fraenkel & Wallen, 2006). Are the documents authentic (external criticism) and is the information in the documents accurate (internal criticism)? In some agricultural education historical research reports, there are 3-4 boilerplate sentences that assert these concerns have been addressed but detail is often lacking. Specific examples of how internal and external criticism were addressed is presented later in this document.

Findings

Research Question 1- Was the Stimson manuscript ever published?

A multistep process was used to answer this research question. It should be noted this research effort was conducted over numerous years and was initiated before the powerful online tools we now enjoy existed. However, these online tools would not have been of much value. The steps followed in answering this research question were:

1. <u>Contact Vernie Thomas of Interstate Printers and Publishers</u>. At the time Stimson was working on this book Interstate was the predominant publisher of agricultural education books in America. They had published *A Handbook on Teaching Vocational Agriculture* and most of the other professional books in agricultural education. Mr. Thomas did not find the Stimson book in the inventory of books published by Interstate and even checked the logbook of contracts to see if there might have been a contract to publish the book. Nothing was found.

2. <u>Search university libraries</u>. The researcher personally searched the libraries at the University of Georgia, Texas A&M University, The Ohio State University and Louisiana State University. If Interstate had not published the book, there was a possibility that it could have been published by another company or been published privately. The head of agricultural education at Ohio State, W. F. Stewart, had published his *Methods of Good Teaching* privately in 1950. Perhaps companies just weren't published agricultural education books at that time for some reason and it had been published privately. If it had been published privately, one of these universities might have the book. Nothing was found.

3. <u>Search the Library of Congress holdings</u>. Stimson's earlier book, *History of Agricultural Education of Less Than College Grade in the United States*, had been published by the U.S. Government in 1942. After Stimson's retirement, he had been employed by the Federal Government as a consultant, so it was possible the government had also printed this book about the early leaders of agricultural education. There was no record of this book in the Library of Congress (National Union Catalog) system. If the U.S. Printing Office had printed the book, it would be listed here.

4. <u>Letters to the elder statesmen of the profession</u>. The next step was to send 20 letters to the elder statesmen of the profession asking them if they had seen this book. This letter was sent to people like

Phipps, Bender, Binkley, Hemp, Fuller and Annis. Several of them personally knew Stimson. Nearly every person contacted responded. None of them remembered the book.

After these efforts to find the book, it was reluctantly concluded that the book did not exist. The manuscript had never been published. It took years of searching to conclude this.

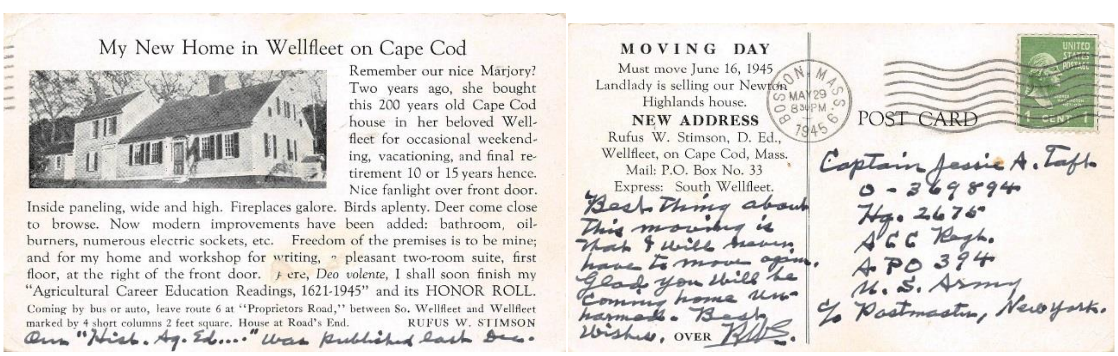
Research Question 2: If the Stimson manuscript was not published, did it still exist and could it be found?

The focus of the research shifted to a search for the manuscript. The Stimson obituary identified Lathrop and Hamlin as people who would finish the project. Dr. H. M. Hamlin was to edit the final manuscript. It was also possible the manuscript was still in the possession of the Stimson family. The steps involved in answering this research question were:

1. Research the Hamlin connection. Hamlin was deceased but many of his colleagues and graduate students were still alive. People were contacted who had been on the faculty with Hamlin at the University of Illinois or had studied under Hamlin during that era. It was discovered that Dr. J. C. Atherton, a retired professor at LSU had shared an office with Hamlin between 1948 and 1950. A personal interview was arranged with Dr. Atherton. He was absolutely certain that Hamlin had never worked on such a book during that time period.

Information obtained from the Stimson family led the researcher to conclude that if Hamlin had handled the manuscript, it would have been later than 1950. Therefore, the individual who had shared an office with Hamlin from 1950 to 1952 was identified. This was Dr. Gerald James, a retired community college president in North Carolina. A personal interview was conducted with Dr. James. He had not seen the manuscript and was positive that he would have known about it if Hamlin had received it.

2. Contact the Stimson family. Jesse Taft, retired state supervisor in Massachusetts, was one of the elder statesmen contacted previously regarding the existence of the book. Mr. Taft responded to the inquiry by sending the researcher a letter that contained the retirement program from Stimson's retirement celebration and a postcard he had received when Stimson retired to Cape Cod. The postcard was printed and showed a picture of the house where Stimson was going to live during his retirement (with his niece) along with brief instructions on how to find the house and a handwritten note to come see him. (See Figure 1)


My New Home in Wellfleet on Cape Cod

Remember our nice Marjory? Two years ago, she bought this 200 years old Cape Cod house in her beloved Wellfleet for occasional weekending, vacationing, and final retirement 10 or 15 years hence. Nice fanlight over front door. Inside paneling, wide and high. Fireplaces galore. Birds aplenty. Deer come close to browse. Now modern improvements have been added: bathroom, oil-burners, numerous electric sockets, etc. Freedom of the premises is to be mine; and for my home and workshop for writing, a pleasant two-room suite, first floor, at the right of the front door. Here, *Deo volente*, I shall soon finish my "Agricultural Career Education Readings, 1621-1945" and its HONOR ROLL.

Coming by bus or auto, leave route 6 at "Proprietors Road," between So. Wellfleet and Wellfleet marked by 4 short columns 2 feet square. House at Road's End. RUFUS W. STIMSON

Our "Hist. Ag. Ed...." was published last Dec.

MOVING DAY
Must move June 16, 1945
Landlady is selling our Newton Highlands house.
NEW ADDRESS
Rufus W. Stimson, D. Ed.,
Wellfleet, on Cape Cod, Mass.
Mail: P.O. Box No. 33
Express: South Wellfleet.

Best thing about this moving is that I will never have to move again. Glad you will be coming home unharmed. Best wishes, OVER RWS.

BOSTON, MASS. MAY 29 830 PM 1945

POST CARD

Captain Jessie A. Taft
O-369894
Hq. 2676
ACC Regt.
APO 394
U. S. Army
c/o Postmaster, New York.

Figure 3 Front and Back of Postcard sent by Stimson to his friends and colleagues in 1945

A trip to Wellfleet on Cape Cod was then planned and executed to see if the house still existed and relatives of Stimson could be located. After some effort the Stimson house was located. Ms. Crooks, Stimson's great niece, had just moved into the old house six days earlier and was cleaning and going through boxes. She had come across numerous items that belonged to Stimson.

Ms. Crooks graciously allowed the researcher to look through the boxes. The first item found was a contract dated August 12, 1944 by Russ Guin, President of Interstate to publish a book titled "Agricultural Career Education Readings" (apparently Stimson had signed the contract but had not returned it to Interstate). There were a number of other documents that provided details about the project. This was the first real proof the manuscript had really existed – but there was no manuscript.

Ms. Crooks vaguely remember running across a letter from a Mr. Lathrop during her cleaning. There had been a fire in the house in 1969 with substantial water damage. Perhaps the manuscript had been in the fire. Recently a cousin from California had come and cleaned out some old stuff and perhaps it had been thrown away. Ms. Crooks indicated that several boxes of materials including some filing cabinets had been moved out of the house into a relative's garage prior to her moving into the house. Ms. Crooks promised to look for the manuscript there at a later date.

The family looked in all the boxes and filing cabinets they could find. Cousin George from California said he hadn't thrown anything like the manuscript away. The family also had a vague recollection of somebody coming to the house long ago and taking away some boxes that belonged to Stimson. It was concluded the manuscript wasn't in Massachusetts.

3. Research the Lathrop Connection.

This left Frank Lathrop in the U.S. Office of Education as the final possible link for finding the manuscript. Lathrop was deceased but Neville Hunsicker, a retired USOE official, had worked with Lathrop. A telephone interview was conducted with Mr. Hunsicker who was in his 80s at the time of the interview. He indicated that Lathrop was very meticulous but slow in getting things done. It was probable that Lathrop had not finished the project.

Hunsicker mentioned that as he was retiring in 1979, one of the secretaries was pushing a cart of boxes full of federal vocational education documents and other historical materials down the hall. She had been instructed to clean out some offices and get rid of the old stuff. Neville intercepted the dump bound load and had it moved to the attic of the FFA center in Alexandria, Virginia along with several of his personal files. He suggested looking there for the manuscript. It might possibly be in one of the boxes.

4. Search the attic of the FFA Center

The researcher was subsequently given access to the attic of the FFA Center. There were hundreds of boxes, filing cabinets and assorted other objects in a major state of disarray in the attic (which is about 100 feet long and 30 feet wide). After three hours of methodically working through the boxes and filing cabinets three cardboard file storage boxes were found with the words Stimson on the spine. A look inside the boxes revealed that the lost Stimson manuscript had been found (See Figure 2).

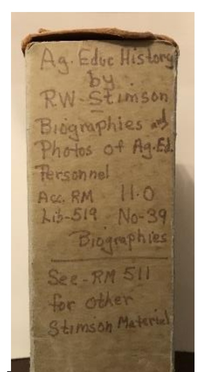


Figure 2
Storage Box
containing the
Sti...

Authenticity and Accuracy

Was the document recovered authentic (external criticism)? Was this really the lost Stimson manuscript? Three different checks were used to verify this document was indeed the missing Stimson manuscript.

During the visit to the Stimson house in Massachusetts the researcher was given Stimson's typewriter (along with other artifacts) by his great niece (See Figure 3). One page of the recovered manuscript was typed on Stimson's typewriter and then compared with the original page. The type was identical, including the slightly misaligned capital C.

Figure 3 Stimson's

The postcard from Jesse Taft had a handwritten note on it from Stimson. This handwriting sample was compared with the editorial comments made by Stimson on the manuscripts. The handwriting was the same.

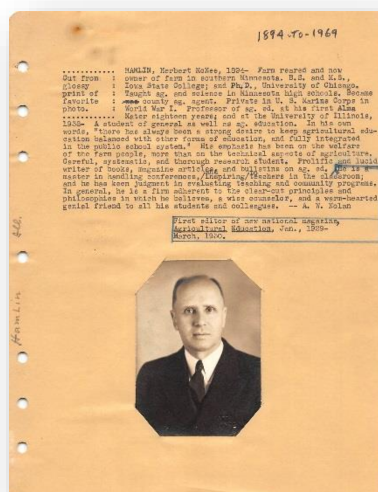
Finally, a letter addressed to the Honor Roll Nominees and their Sponsors dated March 20, 1943 was in the Stimson materials possessed by his great niece, Ms. Crooks. This letter contained substantial detail about the proposed book and its content. The documents recovered matched the description in the letter.

The manuscript was deemed to be authentic and met the external criticism criteria for historical research. The researcher has the manuscript and it is available for inspection.

Were the documents recovered accurate (internal criticism)? Stimson was a stickler for accuracy and had two pages of guidelines for the nominees and nominators. Stimson's instructions were that "…each nominee is invited to speak for himself, by listing and dating items in his career which he considers to have been of first importance" (R. W. Stimson, letter to Honor Roll Nominees and their Sponsors, March 20, 1943). The nominator (sponsor) was to add a sentence or two appraising the contributions of the nominee and was to sign the nomination. All of the living individuals checked the accuracy of their biographical sketches. Thus the document was considered to pass the internal criticism test.

Findings

There were biographical sketches of 165 early leaders along with original photographs of these people. Some of these photographs may have never been published. It was intended that each biographical sketch be ½ page in length; however there was a note written by Stimson addressed to the publisher (Russell Guin) on the George Washington Carver biography that states, "In these days of alleged social discrimination in the U.S., I think it would be a good gesture, considering the distinguished public service of Dr. Carver, to give him a full page." An example of a biography is shown in Figure 4.



1894-TO-1969

Cut from glossy print of favorite photo.

HAMLIN, Herbert McKee, 1894- Farm reared and now owner of farm in southern Minnesota. B.S. and M.S., Iowa State College; and Ph.D., University of Chicago. Taught ag. and science in Minnesota high schools. Became county ag. agent. Private in U. S. Marine Corps in World War I. Professor of ag. ed. at his first Alma Mater eighteen years; and at the University of Illinois, 1938- A student of general as well as ag. education. In his own words, "there has always been a strong desire to keep agricultural education balanced with other forms of education, and fully integrated in the public school system." His emphasis has been on the welfare of the farm people, more than on the technical aspects of agriculture. Careful, systematic, and thorough research student. Prolific and lucid writer of books, magazine articles, and bulletins on ag. ed. He is a master in handling conferences, inspiring teachers in the classroom; and he has keen judgment in evaluating teaching and community programs. In general, he is a firm adherent to the clear-cut principles and philosophies in which he believes, a wise counselor, and a warm-hearted genial friend to all his students and colleagues. -- A. W. Nolan

First editor of new national magazine, Agricultural Education, Jan., 1929-March, 1930.

Hamlin

Figure 4 The Biographical Sketch of H. M. Hamlin from the manuscript.

Of the leaders identified most were typical agricultural educators as we know them (teacher educators and state supervisors). However some of the individuals identified might not be considered to be agricultural educators as we define them. These included education philosophers, authors and publishers, college deans and agricultural scientists. However, at the point in time the document was created, the profession was of the opinion that these individuals had made major contributions to the field of agricultural education and should be recognized. A number of the early agricultural educators whom we know virtually nothing about today are included in the manuscript. The historical significance of this manuscript defies description. A listing of the identified early leaders are found in Table. 1.

Table 1

Early Leaders Listed in the Stimson Manuscript[1]

Person	Professional Contribution	State
Carver, George Washington	African American Agricultural Scientist	AL
Chestnutt, Samuel Lee	Agricultural Teacher Educator	AL
Moton, Robert Russa	Director of Tuskegee Institute	AL
Pierce, John Baptist	One of the first African American county agents	AL
Washington, Booker T.	Pioneered extension work for African Americans	AL
Holloway, Keith Learning	Agricultural Teacher Educator	AR
Smith, Fred Alfred	State Supervisor of Agricultural Education	AR
Hilton, Arthur Robert	Introduced Ag Education into Australia	Australia
Cline, Russell Walter	Agricultural Teacher Educator	AZ
Cullison, James Ralph	State Agricultural Education Supervisor	AZ
Crocheron, B. H.	Extension Director	CA
Cubberly, Elwood Patterson	Educational Historian	CA
McMahon, Byron John	State Agricultural Education Supervisor	CA
Sutherland, Sidney Sampson	Agricultural Teacher Educator	CA
Davis, Irving Gilman	Head of Agricultural Economics	CT
Gentry, Charles Burt	Agricultural Teacher Educator	CT
Gold, Theodore Sedgwick	Established private ag school, now UCONN	CT
Benson, Oscar Herman	National 4-H and Boy Scout Leader	DC
Crosby, Dick J.	Head of Ag Ed Service in USDA , 1901-1913	DC
Dennis, Lindley Hoag	AVA Executive Secretary	DC
Heim, Raymnd Walter	State Agricultural Education Supervisor	DE
Mowlds, William Lyle	State Agricultural Education Supervisor	DE
Hamlin, Herbert McNee	Agricultural Teacher Educator	IL
Gams, Edward Walter	Agricultural Teacher Educator	FL
Aderhold, Omer Clyde	Agr.Teacher Educator, University President	GA
Berry, Martha McChesney	Founded the Berry School (for poor rural students)	GA
Chapman, Paul Wilbur	Agriculture Dean, author of *The Greenhand*	GA
George, Walter Franklin	U. S. Senator	GA
Mobley, Mayor Dennis	AVA Official, teacher educator and supervisor	GA
Sheffer, Lafayette Miles	State Agricultural Education Supervisor	GA
Wheeler, John Taylor	Agricultural Teacher Educator	GA
Bender, Wilbur H.	Agricultural Teacher Educator	IA
Kildee, Henry Herbert	Dairy Specialist	IA
Lancelot, William H.	Agricultural Teacher Educator	IA
Morgan, Barton	Agricultural Teacher Educator	IA

Obye, Charles H.	Pre-Smith-Hughes Agriculture Teacher	IA
Quick, John Herbert	Author of novels promoting vocational agriculture	IA
Sexauer, Theodore Edward	Agricultural Teacher Educator	IA
Starrak, J. A.	Agricultural Teacher Educator	IA
Wallace, Henry Cantwell	Secretary of Agriculture, US Vice-President	IA
Wilson, Guy M.	First Head of Ag Ed at Iowa State	IA
Kerr, William	State Director of Vocational Education	ID
Lattig, Herbert Elmer	Agricultural Teacher Educator	ID
Davenport, Eugene	Agriculture College Dean	IL
Guin, Russell L.	Major Publisher of Agricultural Education Books	IL
Hill, James Edward	State Agricultural Education Supervisor	IL
Holden, Perry Greeley	National Leader in Corn Improvement	IL
Nolan, Aretas W.	Agricultural Teacher Educator	IL
Smith, Z. M.	4-H leader and state agric. education supervisor	IN
Brown, Hale H.	Agricultural Teacher Educator	KS
Davidson, Allan Park	Agricultural Teacher Educator	KS
Williams, Cyrus Vance	Agricultural Teacher Educator	KS
Hammonds, Carsie	Agricultural Teacher Educator	KY
Woods, Ralph H.	State Director of Agricultural Education	KY
Jackson, Shelby Marion	State Superintendent of Education	LA
Lee, J. G.	Agricultural Teacher Educator, Ag College Dean	LA
Allen, Charles Ricketson	Federal T&I Official and prolific author	MA
Eliot, Charles William	President of Harvard	MA
Glavin, John Griffin	State Agricultural Education Supervisor	MA
Hanus, Paul H.	Education Professor at Harvard, voc. ed advocate	MA
Hart, William R	Agric, Teacher Educator before Smith-Hughes	MA
Heald, Franklin Ernest	State Agricultural Education Supervisor	MA
Merrill, Elmer Drew	Director, Arnold Arboretum (Harvard University)	MA
Munson, Willard Anson	State Director of Extension	MA
Orr, William	Deputy Commission - State Board of Education	MA
Sears, Fred C.	National Expert in Fruit Production	MA
Small, Robert Orange	State Director of Vocational Education	MA
Snedden, David	Sociologist, Early Leader/Advocate for Voc. Ed.	MA
Ware, Charlotte Barrell	Established early private dairy school for women	MA
Welles, Winthrop Selden	Agricultural Teacher Educator	MA
BlackwcII, Jefferson Davis	Federal Official, University President	MD
Cotterman, Harold F.	State Agricultural Education Supervisor	MD
Hill, Herbert Staples	Teacher Educator and State Supervisor	ME
Butterfield, Kenyon Leech	Ag College Dean, Country Life Commission	MI
Byram, Harold Moore	Agricultual Teacher Educator	MI
Cook, Glen Charles	Agricultural Teacher Educator	MI
Deyoe, George Percy	Agricultural Teacher Educator	MI

Legge, Alexander	President of International Harvester,	Midwest
Field, Albert Martin	Agricultural Teacher Educator	MN
Perrin, John L.	State Agricultural Education Supervisor	MO
Martin, Verey Good	Agricultural Teacher Educator	MS
Palmer, Ronald Harry	Agricultural Teacher Educator	MT
Browne, Thomas Everette	Boys Corn Club Leader, State Voc. Ed. Director	NC
Cook, Leon Emory	Agricultural Teacher Educator	NC
Joyner, James Yadkin	State Superintendent of Public Instruction	NC
Poe, Clarence	Founder and editor of Progressive Farmer	NC
Thomas, Roy H.	State Agricultural Education Supervisor	NC
Bradford, Harry E.	Agricultural Teacher Education	NE
Bridges, Style	Ag Teacher, Governor, Senator, Farmer Advocate	NH
Howard, Carl Gooch	State Supervisor and Teacher Educator	NM
Wimberly, Frank E.	State Agricultural Education Supervisor	NM
Bailey, Liberty Hyde	Eminent Botanist, Cornell Ag College Dean	NY
Baker, Hugh Potter	Forestry professor and leader	NY
Dewey, John	Educational Philosopher	NY
Eaton, Theodore Hildreth	Professor of Rural Education	NY
Getman, Arthur Kendall	State Agricultural Education Supervision	NY
Graves, Frank Pierrepont	University President	NY
Hoskins, Edwin R.	Professor of Rural Education	NY
Howe, Frank William	USDA proponent of agricultural education	NY
Ladd, Carl Edwin	Agricultural College Dean	NY
Mann, Albert Russell	Rural Sociologist, Ag College Dean	NY
Weaver, W. Jack	State Agricultural Education Supervisor	NY
Works, George Alan	Head of Rural Education Department - Cornell	NY
Olney, Roy A.	Agricultural Teacher Educator	NY,WV
Bricker, Garland Amor	Rural Education Specialist	OH
Charters, Werrett Wallace	Education Dean, Curriculum Authority	OH
Fife, Ray	Agricultural Teacher Educator	OH
Graham, Albert B.	Founder of 4-H	OH
McClarren, Howard	State Supervisor and Teacher Educator	OH
Stewart, Wilbur Filson	Agricultural Teacher Educator	OH
Mcintosh, Daniel Cobb	Agricultural Teacher Educator	OK
Gibson, Heber Howard	Agricultural Teacher Educator	OR
Griffin, Frederick Llewellyn	Agricultural Teacher Educator	OR
Morgan, Ralph Lester	State Agricultural Education Supervisor	OR
Broyles, William Anderson	Agricultural Teacher Educator	PA
Brunner, Henry Sherman	Agricultural Teacher Educator	PA
Dickerson, Russell Burton	Agricultural Teacher Educator	PA
Fetterolf, Howard Cleveland	State Agricultural Education Supervisor	PA
Hall, William Franklin	Agricultural Teacher Educator	PA

Martin, Vernor Allen	Assistant State Supervisor	PA
Parkison, Harry Glenn	Agricultural Teacher Educator	PA
Watts, Ralph L.	Agricultural College Dean	PA
Austin, Everett Lewis	Agricultural Teacher Education	RI
Crandall, Will Giles	Agricultural Teacher Educator	SC
Naugher, R, E.	Federal Specialist in Agricultural Education	SC
Peterson, Verd	State Agricultural Education Supervisor	SC
Beard, Ward P.	Federal Education Specialists	SD
Wiseman, Clinton Raymond	Agricultural Teacher Educator	SD
Fitzgerald, Nugent Edmund	Agricultural Teacher Educator	TN
Davis, Charles Lewis	State Agricultural Education Supervisor	TX
Hayes, Martin Luther	Agricultural Teacher Educator	TX
Rutland, Jesse Blake	State Agricultural Education Supervisor	TX
Wilson, Samuel Calhoun	Agricultural Teacher Educator	TX
Elam, William Nile	Federal Supervisor, Black Agriculture Teachers	USA
Goodwin, William Irving	Federal supervisor of Ag Ed for Indians	USA
Gregory, Raymond Williams	Federal Specialist in Agricultural Education	USA
Hawkins, Layton S.	Federal Vocational Education Official	USA
Hollenberg, Alvin H.	Federal Specialist in Agricultural Mechanics	USA
Huslander, Stewart C.	Federal Agricultural Education Specialist	USA
Knapp, Seaman Asahel	Father of the Extension Service	USA
Lathrop, Frank Waldo	Federal Agricultural Education Specialist	USA
McClelland, John Barnhart	Federal Agricultural Education Official	USA
McCormick, Cyrus Hall	Invented the Reaper	USA
Pearson, James H.	Federal Agricultural Education Official	USA
Prosser, Charles Allen	Early Leader in Vocational Education Legislation	USA
Schopmeyer, Clifford H.	U.S.D.A. Agriculture Curriculum Specialist	USA
Shinn, Erwin Henry	USDA Chief Specialist for Agricultural Education	USA
True, Alfred Charles	USDA, Director of Ag Experiment Stations	USA
Wallace, Henry Agard	Editor of Wallace's Farmer	USA
Williams, Arthur Perry	Federal Agricultural Education Official	USA
Wilson, James	U.S. Secretary of Agriculture	USA
Wright, J. C.	Federal Vocational Education Official	USA
Armstrong, Samuel Chapman	Founded Hampton Institute for Negroes	VA
Lancaster, Dabney Stewart	State Superintendent of Education	VA
Owens, George Washington	NFA Founder, Agricultural Teacher Educator	VA
Webb, Everett Milton	Agricultural Teacher Educator, State Supervisor	WA
Babcock, Stephen Moulton	Invented Babcock milk tester	WI
Hatch, Kirk Lester	Early Extension Leader	WI
Henry, William Arnon	Worldwide expert on Feeds and Feeding	WI
James, John Ambrose	Agricultural Teacher Educator	WI
Selvig, Conrad George	Two year Ag College Director	WI

Parsons, Dickson Ward	Agricultural Teacher Educator	WV
Dadison, Samuel Houston	Agricultural Teacher Educator	WY
Hitchcock, Samuel	State Agricultural Education Supervisor	WY
Ruch, Jack Leon	State Agricultural Education Supervisor	WY

[1]It should be noted that Stimson did not include himself in the Honor Roll.
In a letter to Stimson dated March 20, 1947 Frank Lathrop suggested Roy Roberts (AR) and Robert A. Manire (TX) be added to the honor roll.

Conclusions and Recommendations

Lamar (1966, p. 18), in a call for leadership from the profession, wrote:

Our early leaders in agricultural education had very few guidelines. They were called on to blaze a new trail and develop a new program. They had the responsibility to develop a new program. They had the responsibility to develop a theoretical foundation for vocational education in agriculture which is essential for any sound program. Theirs was the task to develop a basic philosophy and formulate the aim and objectives to serve as guidelines for program development and evaluation.

If agricultural education, in the emerging era, is to serve the vocational education needs of the agricultural industry as well as it has done so in the era just ended, leaders in agricultural education must acquire the same kind of vision, desire, dedication, and capability that characterized the leaders who have carried us to this point.

By studying the lives and accomplishments of the first generation of agricultural educators, we can heed the advice from Lamar and be better prepared to provide leadership for the profession.

Perhaps today we should look outside of our agricultural education inner circle to see what those outside of the circle can contribute to the further growth and development of agricultural education. During the formative years of agriculture, this appears to have been a common practice since a number of educators, philosophers and agricultural leaders were identified as contributing to the profession.

The lost Stimson manuscript did exist and was found.

References

Camp, W. G. & Crunkilton, J. R. (1985). History of agricultural education in America: The great individuals and events. *Journal of the American Association of Teacher Educators in Agriculture*, *26*(1), 57-63. DOI: 10:5032/jaate.1985.01057

Foor, R. M. & Connors, J. J. (2010). Pioneers in an emerging field: Who were the early agricultural educators? *Journal of Agricultural Education*. *51*(3), 23-31 DOI: 10:5032/jae.2010.030123

Fraenkel, J. R. & Wallen, N. E. (2006). *How to design and evaluate research in education (6th ed.)*. New York, NY: McGraw-Hill.

Hamlin, H. M. (1929). Editorial comments. *The Agricultural Education Magazine*. *1*(3), 2.

Heald, F. E. (1929). Our leadership in agricultural education Rufus W. Stimson, pioneer. T*he Agricultural Education Magazine*. *1*(3), 3, 4, 14, 15.

Hirsch, Jr. E. D. (1987). *Cultural literacy: What every American needs to know*. New York: NY: Houghton Mifflin Company.

Lamar, C. (1965). Leadership for new programs. *The Agricultural Education Magazine*. *38*(1), 29.

Lathrop, F. W. (1947). Rufus Whitaker Stimson. *The Agricultural Education Magazine*. *20*(2), 18-19.

National Research Council. (1988). *Understanding agriculture: New directions for education*. Washington, DC: National Academy Press.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Identifying the First Generation Leaders in Agricultural Education: The Lost Stimson Manuscript

A Critique

Brian E. Myers, Professor and Chair
University of Florida

The author presents the process he undertook to discover and share a historical document important to the agricultural education profession. He shares, in detail, the steps he took to locate, secure, validate, and share the document. Dr. Moore is to be commended for his tenacity and dedication in the search for this item. This manuscript highlights the importance and difficulty of quality historical research. Further, in the manuscript, the author provides his own commentary of the quality and practices of other historical research conducted and shared in the profession.

Below I've provided a few questions/thoughts for you to consider:

1. In the manuscript you include a discussion on the importance of historical research and historical reflection in the profession. What are some practices that should be implemented to help ensure current and future generations of the agricultural educational professional have this important foundation?

2. What are the current plans for the Stimson manuscript? Will the project he started be completed? If not, how will the information he did collect be shared?

3. It was noted in the manuscript that previous efforts to document leaders in the profession may be considered incomplete. What processes and standards should be put into place to identify key individuals?

4. Included in the manuscript were a few comments criticizing the current quality of historical research in the profession. What steps need to be put in place to improve this research? What criteria or standards should be used to evaluate this research?

Social Change Movements and Agricultural Education: Offering an Alternative Lens and Framework for Our Future

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Abstract

The purpose of this philosophical paper is to serve as a critical reflection point for Agricultural Education. This was accomplished through a discussion of transformative learning theory as a lens to guide critical evaluation of our profession and utilization of social change theory to provide new perspective to foundational events in the history of Agricultural Education. Finally, challenging questions were raised to foster critical reflection within the profession. This philosophical paper contends that attention to current social issues is warranted to ensure professional viability. Meaningful discourse among all disciplines of Agricultural Education is essential to provide context to future action steps aligned with the profession's strategic goals.

Introduction

The broader profession of disciplines within Agricultural Education are at a collective impasse in deciding future directions. This is evidenced by the detailed strategic goals found within the 2017-2020 American Association for Agricultural Education's (AAAE) Strategic Plan document (AAAE, 2017). A hopeful result of nearly every strategic plan and visioning process (this included) is change for the better; change which ultimately moves an organization forward and addresses the current and future needs of stakeholders and societal influences that organization touches (Brody, 2005). This process allows AAAE to perpetuate its foundational mission with a revitalized sense of purpose and focus.

Change implies becoming different or a different version of one's self within a given frame of reference. Jack Mezirow (1997) would contend that this process is transformative learning. Mezirow (1994, 1997, 2000) stated that in order for adults to experience valid learning, they must experience situations which alter their frames of reference. Challenges to these frames will typically go one of two directions; we either stand and critically evaluate the situation and enact change personally and more broadly or we look past and discard what does not fit our present dogma. Though not written as a model for organizational change, transformative learning theory offers learners (membership and leadership alike) with a framework to understand and evaluate the process of changing habits of mind and points of view (frames of reference). It is a critical theory in which a willingness and openness to alternative points of view are a necessity. As a result, the transformations not only change the individual, but can be the building blocks for broader social change in relation to the individual's circle of influence.

Through this paper we, the authors, offer the lens of transformative learning theory to guide our process of necessary change in AAAE. Transformative learning theory is a framework by which we want to prompt discussion and change, beginning with individuals and leading toward the broader profession. In the spirit of Mezirow's theory, using social change theory as an alternative frame of reference allows us to view impactful historical events, such as the Morrill Land Grant Act of 1862, in different light. These historical events that shaped Agricultural Education, those we are most familiar with, additionally shaped Western society. Grand educational experiments enacted social change in the United States which were the results of critical and transformative thinking. Similarly, as the profession moves forward we need to engage in transformative learning experiences that suggest and encourage pathways to help address current societal needs through Agricultural Education and considerations for our profession to move forward.

Purpose, Objectives, and Procedures

The purpose of this philosophical paper was to serve as a critical reflection point for Agricultural Education. This was accomplished through a discussion of transformative learning theory Mezirow (1994, 1997) as a lens to guide critical evaluation of our profession and utilize social change theory to provide new perspective to foundational events in the history of Agricultural Education. To accomplish this purpose, the following objectives were addressed:

1. Discuss the application of transformative learning theory to Agricultural Education;
2. Articulate the outcomes of social change events in Agricultural Education; and
3. Articulate challenging questions to assist in transforming the Agricultural Education profession.

Our approach to the development of this paper was to conduct a review literature that provided a critical analysis of key historical events or actions. An integrative literature review, as described by Torraco (2005), "reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated" (p. 356). The publications included in this review were identified by peer-recommendations, discipline-related publication searches, and database searches. Search terms included a combination of words and phrases from the research purpose and objectives. Publications were chosen for their relevance to our purpose and objectives. While some were chosen for their repository of historical information (e.g., founding legislation, historical progression), others were chosen for their critical analysis of Agricultural Education and the resulting social impacts. The found information was synthesized (Torraco, 2005) using the research objectives to identify relevant information. The relevant information was then synthesized with transformative learning theory literature to provide a new lens through which Agricultural Education, broadly defined, can engage in addressing societal needs.

Our Lens

Transformative Learning Theory

Given that the nature of our work in Agricultural Education requires faculty and staff to be individually autonomous yet collaborative as a profession, transformative learning theory offers a reasonable lens with which we can prepare for and evaluate the critically important growth we must undergo. Mezirow (1997) stated that it is the adult educator's responsibility to guide learners toward becoming "more autonomous, socially responsible thinkers" (p. 8). While learning is individualistic in part, it is also collaborative as people interact to clarify and solve problems. As professionals engaged in the science of teaching and learning, it is important to also reflect, turning this process onto ourselves, and guide our own transformation.

The process of transformative learning involves transforming personal frames of reference through critical reflection and evaluation of held assumptions. Further, beliefs which are challenged are reconciled through engaged discourse with others and diverse sources. Then, the learner reflects upon the discourse to take action toward maintaining the previous frame of reference or transforming it. Lastly, the learner critically assesses what was learned to secure the understanding (Mezirow, 1997). Transformation begins by reflection on a problem encountered which questions or challenges held beliefs. Though not prescriptive, transformative learning follows in Mezirow's (1994) empirically supported (Taylor, 2005) phases:

1. Experience: A disorienting dilemma (standing juxtaposed to previous assumptions)
2. Critical reflection/assessment of assumptions
3. Reflective Discourse
4. Action

Challenges to our understandings happen through our frames of reference. Our frames of reference are comprised of habits of mind and points of view and are where we hold or make our meaning structures. Habits of mind are durable and less susceptible to change whereas points of view adapt with evolving awareness and feedback from others (Mezirow, 1994, 1997). Situations which challenge our meaning, challenge what we know and espouse. Upon recognition of this challenge, we must engage in discourse and acquiring new knowledge through communicating with others. This process can also lead to a deepening (or narrowing) of beliefs and frames of reference if the discourse is not inclusive enough to alter the point of view and consequently engage change to the habits of mind. Consider this example: For a student coming from an isolated community, leaving home and going to college may serve as either a transformative learning experience or lead to confirmation of previously held beliefs. If they avoid meaningful interactions with others who are different from them, they may just deepen their existing beliefs. But, if they seek new opportunities to engage and reflect on new observations, college can be a transformative learning experience.

Discourse follows critical reflection as an essential component of transformative learning, and is the process of developing a dialogue with others and emphasizes empathy as a priority (Merriam, Caffarella, & Baumgartner, 2007). As assumptions are evaluated and internal equilibrium is sought, when engaged in reflective discourse "people weigh evidence for and against the argument and critically assess assumptions. Clearer understanding is achieved through talking with others" (Merriam et al., 2007, p. 134). Following in depth review and information gathering, the individual takes action. Mezirow (2000) contends that action can take the form of "immediate action, delayed action, or reaffirmation of an existing pattern of action" (p. 24). Societal change, beyond the individual, can develop if the problem/situation being addressed affords the opportunity for like-minded people working together to identify and agree upon the need for change and establish appropriate actions to initiate that change.

"Education that fosters critically reflective thought, imaginative problem posing, and discourse is learner-centered, participatory, and interactive, and it involves group deliberation and group problem solving" (Mezirow, 1997, p. 10). Henceforth, if we are to address societal understandings of agriculture, we must first seek to understand through listening. We cannot merely think we can enact change by standing at our pulpit and proselytizing our present frames of reference and points of view. Doing so is only a continuation of present (comfortable) habits of mind, which does not help us progress. Through the process of transformative learning, social change is necessary to create an environment which all may participate in critically reflective discourse and make meaning from their experience (Mezirow, 1994).

Social Change Happens

Societies are complex and ever-changing. However, how do these changes happen? What are the catalysts, the drivers, and consequences of these changes? Understanding these dynamics requires an understanding of social change. Social change widely refers to any change in behavior patterns, cultural values, and norms. Here, we can see the connection with transformative learning as Mezirow's "action" phase (1994, 1997) - social change is that accumulation of individual actions (behavior patterns). It is through critical reflection and reflective discourse that we begin to see the social changes that have impacted our profession and those we are impacting through our profession. We use Social Change Theory, described herein, to help us take a new point of view to ultimately assist in shaping our frames of reference.

Social change has been studied from a number of perspectives and each has contributed to a number of related theories. Karl Marx was one of the first theorists who began to describe the nature of social change. He described it as proactive; that is, in order for social change to occur, there needs to be an upheaval coming from the differentiation of social classes (Coser, 1957). Marx held that conflict is desirable and needed to initiate social change and rid society of inequality (Coser, 1957). Max Weber discussed social change as stemming from radical changes in concepts and ideas; it was more about the ability of individuals to influence the nature of their social relationships through rational association (Weber, 1946, 1993). Finally, Emile Durkheim constructed his theories about society around social facts: external factors, such as values and social norms (Harms, 1981), which work to establish a society’s moral code. Durkheim observed the dissonance that occurred when there was an imbalance between what an individual perceived to be right and what society had deemed to be correct. His observations of social change led Durkheim to believe that collective conscience, values, and rules are essential to a functional society. These theorists laid the foundation for modern conceptualization of social change.

The understanding of social change has changed through time with many theorists adding to our present understanding. Societal changes have progressed into postindustrial thinking encouraging societal progression; for example, the women’s movement, the civil rights movement, and the ecological movement (Haferkamp & Smelser, 1992). Transformative learning plays a part in those movements by raising collective consciousness, an essential component of social change. This type of collective thinking creates a ripple effect producing societal changes; they can be purposeful--as an outcome of planning and purpose--or indirect--as an unintended or unanticipated consequence (Weinstein, 2010). Today, intentional efforts are increasingly the cause for social change (Weinstein, 2010). However, it is important to also consider social movements that are taking hold outside of the formal structure and, in turn, influence changes in social structure and values (Weinstein, 2010). These changes result from efforts such as grassroots movements, activist groups, and tragedy-induced movements that influence the current social structure to the point of the creation of new social rules/laws and norms.

There can be many drivers of social change: agricultural advancements, industrialization, modernization, urbanization, bureaucratization, conflict and competition, political and legal power, ideologies, and adoption of new technologies, just to name a few (Kornblum, 2012). However, just in this short list, there are many drivers within which the agricultural education profession plays a role. Imagine social change as a ripple in a pool of water; there is very little that remains untouched.

Exploring the origins and consequences of social change can provide a new perspective on the agricultural education profession, as a whole. Investigating the impact of social change on the profession presents a new lens with which to view past, current, and potential changes.

Transformative learning paves the way for changing our personal frames of reference to viewing social change as a part of our profession and creating a more socially cognizant point of view for our work. The profession has, at its core, the call to serve people and communities through agricultural research, teaching, and outreach. It is through these efforts that we achieve better livelihoods. The agricultural education profession is not a passive recipient of social change. Through its mission, it has and can continue to take part in creating movements to change the status quo, create new opportunities, and improve people's lives.

Our Lessons: Social Change in Agricultural Education

Social change has played an essential role in Agricultural Education and how it has transformed through history. The fundamental events and their ramifications remain visible in the structure of our educational and social systems today. The intent here is not to present an exhaustive history of the profession, rather we aim to illuminate how taking a fresh look at previously established events and knowledge can serve to transform our frames of reference through critical reflection (Mezirow, 1994, 1997) and perhaps understand new areas of inquiry in the disciplines of agricultural teacher education, leadership, communication, and extension.

Morrill Acts

The Morrill Act of 1862 established the Land Grant University System and democratized higher education for the United States' populace. It helped to legitimize the value of scientific inquiry, education, and sharing of agricultural knowledge thereby setting the stage for invaluable human progress in the coming century and beyond (McDowell, 2001). Further, this drove the development of education in agriculture beyond higher education and led to the need for training teachers in agricultural education (Herren & Hillison, 1996). The societal ripple effect from the passage of the Morrill Act cannot be understated as it led to the development of associated experiment stations and the extension system. It paved the way for inclusion of minorities and women in higher education with subsequent acts and an official mechanism for secondary career and technical education. The formal beginning of each recognized profession within Agricultural Education today was arguably sparked with this Act of the 37th Congress of the United States.

The Morrill Act, however, was not the beginning push for education in agriculture in the United States. Thomas Jefferson promoted the importance of studying agriculture nearly 100 years earlier and, leading up to 1859, several states in the Midwest began preparations for agricultural colleges at established universities (Grant, Field, Green, & Rollin, 2000). Up to the Morrill Act of 1862, college curriculum was "largely verbalistic" (Carstensen, 1962, p. 35) without reasonable scientific focus and foundation. Further, due to the focus on the agricultural sciences and applications, Land Grant institutions effectively established the mode of operation for scientific inquiry (Carstensen, 1962).

Through all of this positive imagery of an educational, intellectual, and scientific revolution taking place as a result of the Morrill Act, an important, immutable, yet unintended consequence must be discussed. The Morrill Act of 1862 was enacted before the end of slavery and consequently, with a few exceptions, the federal funds developed "white colleges from which black people were excluded" (Humphries, 1991, p. 4). Although the second Morrill Act in 1890 was sanctioned to eliminate an educational disparity, Humphries (1991) points out it actually endorsed a separate but equal ideology in higher education. Funding models were also restrictive for 1890 institutions. This limited the development of agricultural sciences curriculum and Hatch Act research stations (Harris & Worthen, 2004). As a result, many of the 1890 Morrill institutions evolved into normal institutions where they primarily trained teachers and lacked the focus on and support for agricultural and mechanics studies (Humphries, 1991). Ultimately, the structure of higher education and the trajectory of educational opportunities for all in the United States were influenced by the Morrill Acts and the funding the institutions under their umbrella received. It is worth considering if present economic disparities between races could be contributed, in part, to the separate paths 1862 and 1890 institutions traveled at their onset.

Smith-Lever Act

The Cooperative Extension System was formalized by the passage of the Smith-Lever Act of 1914, however, it developed following more than a decade of work to improve the situation of rural Americans through education. As such, Cooperative Extension provides an example of purposeful social change, as described by Weinstein (2010). Early extension efforts promoted a shift from subsistence farming to science-based practices that were part of a larger "modernizing" movement in the United States towards an "interrelated urban-industrial-business society" (Jenkins, 1980, p. 4). This emphasis on scientific methods was also consistent with the Progressivism movement (Jenkins, 1980), as were rural social reform efforts of this era (Rosenberg, 2015).

Youth agricultural and domestic clubs arose among rural reformers' concerns about rural degeneracy and urban migration, claiming that youth clubs "bypass two rotten players driving rural degeneracy: bad parents and bad schools" (Rosenberg, 2015, p. 33). By focusing on youth, corn clubs sought to reach boys and skeptical farmers (Uricchio et al., 2013, p. 233). This method of outreach increased the viability of rural communities (Rosenberg, 2015). The inclusion of home economics and demonstrations recognized of the role of the farm wife in ensuring prosperity for the farm. The courses improved home sanitation through dissemination of new scientific understandings, educated women on running a home, and alleviated problems resulting from issues such as social isolation and overwork (Scholl, 2013).

The Smith-Lever Act also institutionalized the values and ideals of that time. Critics have often discussed Extension's historical emphasis on serving the middle-class interests and values and the promotion of commercial agriculture (Jenkins, 1980; Rosenberg, 2015), arguably limiting access to those without the financial means to participate. This was exacerbated by the segregated Extension systems in southern states (US Commission on Civil Rights, 1965). These systems mirrored race relations and formally set up a system of inequality by allowing state legislatures to choose where Extension work was administered (1862 or 1890 Institutions) and local control of staffing and funding decisions. In 1965, the viability of white farms had significantly improved while most black farms were still operating at near subsistence levels. This is attributed to a variety of structural factors, including: lack of training for black county agents, segregated systems that limited access to specialists, lack of service to black clientele in counties without black agents, separate county offices with discrepancies in resources, and significantly higher caseloads for black agents as compared to their white counterparts.

The social climate of the early 1900's and the agenda of reformers at the time also set up an Extension system that perpetuated gender roles in farm families. While there were some joint activities such as gardening, dairy and poultry, early 4-H programs for boys and girls were often offered separately, with the former emphasizing production agriculture and the latter teaching homemaking skills (Rosenberg, 2015). As opportunity for urban women in the 1920s increased, the 4-H program for rural girls "was increasingly directed at transforming [gendered] labor arrangements" (Rosenberg, 2015, p. 95), moving away from teaching the production of products for economic value to an emphasis on the "aesthetic and social dimensions of women's labor" (Rosenberg, 2015, p. 100). This division of labor was also reflected in programs for adults, "assigning productive work to men and consumption management to women" (Hoffschwelle, 2001, p. 53). Educating 4-H girls and farm wives in home economics improved the conditions of farm families, but their exclusion from agricultural programs likely perpetuated social norms about the role of women on the farm that persist today.

Simultaneously, as the structure of the Land Grant System, the efforts of Cooperative Extension services, and supporting efforts by agricultural leadership and communications programs came into full swing, United States agriculture and rural life began to see dramatic shifts. Increased capacity in rural communities, advancement in agriculture-related research and in development of agricultural technologies, and—minus the troubled years of the Great Depression and Dust Bowl—increases in family and community wealth, health (broadly defined), and general agricultural success (Hurt, 2002). These shifts can be attributed to the social changes affecting Agricultural Education, creating opportunities to serve the people. Through critical reflection, review of these events can also show us much about the current state of Agricultural Education. As a result of the institution and efforts of these entities, there were intended and unintended consequences. Intended were the agricultural efficiencies, wealth, and overall well-being of rural communities and families. Unintended were the mass exodus from the farm to the suburb, the general separation that has occurred between the producer and consumer, and the persistent gender roles and racial inequalities that exist in much of agriculture. In some ways today, our programming is seemingly back at square-one trying to support rural and urban communities so they can be successful in a new social environment.

Discussion: Food for Thought

There is much to be said about examining the Agricultural Education profession through the lens of transformative learning theory and social change. In the previous section, we discussed the impacts social change has had on the history of the profession, as well as highlighting the impacts the profession has had on society. Viewing the lasting positive and negative societal effects of these foundational events as a point of critical reflection, as indicated by Mezirow (1994), we can see the potential for transformative learning to occur within the profession. For example, critical reflection on the structural inequalities set up by the Morrill acts can lead to more productive discourse that may lead to changes in points of view. This broadened perspective could lead to changes in how agricultural education faculty at primarily white institutions engage with their colleagues at minority serving institutions. This discourse can alter our points of view leading to a more informed frame of reference (Mezirow, 1994, 1997) regarding inclusion and diversity. This paper could effectively serve as the disorienting experience which provokes our movement through Mezirow's (1994) phases.

In the United States, there are many historical and current social changes involving agriculture, which include, but are not limited to, food production, slow and local food movements, sustainable agricultural production, and demands for transparency in agricultural production practices. There are also many organizations seeking to use food production as a vehicle for science learning, social justice, and community development through programs such as school gardens, reclaiming vacant lots, and other urban agriculture programs. While Extension continues to remain relevant in the rural context, there is a need for more focus on urban settings. In addition to the further development of urban school-based agricultural education programs to establish food production literacy, there must be a shift in the Agricultural Education paradigm--a shift in our frames of reference (Mezirow, 1994)--to support increased involvement, information/training, and provisions so these programs can be successful, grow, and multiply.

These changes drive the importance and relevance of the Agricultural Education profession by ensuring that agriculturists are well represented and informed, Extension agents know how to work with diversified clients (e.g., urban agriculturists, hobby farmers, organic agriculturists, etc.), and ensuring students entering the agricultural workforce are prepared with the necessary competencies to meet the many challenges of working in this field. In addition to serving the needs of direct constituents, the profession has a place at the table to help address the world's wicked problems (hunger, climate change, rights of women, etc.). As communicators, educators, leaders, and change agents, we have the prime opportunity to partner and show the value of our involvement through innovative research and practical application.

The United States is experiencing a remarkable period of time in its organized democratic society. It has reached a point nearly void of knowledge, understanding, and familial connectedness to the production and processing of human sustenance. The mission of the Land Grant University System has been realized, though more so with unintended consequences. The efficiencies of agricultural food production have fueled the stark separation of the general public from a literate foundation in agriculture. So much so, that little to no educational content on agriculture exists today within the general curriculum in primary and secondary schools. Even teachers graduating from Land Grant institutions have negligible content foundation in the food and agricultural sciences, if any.

However, the social norm of apathy toward food knowledge is more recently supplanted with a public desire, hunger if you will, for an understanding of food origin. The public has chosen to inform their point of view and alter their frames of reference regarding their food. In many unfortunate ways, the expertise found within our profession and the disciplines of agriculture are not being drawn from to inform the public. Instead, anecdotal resources are sought and referenced in broader communications. The public is looking to engage in discourse and information gathering to learn about these topics (Mezirow, 1994, 1997), yet they do not know Agricultural Education exists. They are unaware of the purpose of Land Grant Institutions; Extension; or the invaluable, unbiased research through which our society has advanced since 1862. With this societal dynamic in mind, the Agricultural Education profession is at an impasse. We are needed and the narrative needs to be supported by the members of our profession, as a whole. The process of transformative learning theory can help guide our profession in changing our frames to address how we can continue to be viable, relevant, and important in addressing these societal changes. While not all social changes involve agriculture, those that do continue to give great importance to the foundation of our profession, as well as our forward movement.

Implications for Research and Practice: Transforming our Lens

This paper has presented transformational learning as a new lens through which we in the profession of agricultural education can process the historical foundations of our profession in conjunction with social change to create positive changes for our future. However, we must ask ourselves, "Where do we go from here?"

Research and Practice

As a field founded in applied research, there is ample opportunity to investigate social changes and the Agricultural Education profession through a critical, transformative approach. Transformative research has, at its core, the intention to create change and bring about equity and equality for underrepresented and oppressed individuals and groups (Creswell, 2009). As a profession that seeks to better people's livelihoods, we can view our work through a transformative lens that lends itself to creating social changes. Further, we must be cognizant of the ever-changing, increasingly complicated challenges the world faces. These will require adapting new research approaches to create impactful change.

In addition to using a more critical approach, there are also many theories that can be explored as foundations for social change in the agricultural context. This paper only highlighted deterministic theories of social change. For new theoretical frameworks that demonstrate human interaction with a content area, we can look to various fields such as Social Work, Policy/Political Sciences, Education, Anthropology, Socio-horticulture, and more. Exploring different theories or their intersections with our profession's most commonly used theories, we can begin to view Agricultural Education through a multi-faceted lens, further enhancing the profession's depth of knowledge and connection to other fields. While this critical reflection and reflective discourse with other fields may reaffirm our beliefs and structure, it has the potential to engage us in timely societal change (Merriam et al., 2007; Taylor, 2005).

Public and private funding organizations, such as, but not limited to, the U.S. Department of Agriculture (2014), the National Science Foundation (2014), and the Bill and Melinda Gates Foundation (2016), have realized the critical nature of complex problems and have prioritized applied research in these areas (e.g., food security/safety, climate change, water, nutrition). These complex problems may very well be products of social change movements and will require transformative learning to find/create solutions and initiate change. Our own professional organization, AAAE, acknowledges our profession's role in creating social change to solve complex problems (Roberts, Harder, & Brashears, 2016). The Agricultural Education profession cannot continue to work independently. It will require greater collaborative efforts in working with colleges, departments, and organizations that are not often considered to adapt and address the social challenges of our time. We must be prepared.

Challenging Questions

Each of the discipline areas in Agricultural Education must systematically approach these social issues with questions that challenge what we know, challenge what we assume to be correct (or incorrect), and challenge the foundations of our profession moving forward. Considering the previous point that the profession has achieved the goals set forth by the founding legislations and we are starring in the face of chronic agricultural illiteracy, we need to engage ourselves in critical reflection (Mezirow, 2000). This reflection must challenge our research and our practice. We need to be proactive and forward thinking, not solely reactive. Through AAAE's strategic planning process (AAAE, 2017), this critical reflection must be part of exercising our four goals. In goal one, what does it mean to be inclusive? What structures are in place preventing all forms of inclusivity? In goal two, we aim to increase membership. What types of philosophical shifts will need to take place to ensure existing membership supports this goal? Toward accomplishing goal three and increasing collaboration, how do we promote and legitimize our disciplines in the eyes of a broader audience? Lastly, goal four seeks to increase the impact of our scholarship. How do we move away from picking the low hanging fruit and teaching our graduate students to do the same? How do we keep tenured faculty engaged in advancing Agricultural Education? These questions should also help to guide our role and relevance in society's mind as the grand, social problems are addressed.

As a profession, how are we currently connecting people to their food system in a positive way, and how can we improve these efforts and make them more effective? In Agricultural Education, have we explored the necessary curriculum to teach our youth about food systems? Have we adequately supported and efficiently integrated experiential learning opportunities, such as community and urban gardening, to demonstrate learning and transdisciplinary applications? How can we use the current public interest in food (e.g., cooking, origin, value added, etc.) to reach a broader, non-traditional agricultural audience? In a world of expanding information access, are we teaching our students to critically consume information? Are we teaching them to learn? In Extension, have we conducted the appropriate needs assessments--or aggregated appropriate existing data--to gather consumer understanding and preferences so we can create more efficient programming? How do we evolve delivery methods to incorporate technology more effectively? How can we position Extension resources to be the first source of knowledge for the public? Are we looking outside of our usual community stakeholders? How can we engage adult audiences that are not generally considered stakeholders? With the current social challenges, they are now. In agricultural leadership, what is it going to take for our future leaders in agriculture to be effective from the local to global levels? What skills are they going to need to create and instigate meaningful, purposeful, and great social change? In agricultural communication, how will we need to package information for general public acceptance? How can we work together as a profession to instill effective communication skills into the diverse audiences with which we work? How can we position ourselves as a discipline to be proactive in communicating and translating our messages and not reactive?

We intentionally leave this paper with more questions than answers as we hope it is a charge for our profession. If this document serves as a disorienting dilemma, a critical reflection of our assumptions, then meaningful discourse is the next phase for our progress (Mezirow, 1994, 1997). We need to engage at our conferences, in our universities, in our colleges, and in our departments to inform our points of view and support the change in our frames of reference. We need to inform each other and we need to listen. Our stakeholders must have a seat at the table and co-create the future. This reflection and discussion needs to all take place before we can decide upon the action and direction we need to move toward. Our discourse must be open and exhaustive, otherwise our actions will be ill-informed. Transformation does not happen here, in the ivory tower, alone.

References

AAAE. (2017). *American Association for Agricultural Education 2017-2020 Strategic Plan.* Accessed from:http://aaaeonline.org/resources/Documents/National/AAAE%202017-2020%20Strategic%20Plan%20Public%20Final.pdf

Bill and Melinda Gates Foundation. (2016). *What we do.* Retrieved from http://www .gatesfoundation.org/What-We-Do.

Boone, K., Meisenbach, T., & Tucker, M. (2000). *Agricultural communications: Changes and challenges*. Ames, IA: Iowa State University Press.

Brody, R. (2005). *Effectively Managing Human Service Organizations.* Thousand Oaks: Sage.

Burnett, C., & Tucker, M. (2001). *Writing for agriculture: A new approach using tested ideas* (2nd ed.). Dubuque, IA: Kendall/Hunt Publishing Company.

Burns, J. M. (1978). *Leadership*. New York: Harper & Row.

Cameron, G. (2016, September). Exclude journalists at society's peril. *The International Society of Weekly Newspaper Editors*, p. 7.

Carstensen, V. (1962). A century of the land-grant colleges. *The Journal of Higher Education, 33*(1), 30-37.

Coser, L. A. (1957). Social conflict and the theory of social change. *The British Journal of Sociology, 8*(3), 197-207.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches.* Los Angeles: Sage.

Duley, C., Jensen, R., & O'Brien, J. (1984). *A review of agricultural journalism programs in the United States universities* (Unpublished master's thesis). University of Wisconsin-River Falls, River-Falls, WI.

Grant, P. M., Field, T. G., Green, R. D., & Rollin, B. E. (2000). The importance of comprehensive agricultural education in land-grant institutions: A historical perspective. *Journal of Animal Science, 78*(6), 1684-1689.

Haferkamp, H., & Smelser, N. J. (Eds.). (1992). *Social change and modernity*. Berkeley, CA: University of California Press.

Harms, J. B. (1981). Reason and social change in Durkheim's thought: The Changing relationship between individuals and society. *The Pacific Sociological Review, 24*(4), 392-410.

Harris, R. P., & Worthen, H. D. (2004). Working through the challenges: Struggle and resilience within the historically black land grant institutions. *Education, 124*(3), 447-455.

Herren, R. V., & Hillison, J. (1996). Agricultural education and the 1862 land-grant institutions: The rest of the story. *Journal of Agricultural Education, 37*(3), 26-32. doi: 10.5032/jae.1996.03026.

Hoffschwelle, M. S. (2001). "Better Homes on Better Farms": Domestic Reform in Rural Tennessee. *Frontiers: A Journal of Women Studies, 22*(1), 51-73. doi: 10.1353/fro.2001.0008

Humphries, F. S. (1991). 1890 land-grant institutions: Their struggle for survival and equality. *Agricultural History, 65*(2), 3-11.

Hurt, R. D. (2002). *American agriculture: A brief history*. West Lafayette, IN: Purdue University Press.

Irani, T., & Doerfert, D. L. (2013). Preparing for the next 150 years of agricultural communications. *Journal of Applied Communications, 97*(2), 6-13.

Jenkins, J. W. (1980). Historical Overview of Extension. In *Evaluation of Economic and Social Consequences of Cooperative Extension Programs. Appendix I.* (pp. 1-31). Washington D. C.: Department of Agriculture, Science and Education Administration.

Johnson, E. L. (1997). Misconceptions about the early land-grant colleges. In L.F. Goodchild & H.S. Wechsler (Eds.), *The history of higher education* (pp. 222-233). Needham Heights, MA: Simon & Schuster Publishing.

Kornblum, W. 2012. *Sociology in a changing world* (9th ed.). Bemont, CA: Wadsworth Cengage Learning.

McDowell, G. R. (2001). *Land-grant universities and extension into the 21st century. Renegotiating or abandoning a social contract*. Ames, IA: Iowa State University Press.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in Adulthood*. San Francisco: Jossey-Bass.

Mezirow, J. (1994). Understanding transformation theory. *Adult Education Quarterly, 44*(4), 222-232.

Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, *74,* 5-12.

Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress.* San Francisco: Jossey-Bass.

Moore, G. E. (1988). The involvement of experiment stations in secondary agricultural education, 1887-1917. *Agricultural History, 62*(2), 164-176.

National Science Foundation. (2014). *Strategic plan for 2014-2018*. Retrieved from https://www .nsf.gov/pubs/2014/nsf14043/nsf14043.pdf

Newcomb, L. H. (1993). Transforming university programs of agricultural education. *Journal of Agricultural Education 34*(1), 1-10. doi: 10.5032/jae.1993.01001

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Rosenberg, G. N. (2015). *The 4-H Harvest: Sexuality and the State in Rural America*. Philadelphia, PA: University of Pennsylvania Press.

Rost, J. C. (1991). *Leadership for the 21st century*. New York, NY: Praeger Publishers.

Scholl, J. (2013). Extension family and consumer sciences: Why it was included in the Smith-Lever Act of 1914. *Journal of Family & Consumer Sciences, 105*(4), 8-16.

Taylor, E. W. (2005). An update of transformative learning theory: A critical review of the empirical research (1999-2005). *International Journal of Lifelong Education, 26*(2), 173-191. doi: 10.1080/02601370701219475.

Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review, 4*(3), 356-367. doi:10.1177/1534484305278283

True, A. C. (1929). *A history of agricultural education in the United States, 1785-1925* Retrieved from http://hdl.handle.net/2027/coo.31924055080091

United States Commission on Civil Rights. (1965). *Equal opportunity in farm programs: An appraisal of services rendered by agencies of the United States Department of Agriculture* Retrieved from http://hdl.handle.net/2027/mdp.39015027982688

Uricchio, C., Moore, G., & Coley, M. (2013). Corn clubs: Building the foundation for agricultural and extension education. *Journal of Agricultural Education, 54*(3), 224-237. doi:10.5032/jae.2013.03224

U.S. Department of Agriculture, National Institute of Food and Agriculture. (2014). *NIFA Strategic Plan for FY 2014-2018*. Retrieved from https://nifa.usda.gov/sites/default /files/resource/NIFA%20Strategic%20Plan%20FY2014-FY2018.pdf

Weber, M. (1946). *From Max Weber: Essays in sociology* (H. H. Gerth & C. W. Mills, Eds. & Trans.). New York, NY: Oxford University Press.

Weber, M. (1993). *The sociology of religion*. Boston, MA: Beacon Press.

Weinstein, J. (2010). *Social change* (3rd ed.). Lanham, MD: Rowman & Littlefield Publishers.

Social Change Movements and Agricultural Education: Offering an Alternative Lens and Framework for Our Future
A Critique

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I commend the authors on tackling an important, timely, and critical topic. Drafting a philosophical paper is a challenge. The task involves critical thought analysis of a situation and the presentation of ideas in a manner to engage the reader and the profession in critical dialogue. I contend the authors have done well in navigating the challenges of this type of manuscript in presenting the situation and providing comments that are insightful, yet without claiming to have all the answers.

I encourage all in the profession to read this article and engage in conversation with our colleagues about the points raised in this manuscript. The introduction provides a clear explanation of information that should be used to help us guide us in our conversations. The references cited in this piece should be read in detail and included in instruction for all graduate students in our profession to expand the way we think about our current situation and about the historical events that helped shaped where we are today.

Below I've provided a few questions/thoughts for you to consider:

1. The authors provide an excellent discussion of the accomplishments and the unintended consequences of the Morill and Smith-Lever Acts. Understanding that a line must be drawn somewhere for what events to include in one article, I'm interested in why the impacts of the Hatch Act were not included in this model as a representation of the other segment of the tripartite mission of the Land Grant University. Others in our profession (Hillison) have suggested that the Hatch Act impacted our profession at a greater level in some ways that even the Morill or Smith-Lever Acts since secondary education in agriculture was often associated with the experiment stations established through the Hatch Act.
2. I appreciate the authors providing the context of the social and political climate of the country when the Morill and Smith-Lever Acts were established. I believe one could argue that at the time these acts were established, the focus was on the biological and physical science aspects of agriculture (increase yields, food preservation, etc.), as the authors have noted, there is now a shift to include the social/behavioral science aspects of food, agriculture, and natural resources. How has that shift impacted our role as a profession in higher education?
3. Higher education is just one player in most, if not all, of the issues presented in this manuscript. In reconceptualizing the profession, how should these other players (consumers, producers, industry, commodity groups, health care, etc) be engaged?
4. In the manuscript, the authors state "we need to be proactive and forward thinking, not solely reactive." What should this look like on the local campus? What should this look like nationally?
5. In the Implications for Research and Practice section of the manuscript the authors present some thoughts and challenges for key segments of the profession (communication, education, extension, leadership) separately. Are the challenges of today able to be subdivided into these segments? Should collaboration among these segments be harnessed to address these challenges presented? If so, how? If not, why?

Competition as an Instructional Approach in School-Based, Agricultural Education (SBAE): A Historical Review

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Abstract

The purpose of this study was to describe the historical role of competition as an instructional approach in SBAE. Pragmatism was found to be the philosophical underpinning of competition in SBAE, and the influences of William James and John Dewey were described. The growth of new National FFA contests was presaged by seminal legislative acts such as the Smith-Hughes Act of 1917, the Vocational Education Act of 1963, and by educational reforms in the 1980s. We also identified and discussed the challenges associated with using competition as an instructional approach. Based on the profession's longstanding concerns about competition at the expense of instruction, i.e., prizing winning over learning, it was recommended that SBAE's stakeholders continue to examine the educational merits of its competitive activities.

Introduction

The history of SBAE is steeped with the tradition of youth engaged in competitions. The early success of agricultural youth participating in competitive judging events on state and national levels presaged the formation of what is known today as the National FFA Organization (Talbert, Vaughn, Croom, & Lee, 2014; Tenney, 1977; Tummons, Simonsen, & Martin, 2017). The rich history of competition in SBAE grew amidst some ambiguity from scholars of educational psychology and other disciplines as to its value as an instructional approach (Dewey, 1900; Deutsch, 1949; Johnson & Johnson, 1974; May & Doob, 1937). Even before the Smith-Hughes Act of 1917, many states had formed their own associations for pre-college students studying agriculture. Along with the promotion of vocational agriculture, a common objective for these junior farmer associations and young farmer clubs was to bring about social engagement for rural youth (Tenney, 1977). To accomplish this social objective, these organizations conducted cooperative events such as father-son banquets, leadership conferences, and activities modeled after adult farm organizations as ways for their members to develop leadership skills (Tenney, 1977). These events were accompanied by a variety of early competitions and award programs.

One of the earliest examples of youth competition in agriculture emerged at the turn of the 20th century with corn club contests (Uriccho, Moore, & Coley, 2013). In addition, the popularity of statewide livestock and dairy judging competitions led to the first National Congress of Vocational Agriculture Students in 1926 at Kansas City, Missouri (Tenney, 1977; Tummons et al., 2017). The first congress included 1,524 boys from 22 different states (Tenney, 1977). Today, competition in SBAE is evident in career development events (CDEs), leadership development events (LDEs), supervised agricultural experience (SAE) awards, scholarships, livestock exhibitions, agricultural mechanics exhibitions, and FFA members holding leadership positions on local, state, and national levels. The National FFA Organization currently offers 19 national CDEs and seven LDEs, five levels of FFA degrees, six divisions of Agriscience Fair competition, four star awards, 47 proficiency awards, three levels of national chapter awards, and more than $2.6 million in scholarships to its members annually (National FFA Organization, 2016, 2017). Competition in FFA continues to be popular among its members. A nationwide study by Talbert and Balshweid (2006) reported that 7 in 10 FFA members had participated in a CDE on some level.

The Educational Value of Competition

The educational value of competition as a motivational approach supporting student achievement is, and has been, a subject of debate among educational scholars for more than a century (Ames, 1981; Clifford, 1971; Deutsch, 1949; Dewey, 1900; Johnson & Johnson, 1974; May & Doob, 1937; Ryan & Deci, 2000). Leading up to World War II, the climate of social science research in the United States favored the ideals of individual achievement and competition, and cautioned against the notion of collectivism and group activity. May's and Doob's (1937) work, as promulgated by the Social Science Research Council (SSRC), pushed back against this sentiment:

Leaders of thought at the present time nearly all agree that in the Western World competition has produced a rich technological culture which now, because of radically altered conditions, can be enjoyed by men only if they learn to displace the no longer productive competitive practices with the new, as yet only partially discovered, cooperative ways of living. (pp. 2-3)

However, May and Doob (1937) also recognized the merits of competition. They proposed that public schools in America were primarily a competitive system that brought about more efficient work and achievement in children, and named grades, examinations, seating arrangements, and school athletics as examples. On the other hand, to foster a more cooperative and cohesive society, John Dewey (1900) sought to promote a school and classroom environment inclined to cooperation. Dewey (1900) criticized the American ideal of competition and stated:

Indeed, almost the only measure for success is a competitive one, in the bad sense of the term – a comparison of results in the recitation or in the examination to see which child has succeeded in getting ahead of others in storing up, in accumulating, the maximum of information. (p. 29)

Moreover, according to Deutsch (1949), if a group or an individual in a purely competitive situation achieves its goal, a separate group or individual is unable to achieve all or some of its goals. Deutsch (1949) granted that a purely negatively correlated competition was rare, and that competitive situations are complex. The complex nature of competition among different programs of SBAE, between individual students, between groups or teams of students, and between FFA chapters makes it difficult to measure its effectiveness as an instructional approach (Knobloch, Brady, Orvis, & Carroll, 2016). It is important to note that most of the competitive activities in SBAE were designed to supplement classroom and laboratory instruction and offered to students on a voluntary basis, including career and leadership development events (National FFA Organization, 2017). The *National FFA Career and Leadership Development Handbook* (2016) stated:

National events should reflect instruction that currently takes place in the entire agricultural education program . . . . Events are intended to be an outgrowth of instruction. Also, it is appropriate for the national organization to develop events and awards that stimulate instruction in emerging areas that reflect both current and future community, national and global workforce needs. (p. iv)

Research applied to competitions in SBAE, particularly to CDEs, has measured the perceptions of students, of agricultural education teachers, of parents, and of administrators to examine perceived purpose and benefits, to explore coaching and recruitment strategies, and to assess students' motivations to participate (Ball, Bowling, & Bird, 2016; Croom, Moore, & Armbruster, 2009; Knobloch et al., 2016; Lundry, Ramsey, Edwards, & Robinson, 2015; Russell, Robinson, & Kelsey, 2009). An incomplete understanding of the intracurricular nature of FFA activities by the public, and perhaps even by the stakeholders involved in agricultural education, has clouded, or, in some instances, misportrayed the presumed educational value of such (Bell, 1985). An examination of the history of student competitions in agricultural education, including their philosophical underpinnings, may bring to light their origin and evolution as an approach for supporting learning in SBAE and provide implications and recommendations for future application and research.

Purpose and Research Questions

The purpose of this study was to examine and describe the historical role of competition as an instructional approach in SBAE. Three research questions guided this study: (a) What was the philosophical underpinning of competition as an instructional approach in SBAE? (b) What major events led to the growth of competitions as an instructional approach in SBAE? (c) What challenges have been identified with using competition as an instructional approach in SBAE?

Methods and Procedure

The research questions in this study were answered using historical research methods (McDowell, 2002). McDowell's (2002) principles for conducting historical research guided the methodology for this study. According to McDowell (2002), "historical research represents a systematic enquiry into the past and an attempt to separate true from fictionalised accounts of historical events, based upon the examination of a wide range of relevant source material" (p. 5).

Primary and secondary sources were collected through a variety of Oklahoma State University online library databases. Key search terms included combinations of agricultural education, FFA, and vocational agriculture paired with the terms career development events, competition, contests, judging events, and leadership development events. Primary sources included National FFA convention proceedings, the *Official FFA Manual*, the National FFA Organization's official Web site, National FFA Organization archival records and photographs, and archived articles from *The Agricultural Education Magazine*. Secondary sources included peer-refereed journal articles, books from selected philosophers, and books about agricultural education and the National FFA Organization. The sources were subjected to external criticism for authenticity and internal criticism for accuracy (McDowell, 2002). The manuscript was initially prepared as an outline draft to organize the sources of data into thematic subjects that addressed the research questions. The outline served to organize the sources in a chronological sequence (McDowell, 2002).

Findings

Research Question #1 – What was the philosophical underpinning of competition as an instructional approach in SBAE?

Although studies concerned with the effectiveness of competition in education have produced ambiguous results (Johnson & Johnson, 1974, 1994), American culture, especially within the public school system, has been often described as *competitive* (Dewey, 1900; Johnson & Johnson, 1994; May & Doob, 1937). Early instructional approaches for youth in vocational agriculture were no exception (Stimson, 1933; Tenney, 1977; Tummons et al., 2017).

Grounded in Pragmatism

The origins of competitions for youth in agricultural education were based on the philosophical perspective of pragmatism (Berry, 1924; Croom, 2008; Howe, 1910; Stimson, 1933; Stimson & Lathrop, 1954; Uricchio et al., 2013). Vocational education in the early 20th century concentrated on skill acquisition and solving real-world problems to supply a more prepared workforce, including human capital for the agriculture sector (Talbert et al., 2014). Rufus Stimson (1933), father of the home project method, and a student of William James at Harvard University, described how he believed James would have viewed the early learning approaches to agricultural education:

How James would have gloried in the rich resources now to be found in our projects and other supervised practice, in our 'related' laboratory and field trip studies; our automobile and other farm shop work; our judging practice and contests; our freehand and scale drawing; our public speaking preparations and contests; our thrift work; our whole program of FFA self-educative activities. (p. 100)

Stimson and Lathrop (1954) credited the work of William James and John Dewey for their influence on early vocational agriculture programs' pragmatic approaches to instruction through projects and problem solving. Although he was a critic of competition in schools, Dewey (1910) considered the development of good judgment a fundamental aim of education:

To be a good judge is to have a sense of the relative, indicative or signifying values of the various features of the perplexing situation; to know what to let go as of no account; what to eliminate as irrelevant; what to retain as conducive to outcome; what to emphasize as a clue to the difficulty. This power, in ordinary matters, we call *knack, tact, cleverness*; in important affairs, *insight, discernment* [emphasis in the original]. (p. 104)

It was through home projects, contests, and judging events that young boys and girls were able to develop their ability to assess and evaluate differences, and make reasoned decisions (Berry, 1924; Howe, 1910; Uricchio et al., 2013). In the early 20th century, boys' and girls' agricultural clubs grew in popularity throughout rural America. Competitions related to useful skills such as growing corn and fruits, canning, or bread-making were used to motivate youth to improve their skills in farming and homemaking (Eaton, 1994; Howe, 1910; Stimson & Lathrop, 1954; Uricchio et al., 2013). Berry (1924) promoted student demonstrations such as culling hens, egg grading, soil testing, tool sharpening, and the handling and storage of agricultural products. Uricchio et al. (2013) reported that the first documented corn club was established in 1900 in Illinois with the goal of improving meeting attendance at farmers' institutes, however, the greatest impacts were increased corn yields and making real-world connections to the public school curriculum. Seaman A. Knapp, the father of Extension, helped to systematically grow the corn club movement as an agent in the Farmers' Cooperative Demonstration Work division of the United States Department of Agriculture (Uricchio et al., 2013). According to Knapp (1910), "my ideal of education is that of practical sense, leadership. Get that sense into a boy and he will take up farming" (p. 6).

Layton S. Hawkins (1919), a former member of the Federal Board for Vocational Education, authored what is now known as the FFA motto: "Learning to Do. Doing to Learn. Earning to Live. Living to Serve" (p. 137). Hawkin's (1919) motto reflected a pragmatic philosophical view that would be adopted as one of FFA's most prominent traditions, and it was also evident in students' home projects, contests, and community service activities. According to Talbert et al., (2014) the motto "reflects the pragmatic philosophy of work prevalent when C. H. Lane, the first National FFA Advisor, recommended it to the National FFA Convention delegates" (p. 400).

Central to all of the early contests and judging events was the intent to support vocational agriculture instruction, with the specific aim of linking school life to home life and to the real world (Croom, 2008; Hummel & Hummel, 1913; Johnson, 1948; Tenney, 1977; Tummons et al., 2017; Uricchio et al., 2013). Tuttle (1914), a Cornell University professor of rural education, described the early agricultural competitions for boys and girls in New York state:

Since the fundamental purpose of this competitive work is the development of boys and girls through the doing of practical things, it constitutes a real part of the educational life, and as such should be organized and directed by the established educational authorities. (p. 110)

Similar to home projects and experiments, contests were used as a way to expose students to challenging problems, hard work, and skill development (Hummel & Hummel, 1913). Howe (1910) described how the value of vocational agriculture courses in public schools appeared to be magnified by activities associated with early boys' and girls' agricultural clubs:

Setting aside the question whether boys' and girls' agricultural clubs may eventually be superseded by more permanent organic developments in general public education, they have at least an undoubted value at the present time and seem to be an important, if not necessary, link in the evolution toward a more efficient educational system. (pp. 6-7)

One objective of corn clubs was to aid teachers and their school systems as an educational approach to rural life (Uricchio et al., 2013). Uricchio et al. (2013) concluded that the clubs' "objectives included a need to provide vocational training for boys, encourage more scientific farming methods, vitalize public education in rural areas, and foment public interest in agriculture" (p. 233).

Research Question #2 – What major events led to the growth of competitions as learning venues in SBAE?

The timeline marking growth in the number of competitions in SBAE, known for decades as *contests*, can be characterized by an initial period of rapid growth, followed by an extended interval with little change, and a steady increase in their number during the last 40 years. Table 1 provides a summary of the year each national contest was first held at a National FFA Convention according to the respective convention's proceedings. Also included are the initial five contests that originally took place at the National Congress of Vocational Agriculture Students in the 1920s (Tenney, 1977; see Table 1) before the establishment of FFA. The first public speaking contest was added in 1930, and the next contest, agricultural mechanics, was not added until 42 years later (see Table 1). Six new contests were added in the 1970s, one in the 1980s, eight in the 1990s, and six from 2000 to 2017 (see Table 1).

Table 1
Chronological Emergence of Contests and Career and Leadership Development Events in SBAE

Original name	Current name	Year initiated
Dairy cattle judging[a]	Dairy cattle management and evaluation	1925
Livestock judging[a]	Livestock evaluation	1926
Meats judging[a]	Meats evaluation and technology	1926
Milk quality and dairy foods[a]	Milk quality and products	1926
Poultry judging[a]	Poultry evaluation	1926
Public speaking	Prepared public speaking	1930
Agricultural mechanics	Agricultural technology and mechanical systems	1972
Horticulture[b]		1974
Farm business management	Farm and agribusiness management	1976
Floriculture	Floriculture	1979
Nursery/landscape	Nursery/landscape	1979
Extemporaneous contest	Extemporaneous public speaking	1979
Forestry contest	Forestry	1985
Agricultural sales	Agricultural sales	1991
Parliamentary procedure	Parliamentary procedure	1992
Marketing plan project	Marketing plan	1993
Horse Contest	Horse evaluation	1994
Food science and technology	Food science and technology	1997
Agricultural issues forum	Agricultural issues	1997
Environment and natural resources	Environmental and natural resources	1999
Creed speaking	Creed speaking	1999
Agricultural communications	Agricultural communications	2000
Dairy handlers activity	Dairy handlers activity	2000
Agronomy	Agronomy	2001
Job interview	Employment skills	2001
Veterinary science	Veterinary science	2012
Conduct of chapter meetings	Conduct of chapter meetings	2017

Note. Information retrieved from the National FFA Organization (2016); National FFA Convention Proceedings 1931 to 2012; and Tenney (1977). [a]These contests preceded the establishment of FFA [b]The Horticulture contest was discontinued in 1979.

Smith-Hughes Act and the National Congress of Vocational Agriculture Students

As the popularity of boys' and girls' agricultural clubs continued to increase, the first major event that led to the growth of contests in SBAE occurred with the enactment of the Smith-Hughes Act of 1917. The Smith-Hughes Act provided federal funds for the preparation of teachers in vocational agriculture (Stimson & Lathrop, 1954). With funding and training for the formal teaching of agriculture in public schools, interest in contests for vocational students subsequently grew. Prior to establishment of the National FFA Organization, many states began to host judging contests for students in the early decades of the 20th century. A variety of vocational agriculture clubs for youth and state associations formed across the country in states such as Illinois, Iowa, Michigan, New York, and New Jersey (Tenney, 1977). These organizations began hosting meetings, service activities, as well as leadership training and judging events (Tenney, 1977). Statewide judging events took place in Alabama and Virginia as early as 1919 (Stimson & Lathrop, 1954; Tenney, 1977; Tummons et al., 2017). C. H. Lane chaired a committee tasked with organizing the first national dairy contest for vocational youth to take place at the National Dairy Show at Indianapolis, Indiana in 1925 (Stimson & Lathrop, 1954; Tummons et al., 2017).

In 1926, the American Royal hosted more than 2,000 registered boys and girls in 4-H and vocational education, of which 1,300 participated in the first national livestock judging contest for
youth in agriculture (Tummons et al., 2017). The immediate success of judging contests at the National Congress of Vocational Agriculture Students in 1926 demonstrated a nationwide interest in competitions for agricultural youth (Stimson & Lathrop, 1954; Tenney, 1977; Tummons et al., 2017). Stimson and Lathrop (1954) described the popularity of judging contests: "1928 is chiefly notable as the year when judging and judging contests as activities of high school agriculture pupils reached their zenith" (p. 46).

The National Congress continued to be the host and sponsor of National FFA contests until 1936. The National FFA Convention of 1936 hosted what was referred to as National Contests for Students of Vocational Agriculture (Tenney, 1977). Tummons et al. (2017) described the important role that judging events from the National Congress, along with the Smith-Hughes Act of 1917 and various boys' and girls' clubs, played in the formation of the National FFA Organization as well as the establishment of lasting traditions that still exist today. According to the minutes of the first National FFA Convention in 1928, the second item for the national program of work was to
"encourage and foster national judging contests" (Groseclose, 1929, p. 9).

Rise of Competition and Achievement Ideals

In response to the popularity of cooperative education advocates such as John Dewey and later William Heard Kilpatrick, a concerted effort from business groups, including Du Pont, General Motors, and U.S. Steel Corporation, countered with their own campaign in favor of individual achievement as their idea of the *ideal American way of life.* In the Depression era, major business groups, such as the American Liberty League, formed in 1934, and the National Association of Manufacturers (NAM), rose to prominence as they promoted the approach of interpersonal competition to educators. The approach gained momentum in the 1940s and 1950s and was eventually considered a traditional form of student-to-student interaction by the 1960s (Johnson & Johnson, 1994). The attitude of Social Darwinism or "survival of the fittest" became a popular ideal in many public schools (Johnson & Johnson, 1994; May & Doob, 1937; Pepitone, 1980).

World War II**,** and the years leading up to it, may have led to a cultural norm that emphasized production and results, rather than the attainment of knowledge. The educational trend continued to be focused on student success and achievement (Pepitone, 1980; Smith, 1944). Pepitone (1980) stated that "the suddenness of the attack on Pearl Harbor and the later American involvement in diverse theaters of war required that large masses of people be immediately readied and assigned to different service branches and governmental agencies" (p. 17). Except for public speaking, National FFA contests were halted during the war and resumed in 1947 (Tenney, 1977). A period of 43 years without any new contests on the national level occurred from 1930 until 1972 (National FFA Organization, 2015; Tenney, 1977; see Table 1). One explanation for this gap may have been a lack of funding during the Great Depression era, and the greater priority of mobilizing resources toward the war effort. According to Tenney (1977), "one of the major problems faced by the FFA in the administration of awards and contest programs was obtaining funds for appropriate awards on the national, state and local levels" (p. 132). More financial support arrived with formation of the National FFA Foundation in 1944 (Tenney, 1977). As more funds appeared from sponsorships, award programs such as the National FFA contests continued to increase. In 1977, $104,199 was allocated by the National FFA Foundation for national contest awards that year (Tenney, 1977). In addition, flexibility on the use of federal funds was extended by the Vocational Education Act of 1947, which also provided teachers the ability to supervise off-campus FFA activities in regard to supporting their travel (Croom, 2008; Hawkins, Prosser, & Wright, 1951).

Vocational Education Act of 1963

Another milestone event that contributed to the growth of FFA contests was the Vocational Education Act (VEA) of 1963 (P.L. #88-210), which formally expanded the scope of vocational agriculture to include off-farm agricultural occupations and enterprises (National Research Council [NRC], 1988). The act's declaration of purpose stated that people, including high school students, "will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of actual or anticipated opportunities for gainful employment" (VEA, 1963, p. 403). Rather than funding vocational education areas from earmarked grants, going forward vocational agriculture had to compete for funds with seven other occupational areas, and labor market projections would dictate state funding allocations (NRC, 1988).

The response from agricultural education administrators to the 1963 act was largely positive. The April and July issues of *The Agricultural Education Magazine* featured the themes "Our Place in Vocational Education" (Woodin, 1964b, p. 217), and "Guidance for Off-farm Occupations" (Woodin, 1964c, p. 1), respectively. Bunten (1964), a former state supervisor of vocational agriculture in Nevada and member of the National FFA Board of Directors, stated: "The new legislation has removed the barrier of training for off-farm, agriculture-based occupations. It has opened up a whole new vista of vocational education in agriculture" (p. 4). Woodin (1964a) asserted that "the passage of the National Vocational Education Act of 1963 represent[ed] a great milestone in vocational education. Through its provisions vocational education will be made available to more people in a more complex world of work" (p. 172). In the case of North Carolina, Bullard (1964) described a new curriculum plan for vocational agriculture that included upper level courses in agricultural business, agricultural mechanics, and ornamental horticulture to appeal to the growing number of students seeking off-farm occupations. FFA membership exceeded 400,000 for the first time after 1964 (Tenney, 1977). In the 12 years after the enactment of the Vocational Education Act of 1963, national contests would be added regarding agricultural mechanics, horticulture, and farm business management (Tenney, 1977; see Table 1).

Education Reforms of the 1980s

A movement toward improving public education came in the wake of *A Nation at Risk: The Imperative for Educational Reform* report's release (National Commission on Excellence in Education [NCEE], 1983). The report criticized U.S. public education for its increasing mediocrity, and made suggestions to lengthen school days, reform course requirements for graduation, and return focus to basic skills and subjects (NCEE, 1983; NRC, 1988). It also set into motion an education reform movement, which brought a shift in philosophy and the identity of what was previously known as vocational agriculture and the Future Farmers of America (NRC, 1988).

More emphasis on students attaining basic employment competencies was fomented by enactment of the Carl Perkins Act of 1984, which included “problem-solving skills, entrepreneurial development and attitudes, and practical applications of scientific concepts and experimental methods” as benchmarks for success in vocational education (NRC, 1988, p. 59). The National Council for Agricultural Education (NCAE) was also formed in 1984 to develop strategies for SBAE with leadership from agricultural education instructors, administrators, teacher educators, and other stakeholders (Case & Whitaker, 1998b; NCAE, 2015). S. J. Gartin (1985) called for FFA contests to be evaluated and updated to reflect the growing variety of students’ interests and occupational goals, and also suggested that contests, as an outgrowth of instruction, should be reviewed and changed in the same manner as curriculum. Smith (1987) reported that the National FFA contests had been operating without any educational objectives or administrative criteria for adding, changing, or continuing specific events. Smith (1987) also recommended more research on the effectiveness of contests, and that the National FFA Board of Directors approve any objectives or criteria for such, and related information be made available to interested stakeholders.

In 1988, the NRC specifically addressed the instructional goals and necessary policy changes needed for SBAE with *Understanding Agriculture: New Directions for Education*. The Council’s report set forth recommendations for SBAE to teach both vocational agriculture and agricultural literacy to address changing student demographics, challenges in the agriculture industry, and the rapid growth of technology in agriculture (NRC, 1988). The Council found that much of the instruction that focused on training for employment in production agriculture was outdated and largely unchanged since passage of the Vocational Education Act of 1963 (NRC, 1988). The Council also criticized the tendencies of many vocational agriculture teachers to make production-oriented FFA contests and awards a higher priority than providing high quality classroom instruction (NRC, 1988). The NRC (1988) further recommended:

The FFA should revise the nature, focus, and award structure of its contests and activities to open more new categories of competition in areas outside production agriculture; reduce the number of production-oriented activities and programs; attract minorities and girls . . . ; and minimize absences and conflicts with regular school programs. (pp. 44-45)

The May 1989 issue of *The Agricultural Education Magazine* featured the theme “The Profession Reacts” with multiple articles addressing the NRC’s (1988) report. Zurbrick (1989) stated: “It would certainly seem that the time is right to take a look at the total agricultural education program and make significant adjustments to meet the emerging needs of our changing clientele” (p. 3). Cox, McCormick, and Miller (1989) pointed to a transition needed from strictly occupational-based instruction toward a more holistic view of SBAE. Cox et al. (1989) stated: “There appears to be surfacing a new broadened mission of agricultural education—a mission which now addresses ‘agricultural education’ in lieu of only ‘vocational education in agriculture’” (p. 9). In support, Moore (1989) asserted “the FFA is considered sacred by many agricultural educators, yet it has undergone numerous changes in the past. . . . The changes in the past to the FFA have been beneficial; the changes suggested in the future should also be beneficial" (p. 18). The NRC's recommendations signaled the many changes soon to come for FFA and its contests.

Further Growth and Changes

The delegates at the 1988 National FFA Convention voted in favor of several constitutional amendments that would update the organization's image, most notably changing the official name from "Future Farmers of America" to "National FFA Organization" and "vocational agriculture" to "agricultural education" (National FFA Organization, 1988). The 1994 convention proceedings was the first official reference to contests as "Career Development Events" (National FFA Organization, 1994). At the national convention held in 1995, the committee on career success activities recommended a CDE mission statement and provided this example text: "The purpose of Career Development Events is to enhance members' skills necessary for their lifelong endeavors and to allow them to gain abilities to enhance career success" (National FFA Organization, 1995, p. 58). Eight new CDEs were added in the decade after the NRC's report, and many focused on leadership skills and competencies for employment, including agricultural issues forum, agricultural sales, marketing plan, and parliamentary procedure. The 2017 convention would mark the first year contests were referred to as Career Development Events *and* Leadership Development Events, and the conduct of chapter meetings LDE was offered (National FFA Organization, 2016).

Research Question #3 – What challenges have been identified with using competition as an instructional approach in SBAE?

No shortage of criticism was directed at the competitions experienced by youth in SBAE over the years. Early organizers warned against their misuse and potential adverse effects such could have on youth development. Liberty Hyde Bailey (1915) cautioned against the dangers of agricultural contests, and especially with students' ownership of work and reward structures: "The fundamental consideration is that all this kind of work is educational. . . . The primary consideration is the effect on the child" (Bailey, 1915, p. 302). Eaton (1994) also described some of the challenges:

However, boys' and girls' clubs were sporadically established and 'learning by doing' under the stimulus of competition was mainly employed. Many of the contests held before 1900 for rural youth were scattered and lasted for a year or two. There was no emphasis on continuity of effort. (p. 11)

According to S. A. Gartin (1985), "among professionals of agricultural education, there is probably no issue that arouses more vigorous discussion than whether contests are a value to the vocational agriculture program" (p. 4). Much of the controversy was associated with the effects of competition taking priority over instruction. The hazards of competition in SBAE were highlighted by teachers and teacher educators over many decades (Bell, 1985; Bunger, 1948; Deyoe, 1948; Dillingham, 1976; Gadda, 1978; Johnson, 1948; Key, 1977, 1978; Mayfield, 1978; Schumann, 1977; Wilson, 1958). Bunger (1948) acknowledged the controversy surrounding contests in vocational agriculture, criticized their inconsistent objectives across local, state, and national levels, and asserted that "[i]f the present rate of emphasis continue[d] to be placed on contests there is extreme danger that they will become an end in themselves and will not serve as an intended means to an end" (p. 183).

However, Bunger (1948) praised the award system used by National FFA contests, and by many states at that time, of rating teams and individuals rather than providing a numerical ranking. He suggested that all local and state contests follow a rating system to eliminate the adverse effects of competition and instead promote skill development and competence. Johnson also (1948) acknowledged that "the value and justification of contests as a part of our educational program in vocational agriculture has been questioned on numerous occasions" (p. 76). Johnson (1948) added:

. . . in these . . . contests is the tendency to highlight the winning team in each contest to the degree that some teachers, some administrators, and portions of the public assume that winning contests is the chief criterion of success for a teacher or department. (p. 75)

In perhaps the most outspokenly negative view of competition, Wilson (1958) called for the elimination of all contests in vocational agriculture and listed 19 problems resulting from competitions, including too much time away from instruction, lower motivation for learning, dishonest practices, and the neglect of students not participating. Wilson (1958) continued: "Contests are in opposition to the objectives of FFA. One of the major objectives is to foster cooperation. . . yet there are few if any national or state activities that promote cooperation. . . . One supervisor said, 'we cooperate to hold contests'" (p. 198). In the same issue of *The Agricultural Education Magazine*, Gray (1958) countered this argument and promoted the value of contests, but also addressed the issues he viewed as problematic, i.e., too many contests existed for one teacher to train students, and the selection of team members meant the exclusion of other students.

Dillingham (1976) promoted the practice of ethical behavior and criticized instructors who abused the rules for competitions: "As you examine your vocational agriculture organization at the local, district, area, state or national level you will find the individual rare indeed who has not bent to the temptation of taking a short-cut through dishonest effort" (p. 183). Schumann (1977) reproved the practice of teaching only a select few team members in a class and leaving the remaining students with "busy work" (p. 55). According to Schumann (1977), "the contest should be the means to an end, and not an end in itself. It should be part of a well-organized program of vocational agriculture and should contribute toward the accomplishment of the overall program objectives" (p. 65).

Key (1978) recognized the controversy associated with too much competition and the "monster" (p. 52) that creates for a teacher. Mayfield (1978) claimed "the problem is that the noteworthy objective is sometimes lost because of Lombardi's 'winning is the only thing' philosophy. Contests were designed as an educational tool; winning was secondary. The priorities today, however, may be reversing" (p. 54). Mayfield (1978) described three major categories of instructors in terms of approaches to teaching and training for contests. The *fervent coach* has a win at all costs philosophy with primary concern in winning trophies, and "students believe they are enrolled in judging class" (p. 54). The *active coach* incorporates contest material into classroom instruction, but additional work takes place after class, and learning is the highest priority. The *passive coach* rarely takes part in competition, and his or her teams are often unprepared (Mayfield, 1978). Another point of concern for contests was the amount of instructional time lost due to their pursuit. Deyoe (1948) argued against the excessive time spent on contests for questionable purposes: “[T]hey generate interest in the participant and capture the attention of the public. However, this may be, we are not justified in spending a lot of effort and time on these activities solely for these purposes” (p. 75). And Mulcahy (1998) cautioned that the “tail should not wag the dog” (p. 13), i.e., FFA events such as CDEs should not take precedence over providing a comprehensive program of SBAE.

Key (1977) also described how the abuse of contests and related preparations can lead to students
performing poorly in school. Herren (1984) found that the 1981 National FFA Livestock Judging contestants and their advisors reported an average of 48.5 practice sessions, and 9.34 contests in which they had participated that year. Herren (1984) concluded that, although most teams did not spend extreme amounts of time dedicated to contest preparation, the top placing teams reporting as many as 200 practice sessions and 42 contests “may have [had] difficulty carrying out a well-rounded program” (p. 19). Bell (1985) also opposed the gratuitous amount of time that contests pulled students and teachers away from instruction. Moreover, Bell (1985) noted the often misunderstood intracurricular design of FFA within vocational agriculture instruction:
If the intracurricular nature of FFA in the vocational agriculture/agribusiness program is such and explicitly stated aim, why do public school administrators and the public view student participation in FFA contests in a similar perspective as students participating in extracurricular athletic and/or music contests? (p. 5)

Contests in SBAE were originally established to *support instruction* in the classroom and laboratory. Johnson (1948) stated that “ [agricultural] educators are pretty well agreed that contests should be an outgrowth and a part of organized instruction that aids the student to become established successfully. . .” (p. 76). Gray (1958) touted the value of contests in regard to motivating students toward the instructional goals of vocational agriculture. Spell (1978) promoted contest curriculum for use in instruction, given that all students are involved and the lessons motivate students to learn. Gadda (1978) called for instructors to connect contests to specific employment opportunities, and said that “merely to conduct a competitive activity without a clear notion of how it contributes to the development of occupational competencies is sheer folly” (p. 55).

Conclusions

The use of competitions in SBAE as an instructional approach was grounded in the philosophical perspective of pragmatism. Early founders and influential figures in SBAE and FFA credited scholars such as William James and John Dewey as inspiration for their pragmatic approaches to instruction, including the use of competitions (Berry, 1924; Getman, 1932; Hawkins et al., 1951; Stimson, 1933; Stimson & Lathrop, 1954). Contests began as a way to provide youth with authentic experiences in making decisions, solving real-world problems, and improving their farming practices (Berry, 1924; Howe, 1910; Uricchio et al., 2013). Contests preceded formation of the National FFA Organization and have maintained a prominent position among the many traditions of SBAE (Stimson & Lathrop, 1954; Tenney, 1977; Tummons et al., 2017). After enactment of the Smith-Hughes Act, the first national contests for youth in vocational agriculture were judging events hosted by the National Congress of Vocational Agriculture Students (Tummons et al., 2017). With the exception of public speaking in 1930, no new contests were added to the original five that preceded the organization’s founding until more than 40 years later (see Table 1). A number of historical events led to the growth of student opportunities in SBAE, including a larger variety of National FFA contests. A number of new contests were established in the years following federal legislative acts such as the Vocational Education Act of 1963 and the Carl Perkins Act of 1984 (NRC, 1988; VEA, 1963). Educational initiatives and stakeholders' support for SBAE also fomented the growth of new FFA contests. For instance, formation of the National FFA Foundation in 1944 and the NCAE in 1984, as well as release of the NRC's study *Understanding Agriculture: New Directions for Education* were seminal events that presaged periods of considerable growth in FFA contests. Changing the name from *contests* to *Career Development Events* signaled efforts to update the labeling, and, in some cases, the content and standards of the competitive events to meet the needs of an increasing diversity of students' backgrounds and interests as well as significant shifts in the nation's agriculture sector (Crabtree, 1998; National FFA Organization, 1994).

Competitions for youth in agriculture were met with challenges and criticism early in their formation (Bailey, 1915; Eaton, 1994). The hazards associated with contests as an instructional approach in SBAE have been well-documented. Some of the prominent concerns associated with contests included inconsistent educational objectives, lost instructional time for both teachers and students, undermining student motivation through flawed reward systems, and an excessive emphasis on winning (Bell, 1985; Bunger, 1948; Deyoe, 1948; Dillingham, 1976; Gadda, 1978; Johnson, 1948; Key, 1977, 1978; Mayfield, 1978; Schumann, 1977; Wilson, 1958).

Discussion, Implications, and Recommendations

Historical evidence suggests that the inappropriate use of contests may have adversely affected the motivation and instruction of some students. The NRC (1988) summarized this problem:

Based on evidence and testimony, the committee finds that some vocational agriculture teachers are unduly driven by a desire to help students excel in traditional production-oriented FFA contests and award programs. These teachers tend to place less emphasis on delivering agricultural instruction in the classroom, updating curricula, or involving the business community in the vocational agriculture program. (p. 43).

However, competitive events continue to hold a prominent position in SBAE (Curry, Falk, Warner, & Park, 2017; Talbert & Balschweid, 2006). The National FFA Organization's (2017) stated goals for CDEs/LDEs to foster "college and career readiness skills" (p. 66) and to "develop critical-thinking skills, effective decision-making skills, foster teamwork and promote communication while recognizing the value of ethical competition and individual achievement" (p. 66) continue to reflect the philosophical perspective of pragmatism. However, additional research is needed to examine whether CDEs/LDEs are meeting these established goals. Researchers should investigate if and how SBAE teachers are using the events as an approach to support the instruction of prescribed curriculum, and whether significant and positive relationships exist regarding student motivation and achievement as well as career choice and progress afterward. Teacher educators and supervisors of SBAE programs should emphasize the appropriate educational objectives of competitive events to preservice and inservice teachers and warn against the hazards associated with the contrary. Further, FFA advisors and providers of competitions should examine their current award structures and assess their effectiveness in meeting the instructional goals of SBAE.

Looking to the future, SBAE's stakeholders should ask themselves several questions regarding

praxis: (a) Are existing FFA competitions clearly aligned with the educational objectives of SBAE?
(b) Are these competitions appropriate tools for motivating students to learn SBAE's curriculum?
(c) What changes may be needed to existing competitive events to meet the learning needs, interests, and diversity of today's students? (d) Do teacher evaluation and recognition approaches properly recognize high quality instruction over students winning competitive events? Instructors, teacher educators, state staff, FFA officials, and industry partners should collaborate to evaluate the educational merits of competitive activities to ensure SBAE's continued relevance and success.

References

Ames, C. (1981). Competitive versus cooperative reward structures: The influence of individual and group performance factors on achievement attributions and affect. *American Educational Research Journal, 18*(3), 273-287. doi:10.3102/00028312018003273

Bailey, L. H. (1915). Boys' and girls' contest clubs: There are certain dangers in agricultural contests which should be avoided. *Cornell Countryman, 7*(4), 300-303. Retrieved from https://books.google.com/books?id=6lM6AQAAMAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Ball, A., Bowling, A., & Bird, W. (2016). A case study of learning, motivation, and performance strategies for teaching and coaching CDE teams. *Journal of Agricultural Education, 57*(3), 115-128. doi:10.5032/jae.2016.03115

Bell, L. (1985). The wrong message from contests. *The Agricultural Education Magazine, 57*(11), 5-7. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume57/v57i11.pdf

Berry, J. B. (1924). *Teaching agriculture: An analysis for the teaching activity in its relation to the learning process.* New York, NY: World Book Company.

Bullard, A. G. (1964). A new design for high school vocational agriculture. *The Agricultural Education Magazine, 37*(1), 8-10. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume37/v37i1.pdf

Bunger, A. R. (1948). Functions of state F. F. A. contests. *The Agricultural Education Magazine, 20*(10), 183, 185. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume20/v20i10.pdf

Bunten, J. W. (1964). Our place in vocational education. *The Agricultural Education Magazine, 37*(1), 3-4. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume37/v37i1.pdf

Case, L., & Whitaker, B. K. (1998a). The FFA: Why do we have it? *The Agricultural Education Magazine, 71*(3), 12-13, 27. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume71/v71i3.pdf

Case, L., & Whitaker, B. K. (1998b). What are the goals and purposes of agricultural education?. *The Agricultural Education Magazine, 71*(3), 6-7. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume71/v71i3.pdf

Clifford, M. M. (1971). Motivational effects of competition and goal-setting in reward and non-reward conditions. *The Journal of Experimental Education, 39*(3), 11-16. Retrieved from http://www.jstor.org/stable/20157188

Cox, D. E., McCormick, F. G., & Miller, G. M. (1989). Agricultural education model. *The Agricultural Education Magazine, 61*(11), 9. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume61/v61i11.pdf

Crabtree, D. (1998). Career development events: What do I do? *The Agricultural Education Magazine*, *70*(5), 2. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume70/v70i5.pdf

Croom, D. B. (2008). The development of the integrated three-component model of agricultural education. *Journal of Agricultural Education*, *49*(1), 110-120. doi:10.5032/jae.2008.01110

Croom, B., Moore, G., & Armbruster, J. (2009). An examination of student participation in national FFA career development events. *Journal of Southern Agricultural Education Research, 59*, 109-121. Retrieved from http://jsaer.org/pdf/Vol59/2009-59-009.pdf

Curry Jr., K., Falk, J., Warner, W., & Park, T. (2017). Does motivation matter? Examining the relationship between student motivation and performance in Career Development Events. *Proceedings of the American Association for Agricultural Education National Research Conference, 44,* 869-882. Retrieved from http://aaaeonline.org/resources/Documents/National/2017%20AAAE%20Proceedings.pdf

Deutsch, M. (1949). A theory of co-operation and competition. *Human Relations*, *2*(2), 129-152. doi:10.1177/001872674900200204

Dewey, J. (1900). *The school and society*. Chicago, IL: University of Chicago Press.

Dewey, J. (1910). *How we think*. Boston, MA: D. C. Heath & CO., Publishers.

Deyoe, G. P. (1948). Contests—What of the future? *The Agricultural Education Magazine, 21*(4), 75-76. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume21/v21i4.pdf

Dillingham (1976). Competition and learning of ethical behavior. *The Agricultural Education Magazine*, *48*(8), 183-184. https://www.naae.org/profdevelopment/magazine/archive_issues/Volume48/v48i8.pdf

Eaton, D. W. (1994). *New directions in agricultural education: The impact in public school.* (Master’s thesis) Retrieved from ProQuest Dissertation and Theses database. (Order No. 9504198)

Future Farmers of America. (1928). *Minutes of the First Annual Congress of the Future Farmers of America*, Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/bitstream/handle/2450/6494/minutes_1928.pdf?sequence=1

Future Farmers of America. (1931). *Proceedings of the fourth national convention of Future Farmers of America*, Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

Future Farmers of America. (1972). *45th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

Future Farmers of America. (1974). Proceedings of the *47th National Convention of the Future Farmers of America,*, Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

Future Farmers of America. (1976). *49th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

Future Farmers of America. (1979). *52nd National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

Gadda, H. W. (1978) A philosophy of contests in vocational agriculture. *The Agricultural Education Magazine*, *51*(3), 55. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume51/v51i3.pdf

Gartin, S. A. (1985). Rich sources of inspiration. *The Agricultural Education Magazine, 57*(11), 4. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume57/v57i11.pdf

Gartin, S. J. (1985). A time for evaluation. *The Agricultural Education Magazine, 57*(11), 10-11. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume57/v57i11.pdf

Getman, A. K. (1932). The influence of John Dewey in education. *The Agricultural Education Magazine*, *5*(6), 83-84, 96. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume5/v5i6.pdf

Gray, J. D. (1958). Contests have value. *The Agricultural Education Magazine, 30*(9), 197-199. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume30/v30i9.pdf

Groseclose, H. C. (1929). Future Farmers of America. *The Agricultural Education Magazine, 1*(1), 8-9, 14. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume1/v1i1.pdf

Hawkins, L. S. (1919). A holiday message to real Americans. *The Vocational Summary, 2*(8), 137. Retrieved from https://babel.hathitrust.org/cgi/pt?id=pst.000018562910;view=1up;seq=161

Hawkins, L. S., Prosser, C. A., & Wright, J. C. (1951). *Development of vocational education*. Chicago, IL: American Technical Society.

Herren, R. (1984). Factors associated with the success of participants in the National Future Farmers of America livestock judging contest. *Journal of the American Association of Teacher Educators in Agriculture, 25*(1), 12-19. doi:10.5032/jaatea.1984.01012

Howe, F. W. (1910). *Boy's and girls' agricultural clubs*. Washington, DC: Government Printing Office

Hummel, W. G., & Hummel, B. R. (1913). *Materials and methods in high school agriculture.* New York, NY: The MacMillan Company.

Johnson, D. W., & Johnson, R. T. (1974) Instructional goal structure: Cooperative, competitive, or individualistic. *Review of Educational Research, 44*(2), 213-240. doi: 10.3102/00346543044002213

Johnson, D. W., & Johnson, R. T. (1994) *Learning together and alone: Cooperative, competitive, and individualistic learning.* Needham Heights, MA: Allyn and Bacon.

Johnson, E. J. (1948). Adjustments in national contests. *The Agricultural Education Magazine, 21*(4), 75-76. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume21/v21i4.pdf

Key, J. P. (1977). Fairs, shows, contests, and the FFA. *The Agricultural Education Magazine, 50*(3), 52, 54. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume50/v50i3.pdf

Key, J. P. (1978). Competition—Boon or bane? *The Agricultural Education Magazine, 51*(3), 52. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume51/v51i3.pdf

Knapp, S. A. (1910). *The mission of cooperative demonstration work in the south* (United States Department of Agriculture Circular No. 33). Washington, DC: Government Printing Office.

Knobloch, N. A., Brady, C. M., Orvis, K. S., & Carroll, N. J. (2016). Development and validation of an instrument to assess youth motivation to participate in career development events. *Journal of Agricultural Education, 57*(4), 16-28. doi:10.5032/jae.2016.04016

Lundry, J., Ramsey, J. W., Edwards, M. C., & Robinson, J. S. (2015). Benefits of career development events as perceived by school-based, agricultural education teachers. *Journal of Agricultural Education, 56*(1), 43-57. doi:10.5032/jae.2015.01043

May, M., & Doob, L. (1937). *Competition and cooperation*. New York, NY: Social Science Research Council.

Mayfield, G. M. (1978) Contests and the classroom—A delicate combination. *The Agricultural Education Magazine*, *51*(3), 54, 58. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume51/v51i3.pdf

McDowell, W. H. (2002). *Historical research: A guide.* New York, NY: Longman.

Moore, G. E. (1989). Misoneism and agricultural education. *The Agricultural Education Magazine, 61*(11), 6, 18. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume61/v61i11.pdf

Mulcahy, J. (1998). Bridging the gap between school & work with CDEs. *The Agricultural Education Magazine, 70*(5), 12-13. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume70/v70i5.pdf

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: U.S. Department of Education. Retrieved from https://www.ffa.org/SiteCollectionDocuments/council_national_council_for_agricultural_education_bylaws_update_september_2015.pdfhttps://babel.hathitrust.org/cgi/pt?id=uc1.31210005643745;view=2up;seq=2

National Council for Agricultural Education. (2015). Bylaws of the National Council for Agricultural Education. Retrieved from https://www.ffa.org/SiteCollectionDocuments/council_national_council_for_agricultural_education_bylaws_update_september_2015.pdf

National FFA Organization. (1985). *58th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1988). *61st National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1991). *64th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1992). *65th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1993). *66th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1994). *67th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1995). *68th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1997). *70th National FFA Convention proceedings,* Kansas City, MO. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (1999). *72nd National FFA Convention proceedings,* Louisville, KY. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (2000). *73rd National FFA Convention proceedings,* Louisville, KY. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (2001). *74th National FFA Convention proceedings,* Louisville, KY. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (2012). *85th National FFA Convention proceedings,* Indianapolis, IN. Author. Retrieved from https://archives.iupui.edu/handle/2450/142

National FFA Organization. (2015). *National FFA Organization records, 1916-2008*. IUPUI University Library Special Collections and Archives, Indiana University-Purdue University Indianapolis, Indianapolis.

National FFA Organization. (2016). *National FFA career and leadership development events handbook 2017-2021.* Indianapolis, IN: Author. Retrieved from https://www.ffa.org/SiteCollectionDocuments/cde_2017_2021_intro_section_of_handbook.pdf

National FFA Organization. (2017). *Official FFA manual*. Indianapolis, IN: Author.

National Research Council. (1988). *Understanding agriculture: New directions for education*. Washington, DC: The National Academies Press.

Pepitone, E. A. (1980). *Children in cooperation and competition: Toward a developmental psychology*. Lexington, MA: D. C. Heath and Company.

Russell, C. R., Robinson, J. S., & Kelsey, K. D. (2009). Motivating agriculture students to participate in career development events. *Career and Technical Education Research, 34*(2), 103-118. Retrieved from https://illiad-s.library.okstate.edu/illiad/illiad.dll?Action%3D10&Form%3D75&Value%3D1113394

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25,* 54-67. doi:10.1006/ceps.1999.1020

Schumann, H. (1977). FFA contests. *The Agricultural Education Magazine, 50*(3), 55, 65. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume50/v50i3.pdf

Smith, M. W. (1987). Needed: Educational objectives and administrative criteria for the national FFA contests. *Journal of the American Association of Teacher Educators in Agriculture, 28*(2), 45-50. doi:10.5032./jaatea.1987.02045

Smith, W. A. (1944). Agricultural education. *Review of Educational Research*, *14*(4), 327-336. Retrieved from http://www.jstor.org/stable/1168477

Spell, D. (1978). Contest—Effectiveness in the curriculum. *The Agricultural Education Magazine, 51*(3), 58. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume51/v51i3.pdf

Stimson, R. W. (1933). Professional sanctions from William James. *The Agricultural Education Magazine*, *5*(7). Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume5/v5i7.pdf

Stimson, R. W., & Lathrop, F. W. (1954). *History of agricultural education of less than college grade in the United States.* Washington, DC: United States Government Printing Office

Talbert, B. A., & Balschweid, M. A. (2006). Career aspirations of selected FFA members. *Journal of Agricultural Education, 47*(2), 67-80. doi:10.5032/jae.2006.02067

Talbert, B. A., Vaughn, R., Croom, B., & Lee, J. S. (2014). *Foundations of agricultural education*. Upper Saddle River, NJ: Pearson Education Inc.

Tenney, A. W. (1977). *The FFA at 50, 1928-1978.* Alexandria, VA: National FFA Organization.

Tummons, J. D., Simonsen, J. C., & Martin, M. J. (2017). Role of the agricultural industry and judging events in formation of the Future Farmers of America. *Journal of Agricultural Education*, *58*(1), 236-250. doi:10.5032/jae.2017.01236

Tuttle, E. M. (1914). Agricultural competitions for boys and girls in New York state. *The Cornell Countryman*, *7*(2), 109-114. Retrieved from https://books.google.com/books?id=6lM6AQAAMAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Uricchio, C., Moore, G., & Coley, M. (2013). Corn clubs: Building the foundation for agricultural and extension education. *Journal of Agricultural Education*, *54*(3), 224-237. doi:10.5032/jae.2013.03224

Vocational Education Act of 1963, 20 U.S.C. § 1241 (1963).

Wilson, B. S. (1958). Contests must go! *The Agricultural Education Magazine*, *30*(9), 196, 198. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume30/v30i9.pdf

Woodin, R. J. (1964a). John F. Kennedy and vocational education. *The Agricultural Education Magazine, 36*(8), 172. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume36/v36i8.pdf

Woodin, R. J. (1964b). Guidance for off-farm occupations. *The Agricultural Education Magazine*, *36*(10), 217. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume36/v36i10.pdf

Woodin, R. J. (1964c). Guidance for off-farm occupations. *The Agricultural Education Magazine,* *37*(1), 1. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume37/v37i1.pdf

Zurbrick, P. R. (1989). The national summit. *The Agricultural Education Magazine, 61*(11), 3. Retrieved from https://www.naae.org/profdevelopment/magazine/archive_issues/Volume61/v61i11.pdf

Competition as an Instructional Approach in School-Based, Agricultural Education (SBAE): A Historical Review

A Critique

Brian E. Myers, Professor and Chair

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I commend the authors for addressing the 800-pound gorilla in the room regarding the role, purpose, and place of competitive events in school-based agricultural education. The authors address this question with a clear and objective approach. Both sides of the issue of the value of competition are presented and some excellent questions for the profession to consider are provided.

Below I've provided a few questions/thoughts for you to consider:

12. The authors mention in several places the context of the social and political climate of the country during the times of major changes or conversations around competition. What do you believe is the current climate around the idea of competition and its role in education?

13. Several different groups are involved in various aspects of FFA competitions (teachers, FFA staff, school administration, industry), how should the SBAE profession engage these different groups in the conversation regarding competitions and their place in SBAE?

14. The authors included opinions from historical individuals on both sides of the competition discussion. It could be concluded that this debate has been going on for years and will continue to go on with support from both sides. Therefore, we should just wait it out. How would the authors respond to this idea?

15. I deeply appreciated how the authors provided information regarding the events that led up to the creation of FFA events. I believe too often we in SBAE portray the creation of FFA as just some event that magically happened in 1928. However, here it shows how competitive and education events were happening many years before FFA was founded. In view of this "long game", how does this inform our process for the review of current activities?

16. The authors do well in identifying the original intents of competitive events. Should the intent of these events remain true to these original ideals or does/should the purpose of these events change over time? If so, what should guide that evolution?

17. In addition to Career Development Events, the authors address several other award programs (degree structure, scholarships, etc). Most of these events are norm-referenced competitions; however, some (FFA degrees) are more criterion-referenced. Did the authors find any differences in concerns between the two? Could a shift from one to the other address any of the stated concerns or would that just create other issues?

Discussant – Marshall Baker; Timekeeper – Isabella Damiani1

Teacher Professional Development
Determining Content Knowledge Needs for Professional Development of In-service Agricultural Education Teachers in South Carolina *Catherine A. DiBenedetto, Victoria C. Willis, K. Dale Layfield*
What do they need? Determining Differences in the Classroom-based Professional Development Needs of Louisiana Agriculture Teachers by Years of Teaching Experience *Whitney L. Figland; J. Joey Blackburn; H. Eric Smith; Kristin S. Stair*
Beginning Agricultural Education Instructor Perceived Benefit of Professional Development Experiences *Melanie S. Bloom, Dr. John D. Tummons, Dr. Scott W. Smalley*
Early Career Agricultural Education Instructor Expectations for Professional Development Yields *Melanie S. Bloom, Dr. John D. Tummons, Dr. Scott W. Smalley*

Determining Content Knowledge Needs for Professional Development of In-service Agricultural Education Teachers in South Carolina

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Abstract

The purpose of this study was to administer a needs assessment to determine areas of discrepancy based on perceived levels of proficiency and importance of concepts focused on content knowledge of in-service agricultural education teachers in South Carolina The population frame for the study included all secondary agriculture teachers in South Carolina. Demographic data that included personal and program profiles were collected. The Educational Testing Service's (ETS) Praxis Study Companion: Agriculture (5701) Exam was used to provide an in-depth understanding of teacher's needs. The Borich needs assessment model was used to discern between teachers' perceived knowledge of Praxis' content areas and their perceived level of importance of each content item. The constructs of each pathway were analyzed and ranked using mean weighted discrepancy scores (MWDS), to provide data for the final rankings, which were categorized using grand mean weighted discrepancy scores (GMWDS). Findings indicated most of the GMWDS data for teachers were in the low range, indicating a low perceived need based on the concepts in the study. A notable area of need for future in-service was found in the Agribusiness Systems pathway.

Introduction

Studies dating as far back as the 1960s emphasize the importance of agriculture teacher in-service for content training and specialized areas (Cline, 1963). From Cline's study to the present, researchers sought a current understanding of agriculture teachers needs for pre-service and in-service activities. Throughout this time, the topics studied often included a set of educational and agricultural content competencies developed from previous research (Birkenholz & Harbstreit, 1987; Claycomb & Petty, 1983; Duncan, Ricketts, Peake, & Uesseler, 2006; Golden, Parr & Peake, 2014; Hillison, 1977; Joerger, 2002; Kahler, 1974; Shippy, 1981; Valli, 1992; Veeman, 1984). Up to this point, studies provided a substantial understanding of the general needs in the various agriculture and natural resource content areas and topics related to FFA and SAE. For many years, a lack of nationally adopted standards for school-based agricultural education (SBAE) resulted in a void of studies that pinpoint teachers' needs regarding the capacity to teach all instructional standards.

In 2003, the United States Department of Education (USDE) Clusters Project led the introduction of the Agriculture, Forestry and Natural Resources (AFNR) Career Cluster Content Standards (Honeycutt, 2015). These standards provided a baseline at the national level to support further development of curriculum at state and local levels. In 2009, the National Council for Agricultural Education (The Council) appointed the National AFNR Career Cluster Content Standards Committee to develop the National AFNR Career Cluster Content Standards for the agricultural education profession. The Council representation included leaders in agricultural education and the National FFA. The National FFA provided the financial support for the development of the standards as part of the project, "National FFA 10 x 15." The project's objective was "to provide state agricultural education leaders and educators with a high-quality, rigorous set of standards to guide what students should know and be able to do after completing a program of study in each of the AFNR career pathways" (The National Council for Agricultural Education, 2015, p. 2).

The impetus for the 2009 development of the AFNR Career Cluster Content Standards and the revision in 2015 originated from the Carl Perkins Act of 2006 (hereafter referred to as Perkins IV). In section 2 of Perkins IV, leaders in states and localities are encouraged to develop challenging academic and technical standards to provide students with preparation for high skill occupations "in current or emerging professions" (Carl D. Perkins Career and Technical Education Improvement Act of 2006, § 2).

In 2011, ETS initiated a revision of the Praxis II Agriculture Content Exam (5701), in conjunction with a National Advisory Committee consisting of secondary agricultural educators, teacher educators and others. This decision of the Advisory Committee aligns with the recommendation made by Thobega and Miller (2008), "In the future, if Praxis II tests are required of pre-service teachers, teacher educators in agriculture must provide leadership in selecting or developing an appropriate content area licensure examination" (Thobega & Miller, 2008, p. 107). Praxis exams are used by many states to support the licensure/certification process (Flippo, 2002). Mr. K. Cureton (personal communication, October 2, 2017) described the process used to develop the revised Agriculture Praxis. Cureton explained that knowledge and skill statements based on standards by The Council and various state standards were sent by survey to several thousand educators across the country for feedback.

Revision of the Praxis II Agriculture Content Exam (5701) introduces a paradigm for how more concise needs assessments in agricultural education could be implemented. The Praxis II is a product of an exhaustive synthesis of contributions from agricultural educators, teacher educators and other stakeholders through National AFNR Career Cluster Content Standards. This led to knowledge and skill statements that developed the Praxis, which Mr. K. Cureton (personal communication, October 2, 2017) shared, is currently used by 24 states. Considering nearly half of the states in the U.S. use the Praxis II for certification, this provides a tool for assessing the technical content needs of school-based agricultural educators. This research also aligns with the American Association for Agricultural Educators Research Priority three which calls for a Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Roberts, Harder, & Brashears, 2016).

Review of Literature

Research focused on determining the in-service needs of agricultural educators has been prevalent in the literature base over the past thirty years. Barrick, Ladewig, and Hedges (1983) developed a survey instrument that outlined specific technical agriculture topics to determine needs by identifying importance of, relative knowledge of, and relative ability of agricultural educators. The research of Claycomb and Petty (1983) was based on the notion that as teachers developed in their careers, their needs changed and evolved. Needs of agricultural educators should be determined by specific career stages and will vary dependent upon those stages. Similarly, a variety of needs are indicated by novice teachers (Birkenholz & Harbstreit, 1987). The last known recorded research study published on in-service needs of South Carolina agricultural educators was a study from Layfield and Dobbins in 2002. The 2002 study compared the needs of beginning and experienced agriculture teachers in South Carolina. Layfield and Dobbins (2002) recommended more research be conducted on in-service needs of agriculture teachers on a national level to uncover common needs among varying states. "At the national level, findings from this and similar studies in agricultural education needs assessments should be considered by the National Agricultural Education Research Workgroup" (Layfield & Dobbins, 2002, p.54).

Nationwide needs assessment research results have the potential to greatly improve the future of agricultural education and increase the efficiency and effectiveness of in-service workshops offered for agricultural education teachers. "As the number of states with timely and relevant needs assessment data increases, researchers should analyze data to identify national trends in agricultural education" (Duncan, Ricketts, Peake, & Uesseler, 2006, p. 33).

Previous research has demonstrated that distinctions exist among in-service needs of agricultural education teachers and the types of assessment instruments that have been utilized to determine how to best design high-quality professional development to best serve their challenges. Instruments utilized to study the professional development needs of agricultural educators vary widely (DiBenedetto & Willis, 2017). The ETS Praxis Study Companion: Agriculture (5701) Exam covers topics which agricultural educators should possess competence in and has the ability to serve as the content which researchers can collect and analyze data to determine professional development needs. Following the recommendation of previous research, this study sought to create and utilize a cohesive and consistent needs assessment instrument (DiBenedetto & Willis, 2017) in which the competencies assessed were derived from the ETS Praxis Study Companion: Agriculture (5701) Exam, which has been regarded as a fair and valid source to assess subject-specific academic competency and determine teacher licensure (ETS PRAXIS, 2015).

Theoretical Framework

Social cognitive theory served as the theoretical framework that guided this research. Social cognitive theory suggests "people act on their judgments of what they can do, as well as on their beliefs about the likely effects of various actions" (Bandura, 1986, p. 231). Personal, behavioral, and environmental factors arise through a bidirectional series of events influencing one's sense of self-efficacy (Bandura, 1986). By having teacher's self-report their perceived importance and competency levels of various subjects and topics, they are providing their own perception of their self-efficacy towards their beliefs of proficiency and importance of the content knowledge they possess. Self-efficacy has been defined as one's perceived belief of their aptitude to learn or perform behaviors (Schunk, 2012). Teacher effectiveness has been aligned with social cognitive theory and research has indicated professional development provides occasions for teacher enrichment (Estepp, Stripling, Conner, Giorgi & Roberts, 2013). As teachers have opportunities to reflect upon and improve their teaching effectiveness through professional development, self-efficacy can be built.

Purpose and Objectives

To assist with the design of future high quality professional development, the purpose of this research was to administer a needs assessment to determine areas of discrepancy based on perceived levels of proficiency and importance of concepts related to content knowledge of in-service agricultural education teachers in South Carolina. To achieve our purpose the following objectives were addressed:

1. Describe the demographic profile of in-service agricultural education teachers and the characteristics of their SBAE programs in South Carolina;
2. Utilize the topics in the ETS Praxis Study Companion: Agriculture (5701) Exam to assess South Carolina in-service agricultural education teachers' perceived need for professional development using Mean Weighted Discrepancy Scores (MWDS) in the following seven content areas I. Agribusiness Systems, II. Animal Systems, III. Food Science and Biotechnology Systems, IV. Environmental and Natural Resource Systems, V. Plant Systems, VI. Power, Structural, and Technical Systems, VII. Leadership and Career Development;
3. Using Grand Mean Weighted Discrepancy Scores (GMWDS), rank priority areas of need for professional development within a pathway using the ETS Praxis Study Companion: Agriculture (5701) Exam for South Carolina in-service agricultural education teachers' reported discrepancy between perceived importance and competency levels.

Methods and Procedures

A non-experimental, descriptive survey design was used for this research. The study received approval by the Clemson University Institutional Review Board and was determined exempt. The overall population for the study consisted of a census of agricultural education teachers in South Carolina. South Carolina agricultural education teachers were sent a link to the survey, powered through Qualtrics® online survey platform. State Staff collaborated with the researchers to assist with data collection by sending emails containing the survey link to all agricultural educators in their specified region. A friendly regional competition among the State Staff served as an incentive for each regional coordinator to obtain responses from the teachers in their regions. Data were collected in April of 2017. Survey respondents were offered an incentive of a chance to win instructional supplies, valued at $100, for completing the survey by the established deadline. The survey was administered to 132 agricultural education teachers with a 69% response rate.

The ETS Praxis Study Companion: Agriculture (5701) Exam was used to develop an instrument using the Borich Model (1980) for assessing need. The ETS Praxis Study Companion: Agriculture (5701) Exam is divided into seven pathways. Those pathways are divided into constructs, which are then divided into variables within each construct. ETS was contacted and provided with details regarding the intended use of the Study Companion. Once permission was granted from ETS to use content from the Praxis Study Companion: Agriculture (5701) Exam, an instrument was designed in Qualtrics® to administer the survey to a census of in-service agricultural education teachers in South Carolina. Each of the seven content areas (Agribusiness Systems, Animal Systems, Food Science and Biotechnology Systems, Environmental and Natural Resource Systems, Plant Systems, Power, Structural, and Technical Systems, and Leadership and Career Development) was outlined using the representative descriptions of topics in each category covered on the ETS Praxis Study Companion: Agriculture (5701) Exam. The Food Science and Biotechnology Systems construct was omitted from the data analysis because only one teacher in South Carolina reported teaching the pathway. The ETS Praxis Study Companion: Agriculture (5701) Exam was deemed appropriate for data collection because the “test content is appropriate for examinees who have completed a bachelor’s degree program in agricultural education” (ETS PRAXIS, 2015).

The Borich Model (1980) was used for the instrument design to rank concepts and determine priority area of need. Borich (1980) uses a discrepancy between two measures of an item and allows respondents to provide their perceptions of competency related to the given topic and their relative belief about the importance of the topic as it relates to teaching the agricultural education curricula. The mean weighted discrepancy score (MWDS) was calculated to establish rankings based on priority area of need (Borich, 1980). The following calculation was used to determine MWDS: (Discrepancy = importance level - ability level for each topic), MWDS = [(Importance Rating- Ability Rating) x (M Importance Rating)]/ Number of Observations.

All survey respondents participated in the Agribusiness Systems and Leadership Career Development pathway sections of the instrument, as these concepts are not taught in isolated courses in South Carolina, but typically integrated into each course within a pathway. For all other pathways, respondents were asked if they taught the pathway or not before entering each section of the instrument. Respondents only completed the survey for sections (career pathways) they taught. For all variables within a construct, respondents were asked to rank their perceived importance and competency level. The importance and competency level scale used a Likert scale ranging from one to five, with one indicating low importance/low competence, and five indicating high importance/high competence. The instrument also contained sections related to demographic profiles, education level, curriculum, and SBAE program structure. A reliability coefficient of $\alpha = .84$ was reported for the Praxis II: Agriculture (5701) Exam (K. Cureton, personal communication, October 2, 2017). Considering the Praxis II Agriculture (5701) Exam is a reflection of the Study Companion, we deemed an expert panel for review was not required when using the concepts outlined in the ETS Praxis Study Companion: Agriculture (5701) Exam to develop the instrument for data collection.

The MWDS was calculated for each variable within a construct, which included the teacher’s perceived importance and competency level data, using Microsoft Excel. The grand (G) MWDS was then calculated from the MWDS summary table data by taking each variable’s MWDS, within a particular construct, and calculating the average in a spreadsheet. Variables were categorized into their appropriate construct category, according to ETS Praxis Study Companion: Agriculture (5701) Exam. MWDS and GMWDS were analyzed to maximize the efficiency and applicability for teacher professional development sessions. Findings from this study can only be generalized to the population of interest, South Carolina agricultural education teachers, but with a 69% response rate may provide insight and a starting point for other states to consider and conduct similar data collection by replication of this research.

Findings

The first objective of the study was to describe the demographic profile and program characteristics of South Carolina agricultural education teachers. Nearly the majority of teachers (47%) taught 1-3 years (18%), 4-6 (11%), followed by 7-10 years (18%). The remaining 53% taught 11-15 years (13%), 16-20 (11%), 21-25 (6%), 26-30 (5%), and 14% taught for more than 30 years. The most dominant age group of the respondents was 26-30 year olds (19%), followed by 31-35 year olds (17%). The remaining 64% consisted of 21-25 (11%), 36-40 (11%), 41-45 (7%), 46-50 (7%), 51-55 (7%), 56-60 (16%), 61-65 (3%), followed by 1% reporting age as 66 or older. Male respondents (52%) outnumbered female respondents (48%). The most common race reported by respondents was white (95%), followed by black or African American (4%), and other (1%).

The most common academic degree held by respondents was a master's degree (61%), followed by a bachelor's degree (37%). An open response question was asked to determine where the teachers obtained their degrees; the majority attended Clemson University (81%). A majority of the teachers were certified through traditional certification (92%), followed by alternative certification (8%). Respondents preferred to attend in-service trainings in the summer (56%), followed by district/regional meetings (25%), fall semester (10%), spring semester (7%), and other (1%). An open response question provided the opportunity for teachers to express feedback with regard to specific areas that might help researchers understand their current needs as an agriculture teacher. Responses (n = 17) were primarily centered on animal science. Additionally, developing an adult education program, use of an advisory board, budgeting/updating equipment, and managing a greenhouse were reported.

In regard to program characteristics, the predominant primary pathway taught by the respondents was Horticulture (41%), followed by Plant and Animal Systems (28%), Environmental and Natural Resource Systems Management (24%), Agricultural Mechanics and Technology (6%), and Biosystems Engineering Technology (1%). When asked which secondary pathway teachers taught, the predominant answer was they taught only one pathway (38%). Of those who taught two pathways, the Environmental and Natural Resource Systems Management pathway was most prominent (25%). When asked which instructional resources teachers utilized in daily planning and teaching, MyCAERT curriculum was the predominant response (52%), followed by the other category (30%). When asked how many teachers were in their agricultural education program, the majority answered one (63%), followed by two (28%). Most teachers taught at a high school agricultural education program (94%). A few reported teaching at a middle school agricultural education program (3%) and both middle school and high school agricultural education program (3%).

Objective two required computing the MWDS for each variable within the construct for each pathway. The MWDS data were summarized in the conclusions to assist with providing clarity between the variables (specific content topics/learning objectives) in each of the pathway constructs. The importance and competency level scale ranged from one to five, with one indicating low importance/low competence, and five indicating high importance/high competence. Objective three required computing the GMWDS to rank the constructs. The GMWDS was calculated using Excel for the variables that occurred within each pathway's constructs. The GMWDS scores were ranked from highest to lowest, with a larger GMWDS indicating greater priority need for in-service, and a smaller GMWDS implying less of a need for in-service. The GMWDS findings for each of the systems pathway constructs are displayed in table format below for ease of readability.

The **Agribusiness Systems** construct (n = 91 responses) results in order from highest need to lowest need are presented in Table 1. All respondents were asked to complete this section of the instrument. Agribusiness accounting systems and marketing principles were the highest area of priority need constructs reported in the Agribusiness Systems pathway.

Table 1: Ranking of Agribusiness Systems Pathway

Constructs within Agribusiness Systems	**GMWDS**
D. "Is familiar with generally accepted accounting practices for making agribusiness decisions."	2.13

F.	"Is familiar with the marketing principles needed to accomplish agribusiness objectives."	2.03
C.	"Know the record keeping needed to accomplish agribusiness objectives."	1.77
A.	"Know the principles of capitalism and entrepreneurship in the agribusiness industry."	1.76
B.	"Know the management skills needed to organize an agribusiness."	1.76
E.	"Is familiar with the fundamentals of savings, investments, and credit in agribusiness."	1.66

Note. Letter codes next to each construct within a pathway in all tables were derived from the ETS Praxis Study Companion: Agriculture (5701) Exam.

The **Animal Systems** construct (n = 37 responses) results are presented in order from highest need to lowest need in Table 2. In South Carolina one pathway consists of both Animal and Plant Systems. Respondents were asked to rank the percentage of the curriculum they taught which focused on Plant Systems (50.43%) versus Animal Systems (49.57%). Only those currently teaching the Plant and Animal pathway responded to this section. Overall, teachers in South Carolina feel confident to teach the concepts in the Animal Systems pathway.

Table 2: Ranking of Animal Systems Pathway

Constructs within Animal Systems		**GMWDS**
C.	"Is familiar with proper health care of animals."	1.28
G.	"Is familiar with normal and abnormal animal behavior."	.910
F.	"Know safety practices related to animal production."	.687
E.	"Know the basic principles of animal production and management."	.530
D.	"Know basic principles of animal nutrition."	.505
L.	"Is familiar with the issues related to animal rights, animal welfare, and producer responsibilities."	.475
A.	"Is familiar with the historical development and trends of the animal systems industry."	.355
I.	"Know the principles and practices of basic animal reproduction."	.332
H.	"Is familiar with the proper design and use of animal facilities and the equipment for safe and efficient production."	.280
J.	"Is familiar with the effects of environmental conditions on animal production."	.235
K.	"Is familiar with the impacts of animal production on the environment."	.170
B.	"Know the classification, anatomical, and physiological characteristics of animals."	.165

The **Environmental and Natural Resource Systems (ENR)** construct (n = 38 responses) results in order from highest need to lowest need are presented in Table 3. Only those currently teaching the Environmental and Natural Resource Systems pathway responded to this section of the instrument. Overall, teachers in South Carolina felt confident to teach the concepts in the Environmental and Natural Resource Systems pathway.

Table 3: Ranking of ENR Pathway

Constructs within ENR		GMWDS
A.	"Is familiar with natural cycles related to environmental and natural resource management."	1.32
F.	"Know the use of personal protective equipment (PPE) and safety procedures related to environmental and natural resource management."	1.31
K.	"Is familiar with procedures used to develop an environmental and natural resource management plan."	1.15
L.	"Know the general impact of land use on environmental and natural resources."	1.15
I.	"Is familiar with wetlands and their role in the environment."	.930
G.	"Is familiar with the role of environmental and natural resource management in the local, state, and national economies."	.883
E.	"Is familiar with current issues and regulations in environmental and natural resource management."	.875
H.	"Is familiar with the impact of conventional and alternative energy resources on the environment."	.660
J.	"Is familiar with the use, production, and processing of natural resources."	.650
D.	"Is familiar with the ecological concepts and principles related to natural resource systems."	.582
B.	"Is familiar with chemical properties related to environmental and natural resources."	.510
C.	"Know the various ecosystems of the environment."	.220

The **Plant Systems** construct (n = 38 participants) results in order from highest need to lowest need are presented in Table 4. Only those currently teaching the Plant and Animal pathway responded to this section of the instrument. Overall, teachers in South Carolina indicated little need for professional development in concepts in the Plant Systems pathway.

Table 4: Ranking of Plant Systems Pathway

Constructs within Plant Systems		GMWDS
J.	"Is familiar with the principles and elements of landscape and floral design."	1.00
B.	"Know general safety issues related to plant systems."	.718
F.	"Know the basic characteristics of both soils and growing media and their uses."	.612
H.	"Is familiar with production and management practices associated with horticultural crops."	.507
E.	"Is familiar with propagation, cultivation, and harvesting of plants."	.460

I.	"Is familiar with production and management practices associated with agronomic crops."	.298
D.	"Is familiar with the influence of environmental factors on plant growth."	.005
C.	"Know the basic principles of identification, classification, anatomy, and physiology as related to plant production and management."	-0.022
A.	"Know the historical development of plant science and its relationship with society."	-0.027
G.	"Is familiar with the use of integrated pest management (IPM) in plant production."	-0.15

The **Power, Structure, and Technical Systems** construct (n = 7 participants) results are presented in order from highest need to lowest need in Table 5. Only those currently teaching the Power, Structure and Technical Systems pathway responded to this section of the instrument. Agricultural education teachers in South Carolina indicated a high priority need for professional development in the application of technology in the agriculture industry.

Table 5: Ranking of Power, Structure, and Technical Systems Pathway

	Constructs within Power, Structure, and Technical Systems	**GMWDS**
K.	"Is familiar with the application of technology to the agriculture industry."	3.18
D.	"Is familiar with the principles of power, energy transfer, and conversion."	1.60
A.	"Is familiar with the physical science principles and engineering applications associated with power, structural, and technical systems."	.633
F.	"Know the safe operation and maintenance of hand tools, power tools, and other equipment."	.590
H.	"Is familiar with the planning and building of structures."	.444
L.	"Is familiar with the use of technical and mathematical approaches to map land, facilities, and infrastructure."	.420
I.	"Is familiar with metal fabrication and welding."	.403
C.	"Is familiar with various power and energy sources."	.243
B.	"Is familiar with electricity and electrical wiring."	.117
E.	"Know the proper use, storage, and disposal of potentially hazardous materials common to the agricultural mechanics laboratory."	.012
G.	"Is familiar with the principles of small-engine operation, maintenance, and repair."	-.09
J.	"Is familiar with the installation, maintenance, and repair of water systems."	-.392

The **Leadership and Career Development** construct (n = 91) results are presented in order from highest need to lowest need in Table 6. All respondents were asked to complete the Leadership and Career Development section of the instrument. Overall, teachers in South Carolina indicated little need for professional development in Leadership and Career Development.

Table 6: Ranking of Leadership and Career Development Pathway

Constructs within Leadership and Career Development		GMWDS
B.	"Know the foundational areas of career development."	1.35
E.	"Know communication skills."	1.06
A.	"Know the principles of leadership."	.885
G.	"Understand supervised agricultural experiences (SAE)."	.812
F.	"Know information research skills to make informed decisions."	.775
D.	"Know individual and team leadership skills."	.725
H.	"Know career opportunities across the various pathways of agriculture."	.153
I.	"Is familiar with local program planning and management."	-.15
C.	"Understand the purpose, structure, and function of the National FFA Organization."	-.43

Conclusions, Implications, and Recommendations

The majority of agricultural educators in South Carolina are within their first ten years of teaching. Teachers within the early to mid-stage of their careers may require additional in-service opportunities until they become established, which indicates that professional development opportunities may need to be offered specifically geared toward various career stages.

Overall results indicated low to negative GMWDS, which indicated that teachers are well informed and knowledgeable on the constructs and variables within the AFNR pathways that they are currently responsible to teach. It should be noted that teachers responded to the pathway questions only if they taught that particular pathway, excluding Agribusiness Systems and Leadership and Career Development, as all teachers responded in those pathways. We believe focusing on pathways currently taught by the teachers provided more reliable data to utilize for planning future professional development programs and reviewing curricula within our state.

It is encouraging to see our current agricultural educators self-reporting few areas in which they perceive a crucial need; this reinforces South Carolina agricultural education teachers are competent and have the perceived skills necessary to teach students on the reported construct areas outlined in the ETS Praxis Study Companion: Agriculture (5701) Exam. Given 81% of the respondents attended Clemson University the findings imply the agricultural education program of study has provided students with the knowledge and technical skills required to teach agriculture. We acknowledge that teacher's responses are based on their perceived abilities and perceived importance of the construct variables and thus the study is strongly rooted in self-efficacy and the social cognitive theory. By becoming more aware of teacher's perceived abilities, we can better address areas where teachers require support and customize professional development to their specific needs, thus improving their self-efficacy.

To clarify the difference in the purpose of objectives two and three, we utilized each specific area of content need as outlined by the ETS Praxis Study Companion: Agriculture (5701) Exam. Objective two focused on the MWDS to assess perceived need for professional development, according to specific variables (curricular objectives) within the pathway, while objective three focused on using the GMWDS to determine teachers' perceived importance and competency levels, according to each construct or topic area in the overall pathway. To provide a more in depth look at the conclusions made with regard to perceived needs by curricular objectives we separately analyzed the MWDS in each pathway.

Within the **Agribusiness Systems** pathway, the top three MWDS scores included “Describe commodity futures and options trading” (2.55), followed by “Distinguish between hedging and speculation” (2.43), and “Develop a balance sheet and analyze its issues” (2.37). The top three MWDS data revealed a high need for variables within construct F, “Is familiar with the marketing principles needed to accomplish agribusiness objectives.” High need variables within construct F, when analyzing the top three variables, included “Describe commodity futures and options trading” (2.55) and “Distinguish between hedging and speculation” (2.43). Construct F (Table 1) ranked as the second highest priority area of need in the Agribusiness Systems pathway constructs, using GMWDS, indicating a potential area of focus for agricultural educators in South Carolina.

Within the **Animal Systems** pathway the top three MWDS scores included “Describe the use of vaccination and immunization in the animal science industry” (1.49), followed by “Select proper routes of administration of medications and vaccines on various animal species” (1.33), and “Describe symptoms of common nutrient deficiencies” (1.33). The top three MWDS data revealed the highest need for variables within construct C, “Is familiar with proper health care of animals.” High need variables within construct C, when analyzing the top three variables, included “Describe the use of vaccination and immunization in the animal science industry” (1.49) and “Select proper routes of administration of medications and vaccines on various animal species” (1.33). Construct C (Table 2) had the highest GMWDS in the Animal Systems Pathway.

Within the **ENR Systems** pathway, the top three MWDS scores included “Explain the importance of an indicator species” (1.97), followed by “Describe population sampling techniques (e.g., quadrant sampling, electrofishing in aquatic systems, radio tracking)” (1.62), and “Describe best management practices and explains how they benefit the environment (e.g., stocking rate, protection of critical wildlife habitat)” (1.37). The top three MWDS data revealed a high need for variables within construct K, “Is familiar with procedures used to develop an environmental and natural resource management plan.” High need variables within construct K, when analyzing the top three variables, included “Explain the importance of an indicator species” (1.97) and “Describe population sampling techniques (e.g., quadrant sampling, electrofishing in aquatic systems, radio tracking)” (1.62). Construct K (Table 3) ranked third highest priority area of need in the ENR pathway constructs, using GMWDS.

Within the **Plant Systems** pathway the top three MWDS scores included “Explain soil structure and texture as related to plant growth” (1.18), followed by “Define hazardous plant classifications (e.g., noxious, invasive) (1.17), and “Identify the macronutrients and micronutrients needed for plant growth” (1.09). The top three MWDS data revealed a high need for variables within construct F, “Know the basic characteristics of both soils and growing media and their uses.” High need variables within construct F, when analyzing the top three variables, included “Explain soil structure and texture as related to plant growth” (1.18) and “Identify the macronutrients and micronutrients needed for plant growth” (1.09). Construct F (Table 4) ranked third highest in priority area of need in the Plant Systems pathway constructs, using GMWDS.

Within the **Power, Structural, and Technical Systems** pathway the three top MWDS scores included “Describe the basic operating principles of an electric motor” (3.80), “Explain how GPS and GIS are used in precision agriculture” (3.67) and “List the common applications of GPS technology in agriculture” (3.67). The top three MWDS data revealed a high need for variables within construct K, “Is familiar with the application of technology to the agriculture industry.” High need variables within construct K, when analyzing the top three variables, included “Explain how GPS and GIS are used in precision agriculture” (3.67) and “List the common applications of GPS technology in agriculture” (3.67). Construct K (Table 5) ranked highest in priority area of need in the Power, Structural, and Technical Systems pathway constructs, using GMWDS. It is important for teacher educators to be aware of these content areas of need as future professional development sessions focused on Power, Structural and Technical Systems are designed.

Within the **Leadership and Career Development** pathway the three top MWDS scores for the Leadership and Career Development variables included “Develop a career plan to meet career goals (e.g., education, employment, lifestyle goals)” (1.60), followed by “Describe the various components related to job preparation (e.g., resume development, interviewing, and overall business etiquette)” (1.39), and “Describe how to determine validity and reliability of a source (e.g., author, date, bibliography, type of source)” (1.36). The top three MWDS revealed a need for variables within construct B, “Know the foundational areas of career development.” High need variables within construct B, when analyzing the top three variables, included “Develop a career plan to meet career goals (e.g., education, employment, lifestyle goals) (1.60) and “Describe the various components related to job preparation (e.g., resume development, interviewing, and overall business etiquette) (1.39). Construct B (Table 6) ranked highest in priority of need in the Leadership and Career Development pathway constructs, using GMWDS. Previous research on professional development needs of agricultural education teachers has not specifically focused on the content knowledge of the respondent as they relate to the AFNR standards. Social cognitive theory posits one acts on their judgement about what they can do (Bandura, 1986). One’s confidence and intent to teach concepts is somewhat dependent upon their self-efficacy towards the topic. Understanding content area needs of agricultural education teachers could provide implications for change in state-wide professional development and one’s intent to participate in such programs. The results of this study provided us with information to assist with a curricular review of our undergraduate agricultural education program at Clemson University. Relevant to the findings for the need to increase content knowledge in the Agribusiness Systems pathway, we have considered the addition of an agribusiness course in the undergraduate agricultural education programs’ plan of study.

We recommend use of the instrument designed in this study, by the 24 states that require the ETS Praxis II Agriculture (5701) Exam for certification, to analyze agricultural educator’s perceived importance and competency of content knowledge, in an effort to target future professional development programs and curricular changes for those agricultural education teacher preparation programs. As research is collected among various states, teacher’s needs should be compared, and overarching professional development needs should be identified and presented regionally and nationally. The results of these studies could be useful in developing curricular change for teacher preparation programs and high quality professional development for in-service teachers. The National Association of Agricultural Educators (NAAE) may benefit from these results to plan for their annual conference. One recommendation for practice is to utilize the findings of this research to assist in gauging perceived areas of strength and weakness in content knowledge of both pre-service and in-service agricultural education teachers in South Carolina, focusing on the highest areas of need in each of the seven pathways and more specifically the Agribusiness Systems pathway.

References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Barrick, R. K., Ladewig, H. W., & Hedges, L. E. (1983). Development of a systematic approach to identifying technical in-service needs of teachers. *Journal of the American Association of Teacher Educators in Agriculture, 24*(1), 13-19. doi:10.5032/jaatea.1983.01013

Birkenholz, R. J., & Harbstreit, S. R. (1987). Analysis of the in-service needs of beginning vocational agriculture teachers. *Journal of the American Association of Teacher Educators in Agriculture, 28*(1), 41-49. doi:10.5032/jaatea.1987.01041

Borich, G. D. (1980). A needs assessment model for conducting follow-up studies. *Journal of Teacher Education, 31*(3), 39-42.

Carl D. Perkins Career and Technical Education Improvement Act of 2006, S. 250, 109th Cong. (2006).

Claycomb, D. M., & Petty, G. C. (1983). A three year longitudinal study of the perceived needs for assistance as ranked by vocational agriculture instructors. *Journal of the American Association of Teachers in Agriculture, 24*(4), 28-33. doi:10.5032/jaatea.1983.04028

Cline, R.W. 1963. Some guidelines for teacher education. *Journal of the American Association of Teacher Educators in Agriculture, 4*(2), 11-14.

DiBenedetto, C. A. & Willis, V. (2017). Needs assessments for School-based agricultural education teachers: A review of literature. Proceedings from the Southern Region American Association for Agricultural Educators Conference, February 2017, Mobile, Alabama, 185-198.

Duncan, D.W., Ricketts, J. C., Peake, J. B., & Uesseler, J. (2006). Teacher preparation and in-service needs of Georgia agriculture teachers. *Journal of Agricultural Education*, *47*(2), 24-35. doi:10.5032/jae.2006.02024

Estepp, C. M., Stripling, C. T., Conner N. W., Giorgi, A. & Roberts, T. G. (2013). An examination of the learning activities, cognitive level of instruction, and teacher immediacy behaviors of successful instructors in a college of agriculture. *Journal of Agricultural Education, 54*(2), 15-28. doi:10.5032jae.2013.02015

ETS PRAXIS. Technical Manual for *The Praxis Series* and Related Assessments, Princeton, N.J., 2015. Retrieved from https://www.ets.org/s/praxis/pdf/technical_manual.pdf

Flippo, R. F. (2002). Repeating history: Teacher licensure testing in Massachusetts. Journal of Personnel Evaluation in Education, *16*(3), 211-229.

Golden, M. E., Parr, B., & Peake, J. (2014). An Assessment of the Needs of Middle School Agricultural Education Instructors in Georgia. Journal of Agricultural Education, *55*(5), 222-234. doi:10.5032/jae.2014.05222

Hillison, J. (1977). The concerns of agricultural education preservice students and first year teachers. *The Journal of the American Association of Teacher Educators in Agriculture, 18*(3), 33-39.

Honeycutt, M. (2015, September 3). National Council for Agricultural Education Releases Revised Content Standards. [Blog post]. Retrieved from http://blog.careertech.org/?p=11840

Joerger, R. (2002). A Comparison of the in-service education needs of two cohorts of beginning Minnesota agricultural education teachers. *Journal of Agricultural Education 43*(3), 11- 24. doi:10.5032/jae.2002.03011

Kahler, A. A. (1974). Organization and instructional problems of beginning teachers of vocational agriculture. Ames: Iowa State University, Department of Agriculture Education.

Layfield, K. D., & Dobbins, T.R. (2002). In-service needs and perceived competencies of South Carolina agricultural educators. *Journal of Agricultural Education*, *43*(4), 46-55. doi:10.5032/jae.2002.04046

National Council for Agricultural Education. (2009). Agriculture, food and natural resources (AFNR) career cluster content standards. Retrieved from http://www.jerseyageducation.nj.gov/agriculture/ag_ed/classroom/FINAL%20AFNR%20Standards%20v3%202%204%206%2009.pdf

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Schunk, D., H. (2012). *Learning theories: An educational perspective* (6th ed.). Boston, MA: Pearson Education Inc.

Shippy, R. D. (1981). Professional competencies needed by beginning teachers of agriculture/agribusiness. *Journal of the American Association of Teacher Educators in Agriculture*, *22*(1), 29-34.

The National Council for Agricultural Education. (2015). *Agriculture*, *food and natural resource career cluster content standards.* Retrieved from https://www.ffa.org/SiteCollectionDocuments/council_afnr_career_cluster_content_standards.pdf

Thobega, M. & Miller, G. (2008). Predicting scores of beginning agricultural education teachers on the Praxis II examination. *Journal of Agricultural Education*, *49*(1), 99-109. doi:10.5032/jae.2008.01099

Valli, L. (1992). Beginning teacher problems: Areas for teacher education improvement. *Action in Teacher Education*, *14*(1), 18-25.

Veeman, S. (1984). Perceived problems of beginning teachers. *Review of Educational Research*, *54*(2), 143-178.

Determining Content Knowledge Needs for Professional Development of In-service Agricultural Education Teachers in South Carolina

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Discussant Remarks

This study utilized a Borich Model (1980) approach to identify priority areas of most need in South Carolina. The authors did a great job identifying a state specific need, selecting the method most appropriate to addressing the research questions, executing that plan with methodological integrity, and reporting results in a clear manner. Most interesting in this study was the fact that teachers perceived very few areas as "high need" based on the GMWDS findings. This alone is a very interesting finding that merits our discussion and attention given the commonly documented over-estimation of knowledge and skills by agricultural educators. Social cognitive theory would conclude that these estimations of one's self-efficacy would have motivational impacts on teachers desire to pursue professional development opportunities. There is much to be discussed in this regard.

The chosen theoretical framework, though broad and not variable specific, does a good job framing the questions of interest and providing the rationale for identifying self-reported need. This study seems to be a prime opportunity to utilize a qualitative inquiry to better understand why teachers reported very little need in a time where modern agriculture is becoming more specialized and technical. This inquiry, through the lens of social cognitive theory, could assist in triangulating the quantitative findings for better interpretation.

Authors are commended on achieving a 69% response rate in this census study. Though we all would hope for a higher percentage of respondents, we should also recognize how difficult that can be. Methodologically, this study was executed and reported quite well. The Borich Model conventions were well integrated, constructs were justified using the PRAXIS exam, and findings were reported in a way that was simple to understand. The reporting of parameters, in line with the census approach, was appreciated. One methodological approach worthy of mention is the use of the PRAXIS question bank. Authors noted that states subject to this examination for certification should think of this metric. Could this exam have broader appeal to our profession as a common metric for teacher content preparation? In this specific study, it would be interesting to administer that exam to the teachers responding to see what a direct measure of their abilities would be compared to their reported competence. What if their construct scores were presented to them prior to asking for their needs? How would that impact their perceived need? So often teachers in the field are not provided relevant feedback on their grasp of content due to less focus on student content performance in agricultural education. Improvement science would contend that you can only improve what can be systematically measured – I wonder how that applies to teacher needs in technical agriculture content?

What do they need? Determining Differences in the Classroom-based Professional Development Needs of Louisiana Agriculture Teachers by Years of Teaching Experience

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Abstract

An ever-changing world of education has led to growing demand for teachers to remain competent educators. In order for school districts to enhance teacher effectiveness, professional development workshops must be tailored to the specific needs of educators. Professional development has been traditionally based on research methodology as a tool to develop these workshops. To further complicate the issue, in-service needs of teachers are ever growing and changing based on experience. The theoretical foundation of this study was Knowles Theory of Andragogy. Per the theory, adult learners are motivated to learn when they feel intrinsic value or realize the personal gain from the learning activity. The central drive for this study was to determine what Louisiana] agriculture teachers desired in terms of classroom based professional development, thereby giving these adult learners a hand in planning professional development activities. The results from this study indicate that there are dissimilar professional development needs based on years of teaching experience. Per the conclusions, the authors recommend the results of this study be shared with state agricultural education staff, university faculty, and the Louisiana Agriculture Teachers' Association. It is also recommended that professional development organizers should consider years of experience when planning professional development seminars.

Introduction

Since the 1980's educational research and policy have focused on ways to reform teacher education. These reform efforts have not just been aimed at teacher preparation programs, but have also focused on providing higher quality in-service opportunities and improving overall teacher quality (Borman & Dowling, 2008). Education is a continually changing field; therefore the needs of teachers are constantly evolving. Teachers often possess varying backgrounds and experiences that make each of their in-services needs uniquely different from one to another. In order to meet these needs, school systems must find ways to meet the growing demand for teachers to remain relevant and competent (Smith, Lawver, & Foster, 2017). Often, teacher training is conducted through professional development workshops, which are designed to promote and enhance teacher knowledge, provide training in key areas, and increase teaching effectiveness (Borko, 2004). Professional development needs of teachers change over time. There have often been difficulties in identifying which types of training and professional development should be offered (Birkenholz & Harbstreit, 1987; Washburn, King, Garton, & Harbstreit, 2001). Historically, the United States Department of Education has functioned as a base for identifying relevant professional development topics (Gulamhussein, 2013), but research methodology has also been a commonly employed as a tool to determine the topics for professional development (Birkenholz & Harbstreit, 1987; Claycomb & Petty, 1983; Layfield & Dobbins, 2002; Saucier, Tummons, Terry, & Schumacher, 2010; Washburn et al., 2001).

It is not surprising that professional development needs of teachers change over time, especially in career and technical education (CTE). CTE teachers play a vital role in the nations' educational system, so it remains important that these teachers are meeting CTE standards (Cannon, Kitchel, & Duncan, 2012). Specifically, agricultural educators provide students with foundational education in the agricultural industry (Ramsey & Edwards, 2011). In order for these teachers to remain current, it is vital they receive quality professional development. During a typical academic year, 90% of teachers will spend 2 hours per week participating in district-wide professional development seminars (Darling-Hammond, Chung, Andree, Richardson, & Orphanos, 2009). However, these workshops are often short in duration and provide no visible change in student achievement (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007; Bush, 1984).

In agricultural education, a study completed by Garton & Chung (1996) reported four primary areas in need of professional development including (a) motivating students to learn, (b) preparing FFA degree applications, (c) developing a working Program of Activities, and (d) working with proficiency award applications. Similarly, Dobbins and Camp (2000) indicated there was a need for professional development in areas of (a) learning styles, (b) curriculum development, (c) teaching methods, (d) teaching techniques, and (e) technical areas. According to Washburn et al. (2001) professional development needs can vary by geographic location. It has been concluded that states in the same geographic region (i.e., share a common border) can have vastly different in-service needs (Birkenholz & Harbstreit, 1987). This could be due to the fact that most agricultural education programs are state driven, which makes professional development needs vary from state to state. More recent research has also suggested that technical agriculture areas, like agriculture mechanics, are an emerging area in need of professional development (Rasty, Anderson, & Paulsen, 2017; Duncan, Ricketts, Peake & Uesseler, 2006). Further, Saucier et al. (2010) identified (a) laboratory teaching practices, (b) global positioning systems, (c) state agricultural tours, (d) biofuels, and (e) biotechnology as the areas of greatest need for Missouri agriculture teachers. This is particularly important because Walker, Garton, & Kitchel (2004) reported agriculture teachers in Missouri who left the profession often "did not enjoy agricultural mechanics laboratory instruction" (p. 35).

Several research studies have indicated the in-service needs of teachers can vary with years of teaching experience (Layfield & Dobbins, 2002; Roberts & Dyers, 2004; Washburn et al., 2001). Many studies have concluded that beginning teachers need professional development in the areas of (a) program planning, (b) lesson planning, and (c) managing student behavior (Shippy, 1981; Mundt 1991; and Talbert, Camp, & Heath-Camp, 1994). It is not surprising that novice teachers lack classroom experiences and may require more intensive professional development to ensure that they are effective teachers. For these teachers especially, their needs will change depending on their educational and personal experiences (Steffy, Wolff, Pasch, & Enz, 2000). Regarding experienced teachers, Layfield and Dobbins (2002) and Washburn et al. (2001) concluded that teachers with 10+ years of teaching experience needed the most professional development in the area of technology integration. It appears the in-service needs of beginning and experienced teachers can be vastly different.

Research has indicated that an adequate preservice preparation program, professional development, and support of teachers are very important in improving teacher quality, competency, and retention (Ruhland & Bremer, 2003). Professional development and continued practice in a content area is something any teacher needs in order to stay relevant. Agriculture teachers, regardless of tenure in the profession, still have a continuing desire for professional development to ensure that their skills remain current (Barrick, Ladewig, & Hedges, 1983).

Theoretical and Conceptual Framework

The theoretical foundation of this study was Knowles (1980) Theory of Andragogy. The Theory of Andragogy is driven by six principles: (a) the learner's need to know, (b) self-concept of the learner, (c) prior experiences of the learner, (d) readiness to learn, (e) orientation to learning, and (f) motivation to learn (Knowles, Holton III, & Swanson, 2015). Per the theory, adult learners are motivated to learn when they feel intrinsic value or realize the personal gain they will receive from the learning activity (Knowles et al., 2015). Further, motivation to learn is enhanced when the adult learners have a hand in planning their learning activities (Knowles, 1980). The central purpose for this study was to determine what Louisiana agriculture teachers desired in terms of classroom based professional development, thereby giving them input in planning professional development activities.

The model of teacher development was the conceptual frame that underpinned this study (Fessler & Christensen, 1992). The model posits that teacher's needs differ based on career stage (see Figure 1). Specifically, Fessler and Christensen (1992) described eight career stages, (a) induction, (b) competency building, (c) enthusiastic and growing, (d) career frustration, (e) career stability, (f) career wind-down, and (g) career exit. The induction stage is described as the first few years of employment where the new teacher assimilates into the culture of the school and begins to gain confidence in his or her abilities as a professional educator (Fessler & Christensen, 1992; Greiman, 2010). At some point the novice teacher moves into the competency building stage where he or she strives to improve as an educator, this may include seeking out professional development opportunities or enrolling in graduate coursework (Fessler & Christensen, 1992). The enthusiastic and growing stage is marked by a high sense of teacher self-efficacy and career satisfaction. Often these teachers are sought out to share their excitement and expertise (Fessler & Christensen, 1992; Greiman, 2010). Some teachers begin to feel burnt out and unsatisfied in the career frustration stage. This may happen early or late in one's teaching career (Fessler & Christensen, 1992; Greiman, 2010). During the stability stage, the teacher is likely performing adequately but is not actively striving to better their teaching skills. Career wind-down begins as the teacher contemplates leaving the profession and is marked by a period of reflection. Finally, career exit is the period of time after the teacher has left the job (Fessler & Christensen, 1992; Greiman, 2010). It is important to note these stages are not linear and a teacher may move back and forth through each or may never enter all stages. A teachers' career phase is influenced by several factors, broadly classified as organizational or personal in nature (Fessler & Christensen, 1992; Lynn, 2002).

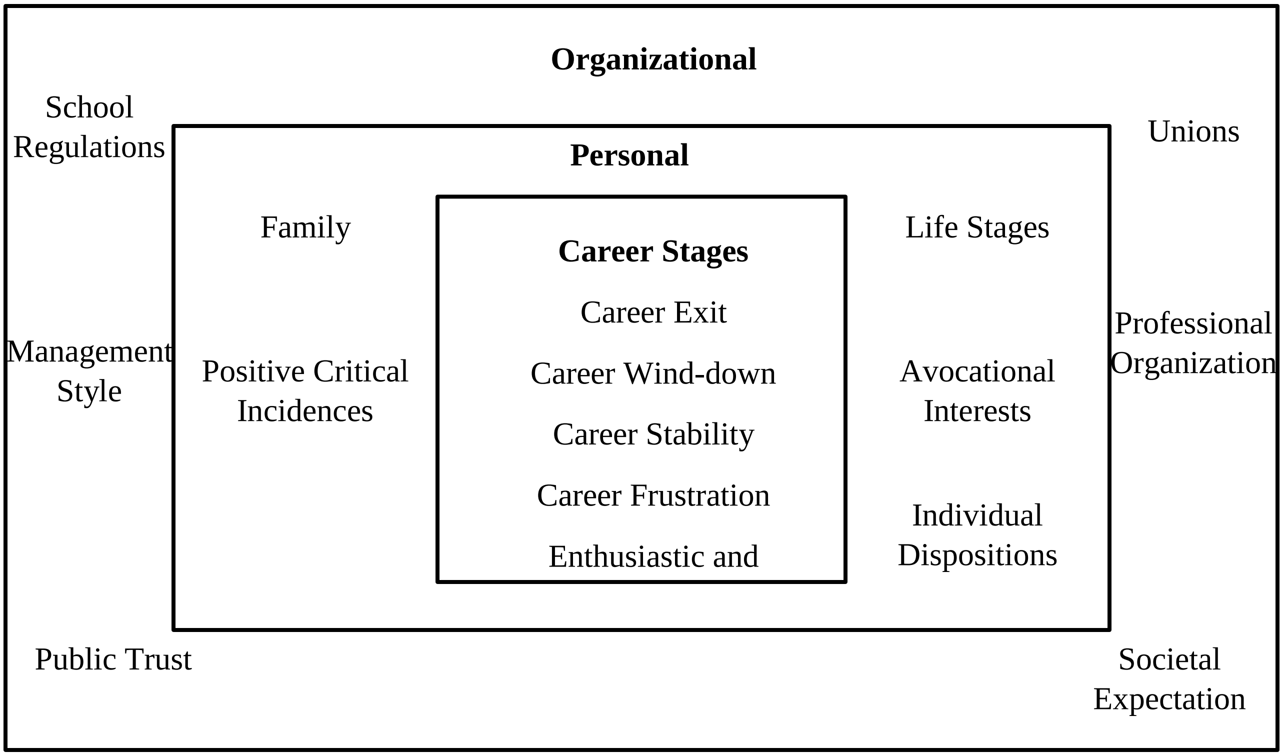

Figure 1. Teacher Career Cycle Model as adapted by Greiman (2010)

A core premise of the model is that teacher development is not a fixed, linear process, but rather ever changing (Fessler & Christensen, 1992; Greiman (2010). As such, teachers within various career stages have different needs for professional development (Fessler & Christensen, 1992; Greiman, 2010). Therefore, individuals involved in organizing teacher professional development should recognize this phenomenon and avoid the one size fits all mentality common in teacher professional development. Agriculture teacher's professional development needs can vary greatly by state (Birkenholz & Harbstriet, 1987; Washburn et al. 2001), as well as by years in the profession (Layfield & Dobbins, 2002; Roberts & Dyer, 2004; Washburn et al., 2001). Therefore, the principle research that arose from the review of literature was: how does the classroom based professional development needs of Louisiana agriculture teachers vary by years of teaching experience?

Purpose and Objectives

The purpose of this study was to identify the classroom-based professional development needs related to agriculture teachers in Louisiana. This research supports the American Association for Agricultural Education's National Research Agenda Research Priority 3: Sufficient Scientific and Professional Workforce that addresses the challenges of the 21st Century (Stripling & Ricketts, 2016). Specifically, this research aims to address Research Priority Question Two, "What methods, models, and practices are effective in recruiting agricultural leadership, education, and communication practitioners (teachers, extension agents, etc.) and supporting their success at all stages of their careers?" (p. 31). The following objectives guided this study:

1. Describe personal and professional characteristics (e.g., years of experience, gender, type of agriculture department) of Louisiana agriculture teachers
2. Identify the instruction and curriculum needs of Louisiana agriculture teachers by years of experience
3. Identify the technical agriculture needs of Louisiana agriculture teachers by years of experience
4. Describe difference in the instruction and curriculum needs of Louisiana agriculture teachers by years of experience
5. Describe differences in the technical agriculture professional development needs of Louisiana agriculture teachers by years of experience

Methods

The target population of this study was all Louisiana agricultural educators actively working during the 2017–2018 academic year (N = 261). Data were collected, with a paper instrument delivered by the researcher at each of the three Louisiana FFA Leadership Camp sessions in July 2017. The Louisiana Agriscience Teachers Association meeting is held immediately after lunch at each FFA camp in the conference center near the campground. In all, 190 advisors registered for camp and 164 finished the survey, which yielded 86.0% response rate, representing 62.8% of the total agriculture teacher population in Louisiana. No attempt to collect data from those who did not attend a camp session was attempted because an accurate frame (i.e., directory) of agriculture teachers was not available at the time of data collection.

The instrument employed in this study was utilized by Roberts and Dyer (2004) and modified by Saucier et al. (2010) to investigate the professional development needs of teachers in their respective states. This instrument was further modified by the deletion of items not relevant to Louisiana and additional items were added to reflect current practice in Louisiana agricultural education. The instrument was comprised of sections that measured teacher needs in the areas of (a) instruction/curriculum, (b) technical agriculture, (c) Career/Leadership Development Events, (d) SAE, (e) program management, and (f) teacher characteristics. For the purposes of this research, only data associated with instruction/curriculum and technical agriculture are reported. Cronbach's alpha was calculated post-hoc to determine internal consistency of the instruction/curriculum ($\alpha = .91$) and the technical agriculture ($\alpha = .97$) sections. Face and content validity were determined by a panel of experts that included two agricultural education faculty members, a doctoral student who had taught agriculture for 14 years in Louisiana, and three current agriculture teachers. After expert review, two items were deleted and several items were reworded to enhance clarity.

Data were analyzed utilizing SPSS version 24 for Macintosh. Descriptive statistics, including mean, standard deviation, frequency, and percentage were utilized to meet the needs for objectives one, two, and three. Objectives four and five sought to describe differences in professional development needs by years of teaching experience, therefore a one-way ANOVA was employed. Further, partial eta squared (η^2) was calculated to determine practical significance and the Tukey HSD statistic was calculated to determine where differences between groups existed. Due to the exploratory nature of this study, an alpha level of 0.10 was set *a priori*.

Findings

Objective one sought to determine the personal and professional characteristics of Louisiana agriculture teachers. The majority (*f* = 110; 65.5%) of these teachers were male and over half (*n* = 86; 51.2%) taught in multiple teacher departments (see Table 1). Most (*n* = 99; 58.9) indicated the bachelor's degree was their highest level of education. Finally, these teachers were categorized by years of teaching experience. Forty-four (26.2 %) had taught 1–5 years, 28 (16.7%) had taught 6–10 years, 29 (17.3%) taught 11–15 years, 21 (12.5%) had taught 16–20 years, 20 (11.9%) had taught 21–25 years, and 21 indicated they had taught 26 or more years.

Table 1
Personal and Professional Characteristics of Louisiana Agriculture Teachers (n = 168)

Variable	*f*	%
Gender		
Male	110	65.5
Female	54	32.1
Type of Agriculture Department		
Single Teacher	77	45.8
Multiple Teacher	86	51.2
Highest Degree Held		
Bachelor's Degree	99	58.9
Master's Degree	58	34.5
Doctoral Degree	1	0.6
Other	5	3.0
Years of Experience Categories		
1–5 years	44	26.2
6–10 years	28	16.7
11–15 years	29	17.3
16–20 years	21	12.5
21–25 years	20	11.9
26 or more years	21	12.5

Note. Percentages may not equal 100 due to missing data

Table 2 highlights the perceived instructional needs Louisiana agriculture teachers based on years of experience. Teachers with 1 – 5 years of experience reported much need in *Teaching in a Laboratory* (*M* = 2.51) and *Managing Instruction Facilities (M* = 2.60). Teachers with 6–10 responded with much need in *Motivating Student Learning (M* = 2.57) and *Developing Online Teaching Resources (M* = 2.61). Agriculture teachers with 11 – 15 years of experience also responded with much need in *Developing Online Teaching Resources (M* = 2.61) and *Using Instructional Technologies (M* = 2.46). Teachers with 16+ years of experience all responded with much need in using *Instructional Technologies* and *Developing Online Teaching Resources*. Teachers with 16–20 years of teaching experience perceived little need for professional development in the areas of (a) *Teaching in a Classroom*, (b) *Teaching in a Laboratory*, (c) *Managing Student Behavior*, and (d) *Teaching Decision-Making Skills.* All other items for all groups were perceived to be areas where at least some need for professional development existed, as interpreted by the real limits of the scale.

The third research objective sought to identify the technical agriculture needs of Louisiana agriculture teachers by years of experience (see Table 3). Overall, Environmental/Natural resources was the highest rated item for teachers who had 1–5 years of experience (M = 2.67; SD = 1.21), 6–10 years of experience (M = 2.57; SD = 1.25), 16–20 years of experience (M = 2.10; SD = 1.00), 21–25 years of experience (M = 2.38; SD = 1.11), and 26 or more years of experience (M = 2.36; SD = 0.93). The highest rated item for those who had taught 11–15 years was Animal Science (M = 1.97; SD = 0.99). All items were perceived to be areas where there was some need for professional development as determined by the real limits of the scale.

Table 2
Perceived Instructional Needs of Louisiana Agriculture Teachers

Instructional Item	*Years of Experience*											
	1–5		*6–10*		*11–15*		*16–20*		*21–25*		*26 or more*	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Teaching in a Classroom	1.83	1.01	1.68	.98	1.75	1.08	.95	.69	1.70	1.03	1.57	1.21
Teaching in a Laboratory	2.51	1.12	2.07	1.15	2.29	1.05	1.35	1.09	2.00	1.30	1.81	1.17
Using Instructional Technologies	2.07	1.20	2.29	1.15	2.46	.88	1.85	1.09	2.80	.95	2.90	.79
Integrating science into the agriculture curriculum	1.91	1.09	2.04	.96	1.96	.92	1.55	.83	2.05	.95	1.90	.94
Integrating math into the agriculture curriculum	2.05	1.09	1.93	1.05	2.18	.91	1.70	.81	2.35	1.14	2.19	1.12
Managing instructional facilities	2.60	1.13	2.26	1.13	2.00	1.15	1.55	1.00	1.95	1.10	1.86	1.23
Managing student behavior	2.21	1.25	2.07	1.09	1.96	1.00	1.20	1.06	1.65	1.18	2.00	1.38
Motivating student learning	2.16	1.25	2.57	.96	2.39	1.10	1.60	1.05	2.35	1.50	2.29	1.35
Developing online teaching resources	2.47	1.14	2.61	1.16	2.61	1.29	1.90	1.02	2.65	.81	2.81	.93
Teaching decision-making skills	2.14	1.00	2.14	1.01	1.93	1.02	1.40	1.10	2.00	1.30	1.81	1.08
Teaching personal finance	2.14	1.28	2.07	1.01	1.89	1.03	1.80	1.15	1.95	1.15	2.14	1.11
Teaching problem solving skills	2.16	1.23	2.32	1.06	2.32	.98	1.65	1.04	2.35	1.18	2.24	1.18
Instruction Grand Mean	2.19	0.77	2.16	0.72	2.15	0.64	1.54	0.81	2.15	0.81	2.78	0.84

Note. Real limits: No Need = 0 – 0.49; Little Need = 0.50 – 1.49; Some Need = 1.50 – 2.49; Much Need = 2.50 – 3.49; Highest Need = 3.50 – 4.00

Table 3
Perceived Technical Agriculture In-service Needs of Louisiana Agriculture Teachers

Technical Agriculture Category	*Years of Experience*											
	1–5		*6–10*		*11–15*		*16–20*		*21–25*		*26 or more*	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Agribusiness	2.32	1.06	2.32	0.84	1.81	0.78	1.73	0.78	2.09	0.96	1.88	0.88
Animal Science	2.36	0.86	2.34	0.95	1.97	0.99	1.56	0.83	2.26	0.71	1.93	0.80
Environmental/Natural Resources	2.67	1.21	2.57	1.25	1.96	1.07	2.10	1.00	2.38	1.11	2.36	0.93
Plant/Soil Science	2.35	1.01	2.32	0.95	1.87	0.85	1.60	0.84	1.94	0.85	1.94	0.87
Agricultural Mechanics	2.22	0.95	2.22	1.02	1.82	0.85	1.73	0.87	2.07	0.93	2.01	0.79
Technical Agriculture Grand Mean	2.38	0.88	2.41	0.77	1.88	0.78	1.74	0.78	2.14	0.71	2.04	0.78

Note. Real limits: No Need = 0 – 0.49; Little Need = 0.50 – 1.49; Some Need = 1.50 – 2.49; Much Need = 2.50 – 3.49; Highest Need = 3.50 – 4.00

Objective four sought to determine if differences existed in perceived needs for professional development related to instruction based on years of teaching experience. Prior to calculating a one-way ANOVA, Levene's test for equality of error variances was employed. Specifically, the Levene's test was not statistically significant (p = .70), therefore equality of error variances was assumed. The ANOVA yielded F(1, 151) = 199.27, p = 0.00, power = 1.00 (see Table 4). Partial η^2 was calculated to determine practical significance at 0.89, indicating a large effect (Cohen, 1988). The Tukey HSD statistic revealed statistically significant differences between teachers who had taught 16–20 years and the groups of teachers who had taught 1–5 years (p=.03), 6–10 years (p = .07), 11–15 years (p = .08), and 26 or more years (p = .10). No differences were found between those who had taught 16–20 years and those who had taught 21–25 years (p = .12).

Table 4
Analysis of Variance Summary Table for Differences in Instruction Related Professional Development Needs by Years of Experience

Source	SS	df	MS	F	p	Partial η^2
Years	690.35	6	115.06	199.27	.00	0.89
Error	87.19	151	.58			
Total	777.54	157				

The goal of objective five was to determine if differences existed in the perceived professional development needs related to technical agriculture based on years of experience. Prior to employing ANOVA, Levene's test was calculated to ensure equality of error variances. Levene's test was determined not to be statistically significant (p = .72). The ANOVA yielded F(1, 144) = 182.75, p = .00, and power = .85. Partial η^2 was calculated at .09 indicating a medium practical effect. The Tukey HSD revealed statistically significant differences between the teachers who had taught 16–20 years and those who had taught 1–5 years (p = .04) teachers and 6–10 years (p = .06).

Table 5
Analysis of Variance Summary Table for Differences in Technical Agriculture Related Professional Development Needs by Years of Experience

Source	SS	df	MS	F	p	Partial η^2
Years	700.97	6	116.83	182.75	.00	0.88
Error	92.06	144	0.64			
Total	793.02	150				

Conclusions/Implications

The purpose of this study was to identify the classroom-based professional development needs of agriculture teachers in Louisiana. The first objective sought to describe the personal and professional characteristics of Louisiana agriculture teachers. A majority of participants were male and over half taught in a multiple teacher agriculture department. There were more teachers with 1–5 years of experience than any other age group. All teachers reported a professional development need in *Developing Online Teaching Resources*. Agriculture teachers with 1–5 years of experience also indicated *Teaching in a Laboratory* and *Managing Instructional Facilities* as additional areas in which they desired professional development. Teachers with more than six years of experience reported needing professional development in *Using Instructional Technologies.* This aligns with previous research where professional development needs were found in the areas of teaching methods/techniques and technical areas (Dobbins & Camp, 2000). Similarly, Layfield & Dobbins (2002) and Washburn et al. (2001) concluded that teachers with over 10 years of teaching experience needed the most professional development in technology integration.

Objective three examined the perceived technical agriculture in-service needs of Louisiana Agriculture teachers. Teachers with 1–15 years of teaching experience desired professional development in *Animal Science*, and *Environmental/Natural Resources*. Also, teachers with 16+ years of expressed need for professional development related to *Environmental/Natural Resources*, *Agricultural Mechanics*, and *Agribusiness*. Perhaps technical agriculture professional development needs differ because of geographic location. Previous research tells us that professional development needs in states can have vastly different professional development needs based on their region (Birkenholz & Harbstriet, 1987; Washburn et al., 2001). Perhaps professional development needs may vary within regions of a particular state. For example, teachers in the southern region of Louisiana have a particular industry that is important to that region that needs to be emphasized in their curriculum, so they may need professional development in that technical area to provide those skills.

When further exploring objective three, it could be noted that perhaps teachers with 16+ years of experience feel they need more professional development in technical agriculture areas that have re-emerged in agricultural education (i.e., agricultural mechanics). In Louisiana, agriculture teachers are expected to provide Industry Based Certifications (IBCs) as part of their instructional program. One certification program has led to an emphasis in agricultural mechanics coursework and a push for certification in this area by many school administrators. Since this program was implemented in 2006, it is possible that the 16+ year teachers from this study have had to implement this program into their classroom well after they had already established their classroom, which could result in a for need professional development. According to previous research, agricultural mechanics, laboratory teaching practices, GPS, and biotechnology were all areas in need of professional development (Rasty et al., 2017; Saucier et al., 2010).

Objectives four and five sought to determine if differences existed between the perceived professional development needs of teachers related to instruction and technical agriculture based on years of teaching experience. When exploring objective four, it was concluded that there were statistically significant differences between professional development needs related to instruction for teachers who taught 16 – 20 years, 1 – 5, 6 – 10, 11–15, and 26+ years. Specifically, those teachers who had taught 16 – 20 years felt the least need for professional development in the area of instruction. Perhaps these teachers have reached the career stability stage and believe they are performing their job well and do not desire to change their teaching (Fessler & Christensen, 1992). This finding could serve as additional support for the notion that the teacher career stages are not linear, as teachers with over 21 years of experience felt a stronger need for instructional professional development. Similarly, objective five sought to determine if there were differences in professional development needs related to technical agriculture. It was concluded that there were statistically significant differences between teachers who taught 16–20 years, 1–5, and 6–10 years. Specifically, teachers with 1–5 and 6–10 years of experience felt a greater need for professional development related to technical agriculture. These teachers are likely in the induction or competency building stages and are focused on honing their teaching abilities and furthering their knowledge of agriculture (Fessler & Christensen, 1992).

Recommendations

The results of this study should be shared with state agricultural education staff, university faculty, the Louisiana Agriculture Teachers' Association, and anyone else who offers professional development experiences for agriculture teachers. These groups should work together as a Louisiana Team AgEd to offer relevant professional development experiences based on this research. Per the theory of Andragogy, teachers in Louisiana should be receptive to professional development opportunities based on this research because they had a role in identifying the topics (Knowles, 1980). Further, professional development organizers should consider years of experience when planning workshops. One size fits all professional development workshops may not be the most effective means of encouraging attendance since the results of this study indicate differences based on years of experience. For example, workshops could be offered specifically for 1–5 year teachers in the areas of instructional facility management and laboratory teaching methods. Further, it is recommended that web based professional development (i.e., webinars) be explored as a means to offer training in conducive subject areas. Additionally, professional development opportunities related to technical agriculture areas should be created and targeted toward teachers with 10 or fewer years of experiences.

The National Association of Agricultural Educators (NAAE) has recently implemented a one year professional development training for mid-career teachers (7–15 years). The overall goals of this program are to develop these teachers into mentors for younger teachers, provide mid-career level professional development, and increase longevity and job satisfaction. Perhaps, implementing programs like this for early career teachers (1–6 years) could improve teacher retention, job satisfaction, and teacher effectiveness. Late career teachers (16+ years) could be provided with quality professional development in areas of weakness to improve in overall competency, and perhaps be mentors to early career teachers.

Future research should attempt to gather data from all agriculture teachers in Louisiana. As such, Louisiana agricultural education staff and teacher education departments should attempt to create an accurate, up-to-date frame of agriculture teachers. This would allow data to be collected from those who did not participate in the FFA camp sessions and determine if their professional development needs differ. It is speculated that a number of the teachers who do not attend FFA camp may be alternatively certified and may not know they are expected to attend with FFA members. Further, research should be conducted to determine if professional development needs of Louisiana agriculture teachers differ based on certification type. Alternatively certified teachers have been hired in Louisiana for many years, previous research has indicated that the needs of these teachers differ from those who completed a traditional teacher education program (Roberts & Dyer, 2004; Swafford & Friedel, 2010). Further, the job of being an agriculture teacher extends beyond the classroom and laboratory; therefore research should be completed that identifies professional development needs in the areas of Supervised Agricultural Experience (SAE), FFA advisement, and running a total program.

References

Barrick, R.K., Ladewig, H.W., & Hedges, L.E. (1983). Development of a systemic approach to identifying technical inservice needs of teachers. *The Journal of the American Association of Teacher Educators in Agriculture*, 24(1), 13–19. doi: 10.5032/jaatea.1983.01013

Birkenholz, R. J., & Harbstreit, S. R. (1987). Analysis of the inservice needs of beginning vocational agriculture teachers. *Journal of the American Association of Teacher Educators in Agriculture*, *28*(1), 41–49. doi: 10.5032/jaatea.1987.01041

Borko, H. (2004). Professional development and teacher learning: mapping the terrain. *Educational Researcher, 33*(8), 3–15. doi: 10.3102/0013189X033008003

Borman, G.D., & Dowling, B.N. (2008). Teacher attrition and retention: A meta-analytic and narrative review of the research. *Review of Educational Research, 78*(3), 367–409. doi: 10.3102/0034654308321455

Bush, R. N. (1984). *Effective staff development in making schools more effective: Proceedings of three state conferences.* San Francisco, CA: Far West Laboratory. Retrieved from https://eric.ed.gov/?id=ED249576

Cannon, J. G., Kitchel, A., & Duncan, D. W. (2012). Perceived teaching and learning professional development needs of Idaho secondary career and technical education teachers. *The Researcher*, *24*(1), 43–54. Retrieved from http://www.nrmera.org/wp-content/uploads/2016/02/Researcherv24n1Cannon.pdf

Claycomb, D. M., & Petty, G. C. (1983). A three year longitudinal study of the perceived needs for assistance as ranked by vocational agriculture instructors. *Journal of the American Association of Teacher Educators in Agriculture*, *24*(4), 28–33. doi: 10.5032/jaatea.1983.04028

Darling-Hammond, L., Chung, R.W., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession: A status report on teacher development in the U.S. and abroad. *National Staff Development Council*. Retrieved from http://eric.ed.gov/?id=ED504168

Dobbins, T. R., & Camp, W. G. (2000). Clinical experiences for agricultural teacher education programs in North Carolina, South Carolina, and Virginia. *Proceedings of the 27th Annual National Agricultural Education Research Conference, 543–555.* Retrieved from http://aaaeonline.org/Resources/Documents/National/Proceedings,%20National2000.pdf

Duncan, D. W., Ricketts, J. C., Peake, J. B., & Uesseler, J. (2006).Teacher Preparation and In-service needs of Georgia Agriculture Teachers. *Journal of Agricultural Education*, *47*(2), 24–35. doi: 10.5032/jae.2006.02024

Fessler, R., & Christensen, J. (1992). Teacher development as a career-long process. In R. Fessler & J. Christensen (Eds.), *The teacher career cycle: Understanding and guiding the professional development of teachers*. Boston, MA: Allyn & Bacon.

Garton, B. L., & Chung, N. (1996). The inservice needs of beginning teachers of agriculture as perceived by beginning teachers, teacher educators, and state supervisors. *Journal of Agricultural Education, 37(3),* 52–58. doi: 10.5032/jae.1996.03052

Greiman, B. C. (2010). Continuing professional development. In R. M. Torres, T. Kitchel, & A. Ball (Eds.), *Preparing and advancing teachers in agricultural education*. Columbus, OH: Curriculum Materials Services.

Gulamhussein, A. (2013). Effective Professional Development in an Era of High Stakes. *Center for Public Education*. Retrieved from http://www.centerforpubliceducation.org

Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy*. Chicago, IL: Follet Publishing Company.

Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2015). *The adult learner: The definitive classic in adult education and human resource development.* New York, NY: Routledge.

Layfield, K. D., & Dobbins, T. R. (2002). Inservice needs and perceived competencies of South Carolina agricultural educators. *Journal of Agricultural Education*, *43*(4), 46–55. doi: 10.5032/jae.2002.04046

Lynn, S. (2002). The winding path: Understanding the career cycle of teachers. *The Clearing House*, *75*(4), 179–182. doi: 10.1080/00098650209604926

Mundt, J.P. (1991). The induction year - A naturalistic study of beginning secondary teachers agriculture in Idaho. *Journal of Agricultural Education, 32*(1), 18–23. doi: 10.5032/jae.1991.01018

Ramsey, J. W., & Edwards, M. C. (2011). Entry-level technical skills that agricultural industry experts expected students to learn through their supervised agricultural experiences: A modified Delphi study. *Journal of Agricultural Education*, *52*(2), 82–94. doi: 10.5032/jae.2011.02082

Rasty, J., Anderson, R. G., & Paulsen, T. H. (2017). How the quantity of agricultural mechanics training received at the secondary level impact teacher perceived importance of agricultural mechanics skills. *Journal of Agricultural Education*, *58*(1), 36–53. doi: 10.5032/jae.2017.01036

Roberts, T. G., & Dyer, J. E. (2004). Inservice needs of traditionally and alternatively certified agriculture teachers. *Journal of Agricultural Education*, *45(4)*, 57–70. doi: 10.5032/jae.2004.04057

Ruhland, S., & Bremer, C. (2003) Perceptions of traditionally and alternatively certified career and technical education teachers. *Journal of Vocational Education Research*, 28(3), 285–302.

Saucier, P. R., Tummons, J. D., Terry, R., & Schumacher, L. G. (2010). Professional development inservice needs of Missouri agricultural educators. *Proceedings of the 2010 American Association for Agricultural Education Research Conference, Omaha, NE.*

Shippy, R.D. (1981). Professional competencies needed by beginning teachers of agriculture/agribusiness. *Journal of the American Association of Teacher Educators in Agriculture*, 22(1), 29–34. doi: 10.5032/jaatea.1981.01029

Smith, A. R., Lawver, R. G., & Foster, D. D. (2017). *National agricultural education supply and demand study, 2016 Executive Summary.* Retrieved from http://aaaeonline.org/Resources/Documents/NSD2016Summary.pdf

Steffy, B.E., Wolfe, M.P., Pasch, S.H., & Enz, B.J. (2000). *Life cycle of the career teachers*. Thousand Oaks, CA: Corwin Press, Inc.

Stripling, C. T., & Ricketts, J. C. (2016). Research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century. In T. Roberts, A. Harder, & M. Brashears (Eds.), *American Association for Agricultural Education National Research Agenda 2016–2020.* (pp. 29–35). Gainesville, FL: Department of Agricultural Education and Communication.

Swafford, M.R., & Friedel, C.R. (2010). A comparison on the inservice needs of traditionally and alternatively certified beginning agriculture teachers in Louisiana. *Journal of Southern Agricultural Education Research, 60*(1), 90–103. Retrieved from http://www.jsaer.org/pdf/vol60Whole.pdf

Talbert, B.A., Camp, W.G., & Heath-Camp, B. (1994). A year in the lives of three beginning agriculture teachers. *Journal of Agricultural Education, 35*(2), 31–36. doi: 10.5032/jae.1994.02031

Walker, W. D., Garton, B. L., & Kitchel, T. J. (2004). Job satisfaction and retention of secondary agriculture teachers [Electronic Version]. *Journal of Agricultural Education 45*(2), 28–38. doi: 10.5032.jae.2004.02.028

Washburn, S. G., King, B. O., Garton, B. L., & Harbstreit, S. R. (2001). A comparison of the professional development needs of Kansas and Missouri teachers of agriculture. In *Proceedings of the 28th National Agricultural Education Research Conference* (Vol. 28, pp. 396–408).

Yoon, K. S., Duncan, T., Lee, S. W. Y., Scarloss, B., & Shapley, K. L. (2007). Reviewing the Evidence on How Teacher Professional Development Affects Student Achievement. Issues & Answers. REL 2007-No. 033. *Regional Educational Laboratory Southwest (NJ1)*.

What do they need? Determining Differences in the Classroom-based Professional Development Needs of Louisiana Agriculture Teachers by Years of Teaching Experience

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Discussant Remarks

This study examined the needs of agricultural educators in the state of Louisiana in both technical and instructional areas. I will begin by commending the authors on their efforts to support professional development needs in Louisiana. Though this study is only generalizable to the state of Louisiana and those of the population attending the FFA camp, the unique approach of examining needs by experience is something I found informative. The authors ultimately concluded that a *one size fits all* approach to professional could fail to acknowledge the different needs of teachers at various careers. The results of this study will prove useful to state leaders in serving their constituents – something we should appreciate and value.

The theoretical framework, Knowles (1980) Theory of Andragogy, provided six principles that frame the factors of instructional and technical needs quite well. Greiman's (2010) Teacher Career Cycle Model also added a general idea that teachers development is a dynamic process. I found these to both be very relevant and informative in framing the primary objectives of the study. To strengthen the study, I might consider how these frameworks more fully integrate into the study. I found the questionnaire to focus on specific areas of need and the frameworks addressed the motivational drivers and products throughout one's career. How can these concepts be more fully integrated throughout the manuscript? I might encourage more integration of the frameworks in the conclusions, implications, and discussions. Did you find the career stages to match the areas of noted need?

Methodologically, this study achieved adequate participant numbers to establish normality and drive the chosen analyses. Selection of participants was not clearly outlined. If this was a census study, than perhaps the inferential analyses was unnecessary. If the eligible respondents were a convenience sample, that too should be more fully addressed. Means and standard deviations were reported on data that appeared to be more nominal or ordinal in nature. I would be curious to see findings reported as frequencies, medians, or modes – perhaps it would be more telling? I also calculated means for each experience level and found a general trend of decreasing needs in general in year four and then an odd increase in the needs of late career teachers. This was addressed by the authors in the article, but perhaps that type of aggragate summation of needs by experience would be an additional interesting objective to address with the additional remaining room in this manuscript.

Thank you for this work! I am excited to focus discussion on replication and methodological approach, rather than on generalization of findings. This approach could benefit each of us in our respective states.

Beginning Agricultural Education Instructor Perceived Benefit of Professional Development Experiences

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Agricultural education instructors in the first through fifth years of experience benefit from professional development experiences tailored to individual needs. The purpose of this study was to identify the extent at which differences in the perceived positive impact of professional development experiences of beginning agricultural education instructors can be explained by differences in gender and CASE certification. The researchers distributed a survey instrument to the target population and collected usable responses from 126 beginning agriculture teachers from four Midwestern states. The most impactful professional development opportunities identified by beginning agricultural education instructors were CASE institutes and student teaching feedback. Researchers found no significant differences by gender for impact of any professional development experience. Future research should seek to determine beginning teachers perceived impact of various professional development experiences and what beginning teachers hope to receive from their professional development experiences.

Introduction

Researchers estimate beginning teacher attrition rates as low as a conservative 17%, and as high as 50% by the end of the fifth year of teaching experience over the past two decades (Gray, Taie, & O'Rear, 2015; Kaiser, 2011; Darling-Hammond & Sykes, 2003; NCTAF, 2003). As to causation for attrition, several factors for attrition among teachers in the first through fifth years of experience have been identified. Many young teachers report feeling ineffective and overwhelmed by teaching responsibilities (Johnson & Birkeland, 2003; Bennet, Iverson, Rohs, Langone, & Edwards, 2002). This is not a new phenomenon. Fuller (1969) reported that new teachers feel concern for self-adequacy, themselves as teachers, and how they fit into the school environment. While most agriculture teachers report healthy professional and personal support, many feel job pressure of such a measure that they are near a tipping point (Torres, Lawver, & Lambert, 2009). Stressors include working overtime, meeting deadlines, and excessive paperwork (Torres, Lawver, & Lambert, 2009). Another factor affecting beginning teachers is the difficult transition from student to teacher. Despite years of classroom experience as a student, new teachers must tackle a challenging psychological shift to become an educator and classroom leader (Cruickshank & Callahan, 1983). Beginning teachers need help in developing their skills in the teaching environment (McCormack, Gore, & Thompson, 2006). Learning to teach includes process of construction of new knowledge and skills (Darling-Hammond & Bransford, 2005). Dewey (1938) stated that genuine education is a result of experience. Knowledge and skills are built by teachers through experience, feedback, and reflection (Darling-Hammond & Bransford, 2005).

Contributing to teaching stressors, agricultural education, specifically, is a dynamic profession, and agriculture teachers require a complex and evolving skill set. In 1915, Leake stated school-based agricultural education programs were designed to prepare students for careers in production agriculture. Over time, this focus shifted to consumption-based curriculum and courses (Washburn & Dyer, 2006). Roberts and Ball (2009) found that "...agricultural educators teach both agricultural content and knowledge from other domains...in complex social environments with teacher-to-learner and learner-to-learner interactions… [resulting in] dual outcomes: (a) a skilled agricultural workforce and (b) successful citizens that are agriculturally literate contributors in a democratic society" (p.87). Agricultural educators must prepare students for employment in the fast-paced agriculture industry through a positive learning environment in the secondary classroom (Layfield & Dobbins, 2002).

Another critical change within the profession is the demographic shift in gender, creating additional pressure for young females. In 1987, women held only 5.1% of all national secondary agricultural education teaching positions (Knight, 1987). In 2000, women comprised just over 15% of the national agricultural education teacher profession. (Foster, 2003). A 2016 census of national agricultural education instructors split the agricultural education teacher population 43.4% female and 56.6% male (Smith, Lawver, Foster, & Thompson, 2017). While looking at these gender differences, Texas female agriculture teachers reported facing more extra-role commitments than their male counterparts (Hainline, Ulmer, Ritz, Burris, & Gibson, 2015). Additionally, many female agriculture teachers face issues of peer acceptance, work-life balance, and administrator acceptance which is not experienced by their male counterparts (Foster, 2003).

To address concerns of beginning teachers, the measure of self-efficacy is valuable. Self-efficacy is the ability to assess personal capability to organize and complete specific actions (Bandura, 1997). Teachers who have high self-efficacy experience more success as classroom teachers (McKim, Velez, & Clement, 2017). New teachers, especially, struggle with self-efficacy during their first year (Knobloch & Whittington, 2003).

To develop self-efficacy in the classroom, professional development may be the answer. The goal of professional development is to provide essential knowledge, skills, and technical information required for effective performance by teachers in a dynamic classroom environment (Saucier, Tummons, Terry & Schumacher, 2010; Washburn, King, Garton, & Harbstreit, 2001; Nesbitt & Mundt, 1993; Birkenholz & Harbstreit, 1987; Barrick, Ladewig, & Hedges, 1983). According to Desimone (2009), the five key characteristics of effective professional development include allowing teachers to focus on content, teachers engaging in active learning, coherence with teacher beliefs, duration, and collective participation. Developing successful teaching professionals requires accurately identifying professional development needs (Layfield & Dobbins, 2002). Park, Moore, and Rivera (2007) indicated agricultural science educators found personalized professional development, tailored to their own needs, most meaningful. Garet, Porter, Desimone, Birman, and Yoon (2001) learned the highest increase in student achievement resulted from content-focused, classroom-applied, and hands-on learning during professional development experiences.

In 2000, the National Council for Agricultural Education established eight initiatives for improving agricultural education program quality. The third initiative called for a sequence of courses to enhance the delivery model of agricultural education (NCAE, 2000). The Curriculum for Agricultural Science Education (CASE) project was initiated by NCAE, in 2006. According to the CASE website, "CASE develops curriculum utilizing science inquiry for lesson foundation and concepts are taught using activity-, project-, and problem-based instructional strategies. In addition to the curriculum aspect of CASE, the project ensures quality teaching by providing extensive professional development for teachers…" (2013). In 2014, experienced teacher participants posited that CASE would have been "extremely beneficial" during their first few years of teaching (Lambert, Velez & Elliott, 2014). These participants recommended that teachers consider the benefit of CASE in terms of time management. CASE allows teachers to refocus creative and curriculum development energies into different activities (Lambert, et al., 2014). Additionally, teachers who participate in focused professional development feel more confidence in science instruction (Wilson & Curry, 2011).

As a larger proportion of early-career teachers earn CASE certifications, researchers have identified gaps in the literature regarding which professional development experiences are viewed as most impactful for beginning agricultural education instructors, and how CASE certification and gender may explain differences in participation and perceived impact among professional development opportunities. How much value does professional development hold for beginning agricultural education instructors?

Theoretical Framework

This study was guided by Mezirow's transformative learning theory (2000), which frames learning in adulthood as a transformative, as opposed to a functional, process. Impactful teacher professional development must engage the practical knowledge gained from their experiences of teachers as learners (Knowles, 1980; Trotter, 2006). In a functional professional development model, teacher development strengthens and clarifies existing mental models, and teacher improvement occurs through perfecting existing practice (Beavers, 2009). In contrast to functional models, transformative learning in adults takes place when teachers discard or set aside previously learned habits in order to act differently. In transformative learning, professional development facilitators lead teachers to critically examine their practice, then acquire new or alternative ways of understanding what they do (Cranton, 1996). Researchers seek to isolate the transformative nature of CASE inservice and how CASE inservice participation changes professional development expectations of beginning teachers.

Purpose / Objectives

The purpose of this study was to identify to what extent differences in the perceived positive impact of professional development experiences of beginning agriculture teachers can be explained by differences in gender and CASE certification. Specific objectives included:

1. Describe the sample characteristics (gender, years' experience, and CASE certifications)
2. Describe the perceived positive impact of various professional development experiences.
3. Identify to what extent differences in gender and CASE certification explained differences in the perceived positive impact of various professional development opportunities.

This study addresses Research Priority Area Four: Meaningful Engaged Learning in all Environments within the American Association for Agricultural Education's National Research Agenda (Roberts, Harder, & Brashears, 2016). Limited research has focused on professional development preferences of beginning teachers. Professional development planners need to know how beginning teachers value various professional development experiences in order to prioritize and deliver the most impactful programming.

Methods / Procedures

The target population was in-service agricultural education instructors in their first through fifth years of teaching experience in Iowa (*n*=90), Minnesota (*n*=78), Missouri (*n*=183), and Nebraska (*n*=86). These states were chosen due to a substantial population of CASE certified beginning agricultural education instructors. The accessible population was beginning agriculture teachers in those states with email access. The researchers emailed a link of the survey to agricultural education leaders in each state, and state leader distributed the electronic link to beginning teachers only one time. The survey was administered in the fall of 2016, following the onset of the academic year. Survey items include demographics (age, gender, state, years of teaching experience), professional development experiences participated in, and rating of each professional development experience participated in. A total of 126 beginning teachers responded to the survey, with a response rate over one-quarter (29%). As the surveys were distributed by state leaders, non-response follow-up was not possible. The respondents represent a time and place convenience sample of past and future beginning agricultural educators in these states; therefore, the use of inferential statistics was justified (Oliver & Hinkle, 1982).

Researchers asked participants to identify all professional development experiences to date from an alphabetized list, including CASE institutes, graduate coursework, local school district programming, National Agriscience Teacher Ambassador Academy (NATAA), National Association of Agricultural Educators (NAAE) convention workshops, National FFA Convention teacher workshops, other professional development experiences, state agricultural education conference programming, state department of education programming, student teaching evaluation and feedback, and undergraduate coursework. Researchers also asked participants to rate the perceived positive impact for each professional development experience.

Researchers used *ex post facto* design to gather quantitative data about professional development activities experienced by participants. For objectives one and two, researchers calculated frequencies and measures of central tendency and variation. For objective three, researchers utilized an Analysis of Variance (ANOVA) to identify if any significant differences in professional development preferences can be explained by gender, CASE certification, or the interaction of gender and CASE certification. The level of significance was set *a priori* at alpha $p= 0.05$. Before conducting the ANOVA tests, researchers tested the nine assumptions of ANOVA, as identified by Field (2009). As part of the study set up, both gender and CASE certification were identified as categorical independent variables, and the dependent variable was ratio data. Samples were random, independent, differed in only one way, and were of adequate and similar size. Researchers verified homogeneity of variance with Levene's test and checked for normal distribution of the dependent variable by visual inspection of P-P and Q-Q plots, and skewness and kurtosis.

Results / Findings

For objective one, researchers sought to describe the characteristics of the population. Eighty-seven participants (69%) of the sample identified as female, and 39 (31%) identified as male. Within the sample, 32 teachers (26%) reported 1 year of teaching experience, 25 teachers (20%) with two years' experience, 28 teachers (22%) with three years' experience, 17 teachers (14%) with four years' experience, and 23 teachers (18%) in their fifth year of teaching.

Among the sample, 41 females and 10 males reported holding at least one CASE certification (42%), whereas 43 females and 28 males reported they had not earned a CASE certification (58%). Among the 125 teachers in the study, 41 taught in Iowa (33%), 32 in Missouri (26%), 28 in Minnesota (22%), and 24 in Nebraska (19%).

Table 1.
Demographics of Beginning Teachers

State	*n*	# of Teachers in 1-5 Years of Experience	Total State SBAE Instructors
Iowa	41	90	236
Minnesota	28	78	254
Missouri	32	183	490
Nebraska	24	86	170
Total	126	437	1150

For objective two, researchers sought to describe the perceived positive impact of various professional development experiences. For those participating in professional development opportunities, CASE trainings were perceived as most impactful (*n=57,* $\bar{x}$*=8.07(2.04))*, then student teaching evaluation and feedback *(n=118,* $\bar{x}$*=7.92(2.19))*, followed by state agricultural education conference (*n=116,* $\bar{x}$*=6.89(1.98))*, and National Agriscience teacher ambassador academy (*n=8.* $\bar{x}$*=6.88(2.85)).* Undergraduate coursework was perceived as the next most impactful experience (*n=122,* $\bar{x}$*=6.74(2.04)*, then National Association of Agricultural Education convention workshops (*n=62,* $\bar{x}$*=6.06(2.33)*), graduate coursework (*n=59,* $\bar{x}$*=2.66))*, National FFA Convention workshops (*n=71,* $\bar{x}$*=5.82(2.29))*, and local school district programming (*n=117,* $\bar{x}$*=5.54(2.25)).* The professional development types with the lowest positive impact included state department of education programming (*n=104,* $\bar{x}$*=5.27(2.43)).*

Table 2.
Positive Impact on Teaching Career of Various Professional Development Activities for Beginning Agriculture Teachers (n=122)

Professional Development Activity	Participants (*n*)	Mean Impact[a]	*SD*
CASE institute	57	8.07	2.04
Student teaching evaluation and feedback	118	7.92	2.19
State agricultural education conference programming	116	6.89	1.97
NATAA	8	6.88	2.85
Undergraduate coursework	122	6.74	2.04
NAAE convention workshop(s)	62	6.06	2.33
Graduate coursework	59	5.92	2.66
National FFA Convention workshops	71	5.82	2.28

Local school district programming	117	5.54	2.25
State department of education programming	104	5.27	2.42

[a]Note. Scale anchors: 1 =*Least Positive Impact*, 10 = *Greatest Positive Impact*.

For objective three, researchers sought to identify to what extent differences in gender and CASE certification explained differences in the perceived positive impact of various professional development opportunities. Researchers found nonsignificant main effect (p > 0.05) for differences in CASE impact by gender (F=0.86, df=1,57) (see Table 3).

Table 3.
CASE Institute Impact by Gender (n=57)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	3.60	1	3.60	0.86	0.36	0.02
Intercept	2360.02	1	2360.02	564.07	0.00	0.91
Gender	3.60	1	3.60	0.86	0.36	0.02
Error	230.12	55	4.18			
Total	3946.00	57				

Notes: Gender coded as 1=*Female*, 2=*Male;* *p < 0.05

Researchers found significant main effect (p<0.05) for differences in CASE certification (F=4.63, df= 1,119) regarding their perceived impact of student teaching evaluation and feedback. CASE certified teachers reported a significantly higher value to the student teaching feedback component than did non-CASE certified teachers. Gender (F=0.02, df=1,119), and CASE* gender interaction (F=0.05, df=1,119), yielded nonsignificant (p>0.05) effects for student teaching evaluation and feedback (see Table 4).

Table 4.
Student Teaching Evaluation and Feedback Impact by Gender and CASE Certification (n=118)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	28.21	3	9.40	2.00	0.12	0.05
Intercept	5437.80	1	5437.80	1158.83	0.00	0.91
Gender	0.10	1	0.10	0.02	0.88	0.00
CASE certification	21.75	1	21.75	4.63	0.03*	0.04
Gender*CASE certification	0.24	1	0.24	0.05	0.82	0.00
Error	534.95	118	4.69			
Total	7956.00	119				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *p < 0.05

For professional development related to the state agricultural education conference, researchers also found nonsignificant main effects for differences in gender (F=2.22, df=1,116), CASE certification (F=0.18, df=1,116), and nonsignificant interaction effects for gender*CASE certification (F=0.17, df=1,116) (see Table 5). For professional development related to National

Agriscience Teacher Ambassador Academy, researchers found nonsignificant main effects for differences in gender (*F*=0.17, df=1,8), CASE certification (*F*=0.27, *df*=1,8) (see Table 6).

Table 5.
State Agricultural Education Conference Impact by Gender and CASE Certification (n=116)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	9.22	3	3.07	0.78	0.51	0.02
Intercept	3901.55	1	3901.55	992.40	0.00	0.90
Gender	8.72	1	8.72	2.22	0.14	0.02
CASE certification	0.72	1	0.72	0.18	0.67	0.00
Gender*CASE certification	0.17	1	0.17	0.04	0.84	0.00
Error	440.32	112	3.93			
Total	5953.00	116				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *$p < 0.05$

Table 6.
NATAA Impact by Gender and CASE Certification (n=8)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	7.71	2	3.85	.39	0.70	0.14
Intercept	309.12	1	309.12	31.44	0.00	0.86
Gender	1.63	1	1.63	0.17	0.70	0.03
CASE certification	2.67	1	2.67	0.27	0.63	0.05
Gender*CASE certification	0.00	0	0			0.00
Error	49.17	5	9.83			
Total	435.00	8				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *$p < 0.05$

Researchers found nonsignificant (p>0.05) main effects for differences in gender (F=0.69, df=1,122), CASE certification (F=0.00, $df=1,122$), and nonsignificant interaction effects for gender*CASE certification (F=0.76, $df=1,122$) for the positive impact of their undergraduate coursework (see Table 7).

Table 7.
Undergraduate Coursework Impact by Gender and CASE Certification (n=122)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	9.73	3	3.24	0.77	0.51	0.02
Intercept	3909.54	1	3909.54	930.32	0.00	0.89
Gender	2.92	1	2.92	0.69	0.51	0.01
CASE certification	0.00	1	0.00	0.00	0.99	0.00
Gender*CASE certification	3.195	1	3.20	0.76	0.39	0.01
Error	495.88	118	4.20			
Total	6044.00	122				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *$p < 0.05$

For professional development related to National Association of Agricultural Educators workshops, researchers found nonsignificant main effects for differences in gender (*F*=0.81, *df*=1.62), CASE certification (*F*=1.39, *df*=1,62), and nonsignificant interaction effects for gender*CASE certification (*F*=1.72, *df*=1,62) (see Table 8).

Table 8.
NAAE Convention Workshops Impact by Gender and CASE Certification (n=62)

	SS	*df*	*MS*	*F*	*p*	Partial □ □
Corrected model	32.15	3	10.72	2.08	0.11	0.10
Intercept	1503.66	1	1503.66	291.10	0.00	0.83
Gender	4.20	1	4.20	0.81	0.37	0.01
CASE certification	7.17	1	7.17	1.39	0.24	0.02
Gender*CASE certification	8.95	1	8.95	1.73	0.19	0.03
Error	299.59	58	5.17			
Total	2612.00	62				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *p < 0.05

For graduate coursework, researchers found nonsignificant (p>0.05) main effects for differences in gender (*F*=0.52, *df*=1,59), CASE certification (*F*=0.20, *df*=1,59), and nonsignificant interaction effects for gender*CASE certification (*F*=0.24, *df*=1,59) (see Table 9).

Table 9.
Graduate Coursework Impact by Gender and CASE Certification (n=59)

	SS	*df*	*MS*	*F*	*p*	Partial □ □
Corrected model	12.91	3	4.30	0.60	0.62	0.03
Intercept	1101.53	1	1101.53	152.35	0.00	0.74
Gender	3.73	1	3.73	0.52	0.48	0.01
CASE certification	0.14	1	0.14	0.20	0.89	0.00
Gender*CASE certification	1.74	1	1.74	0.24	0.63	0.00
Error	397.67	55	7.23			
Total	2475.00	59				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *p < 0.05

For professional development related to National FFA Convention teacher workshops, researchers also found nonsignificant main effects for differences in gender (*F*=0.96, *df*=1,71), CASE certification (*F*=1.36, *df*=1,71), and nonsignificant interaction effects for gender*CASE certification (*F*=2.85, *df*=1,71) (see Table 10). For local school district programming, researchers found nonsignificant main effects for differences in gender (*F*=1.36, *df*=1,117), CASE certification (*F*=0.14, *df*=1,117), and nonsignificant interaction effects for gender*CASE certification (*F*=0.77, *df*=1,117) (see Table 11).

Table 10.
National FFA Convention Workshops Impact by Gender and CASE Certification (n=71)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	29.27	3	(9.76	1.94	0.13	0.08
Intercept	1896.08	1	1896.08	376.58	0.00	0.85
Gender	4.81	1	4.81	0.96	0.33	0.01
CASE certification	6.83	1	6.83	1.36	0.25	0.02
Gender*CASE certification	14.33	1	14.33	2.85	0.10	0.04
Error	337.35	67	5.04			
Total	2769.00	71				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; $*p < 0.05$

Table 11.
Local School District Programming Impact by Gender and CASE Certification (n=117)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	17.17	3	5.73	1.14	0.34	0.03
Intercept	2571.85	1	2571.85	509.95	0.00	0.82
Gender	6.84	1	6.84	1.36	0.25	0.01
CASE certification	0.70	1	0.70	0.14	0.71	0.00
Gender*CASE certification	3.89	1	3.89	0.77	0.38	0.01
Error	569.90	113	5.04			
Total	4176.00	117				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; $*p < 0.05$

For state department of education programming, researchers found nonsignificant main effects for differences in gender (F=0.75, df=1,104), CASE certification (F=2.72, df=1,104), and nonsignificant interaction effects for gender*CASE certification (F=0.17, df=1,104) (see Table 12).

Table 12.
State Department of Education Programming Impact by Gender and CASE Certification (n=104)

	SS	*df*	*MS*	*F*	*p*	Partial □□
Corrected model	29.64	3	9.88	1.71	0.17	0.05
Intercept	1873.89	1	1873.89	324.86	0.00	0,77
Gender	4.32	1	4.32	0.75	0.38	0.01
CASE certification	15.70	1	15.67	2.72	0.10	0.03
Gender*CASE certification	0.97	1	0.97	0.17	0.68	0.00
Error	576.824	100	5.77			
Total	3494.00	104				

Notes: Gender coded as 1=*Female*, 2=*Male;* CASE certification coded as 1=*CASE certified*, 2=*no CASE certification*; *p < 0.05

Conclusions / Recommendations / Implications

The findings of this study provide guidance as to the professional development preferences of beginning teachers, but results should be inferred with caution. Teachers surveyed in this study were from four states and had five or less years of experience. In this sample, the ratio between female (43%) and male (57%) closely matched historical teacher census data (Smith, et al., 2017). The number of female participants completing the survey with CASE certification were four times greater than males.

Participants perceived the most impactful professional development was CASE trainings. Desimone (2009) outlined key characteristics of effective professional development, which focus on content and engagement. This type of professional development aligns with the goals and necessity of transformative learning as it provides teachers with opportunities to meet the needs of changing demands of their classroom. McKim, Velez, and Clement (2017) found teachers who have high self-efficacy will have more success in the classroom, which can be provided through high quality professional development opportunities. Facilitators in a structured professional development experience are modeling best practices which provide beginning teachers additional exposure to good teaching. Garet, et al. (2001) identified significant student achievement resulting from carefully planned professional development experiences that focused on hands-on approach. The planning for CASE professional development experiences focuses on providing student perspective and teacher facilitation with hands-on approaches.

Beginning agriculture teachers also reported high positive impact from their student teaching experience. The student teaching experience is often used as a capstone experience for undergraduate education programs, and both CASE certification and student teaching share the characteristics of sustained, transformational professional development. Researchers concluded CASE certified teachers found a significantly higher value to student teaching feedback than those who do not have CASE certification. As outlined by Park, Moore, and Rivera (2007) who found personalized professional development most meaningful when tailored to their own needs. Do beginning teachers who have participated in CASE find the training impactful for this reason? Do CASE teachers find student teaching more valuable because of their CASE experience, or are teachers who get more from their CASE experience more likely to get CASE certified? Future research should investigate motivational drivers for young teachers to pursue professional development. What cooperating teacher factors impact the sustained professional development practices of their student teachers?

The professional development experiences of graduate coursework, National FFA Convention workshops, local district programming, and state department of education programming had the least positive impact on beginning teacher success. Future research should be conducted on the scope, frequency, and subject matter of these professional development experiences. Are teachers enrolling in graduate education programs outside of their professional development as a teacher, or are their experiences just not impactful to their teaching? Does the mandatory nature of state and local professional development affect the perceived value of those experiences? What, if any, are the characteristics of impactful state or local professional development programming?

Researchers concluded gender did not explain significant proportions of variance for the perceived impact of any professional development experiences. One of the big changes in agriculture teacher preparation has been the growth in the number of females enrolled in undergraduate teacher preparation programs (Blackburn, Robinson, & Field, 2015). Researchers noted the level of CASE participation for females is higher than that of male teachers. Why are there more females seeking out CASE certification? Future research should investigate the motivations and values of seeking CASE certification for female teachers. Why do young female agricultural education teachers seek professional development more often than male educators?

This study has implications for professional development of beginning teachers at the local, state, and national level. Professional development facilitators lead teachers to acquire new ways of understanding what they do (Cranton, 1996). Mezirow's (2000) transformative learning theory frames learning in adulthood. Agricultural education professional development nationwide can use the results of this study to understand beginning teachers perceived benefits of professional development experiences. This study also provides information for professional development planners to review professional development experiences deemed beneficial by young teachers.

This study provides a foundation for further investigation. Future research should seek to determine beginning teachers perceived impact of various professional development experiences and what beginning teachers hope to receive from their professional development experiences.

References

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: Freeman.

Beavers, A. (2009). Teachers as learners: Implications of adult education for professional development. *Journal of College Teaching and Learning, 6*(7), 25-30.

Barrick, R.K., Ladewig, H.W., & Hedges, L.E. (1983). Development of a systematic approach to identifying technical inservice needs of teachers. *The Journal of American Association of Teacher Educators in Agriculture, 24*(1), 13-19.

Bennett, P.N., Iverson, M.J., Rohs, F.R., Lngone, C.A., & Edwards, M.C. (2002). Job satisfaction of agriculture teachers in Georgia and selected variable indicating their risk of leaving the teaching profession. Paper presented at the Southern Agricultural Education Research Conference, Orlando, Fl.

Birkenholz, R.J., & Harbstreit, S.R. (1987). Analysis of the inservice needs of beginning vocational agricultural teachers. *The Journal of the American Association of Teacher Educators in Agriculture, 28*(1), 41-49.

Blackburn, J. J., Robinson, J. S., & Field, H. (2015). Preservice Agriculture Teachers' Perceived Level of Readiness in an Agricultural Mechanics Course. *Journal of Agricultural Education, 56*(1), 172-187. doi:10.5032/jae.2015.01172

Curriculum for Agricultural Science Education (2013). Curriculum for agricultural science education website. Retrieved 2017. http://www.case4learning.org

Cranton, P. (1996), Types of group learning. New Directions for Adult and Continuing Education, 1996: 25–32. doi:10.1002/ace.36719967105

Cruickshank, D., & Callahan, R. (1983). The other side of the desk: stages and problems of teacher development. *The Elementary School Journal, 83*(3), 251-258.

Darling-Hammond, L, & Bransford, J. (2005). Preparing teachers for a changing world: what teachers should learn and be able to do. San Francisco, Ca: Jossey-Bas.

Darling-Hammond, L., & Sykes, G. (2003). Wanted: A national teacher supply policy for education: The right way to meet the "highly qualified teacher" challenge. *Education Policy Analysis Archives, 11*(33), 1–55.

Desimone, L.M. (2009). Improving impact studies of teachers' professional development: toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181-199. doi:10.3102/0013189X08331140

Dewey, J. (1938). *Experience and education*. New York, Ny: Simon & Schuster.

Field, A. (2009). Discovering Statistics using SPSS 3rd Edition. London: Sage.

Foster, B. (2003). Profiling female teachers of agricultural education at the secondary level. *Journal of Career and Technical Education, 19*(2), 15-28. Retrieved from https://ejournals.lib.vt.edu/JCTE/article/view/614

Fuller, F.F. (1969). Concerns of teachers: a developmental conceptualization. *American Educational Research Journal, 6*(2), 207-226. doi:10.2307/1161894

Garet, M.S., Porter, A.C., Desimone, L, Birman, B.F., & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, *38*(4), 915-945. doi:10.3102/00028321038004915

Gray, L., Taie, S., & O'Rear, I. (2015). *Public school teacher attrition and mobility in the first five years: Results from the first through fifth waves of the 2007–2008 Beginning Teacher Longitudinal Study*. Washington, DC: U.S. Department of Education. http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED556348&site=ehost-live.

Hainline, M.S., Ulmer, J.D., Ritz, R.R, Burris, S., & Gibson, C.D. (2015). Career and family balance of Texas agricultural science teachers by gender. *Journal of Agricultural Education 56*(4), 31-46. doi:10.5032/jae.2015.0431

Johnson, S.M., & Birkeland S. (2003). Pursuing a "sense of success": new teachers explain their career decisions. *American Educational Research Journal, 40*(3), 581-617.

Kaiser, A. (2011). Beginning teacher attrition and mobility: Results from the first through third waves of the 2007-08 beginning teacher longitudinal study. First Look. NCES 2011-318. National Center for Education Statistics. http://eric.ed.gov/?id=ED523821

Knight, J. (1987). Current status of women teachers of vocational agriculture in Ohio and their perception of their place in the profession. *Proceedings of the National Agricultural Education Research Meeting*, 223-236.

Knowles, M. S. (1980). The modern practice of adult education: From pedagogy to andragogy (2nd edition). New York: Cambridge Books.

Knoblock, N.A., & Whittington, M.S. (2003). The influence of the initial ten weeks of the school year on novice teacher efficacy in agricultural education. *NACTA Journal, 47*(4), 16-21. Retrieved from http://www.jstor.org/stable/43765800

Lambert, M.D., Velez, J.J., & Elliott, K.M. (2014). What are the teachers' experiences when implementing the curriculum for agricultural science education? *Journal of Agricultural Education*, *55*(4), 100-115. doi:10.5032/jae.2014.04100

Layfield, K.D., & Dobbins, T.R. (2002). Inservice needs and perceived competencies of South Carolina agricultural educators. *Journal of Agricultural Education, 43*(4), 46-55. Retrieved from http://pubs.agedu.tamu.edu/jae//pdf/vol43/43-04-46.pdf

McCormack, A., Gore, J., & Thomas, K. (2006). Early career teacher professional learning. *Journal of Teacher Education, 34*(1), 95-113. doi:10.1080/13598660500480282

McKim, A.J., Velez, J.J., & Clement, H.Q. (2017). Exploring relationships between personal variables, programmatic variables, and self-efficacy in school-based agricultural education. *Journal of Agricultural Education*, *58*(2), 284-298. doi:10.5032/jae.2017.02284

Mezirow, J. (2000). Learning as Transformation: Critical Perspectives on a Theory in Progress. The Jossey-Bass Higher and Adult Education Series. Jossey-Bass Publishers, 350 Sansome Way, San Francisco, CA 94104.

National Council on Agricultural Education. (2000). The national strategic plan and action agenda for agricultural education: Reinventing agricultural education for the year 2020. Alexandria, Va. Retrieved from https://www.ffa.org/SiteCollectionDocuments/plan2020.pdf

National Commission on Teaching & America's Future (2003). No dream denied: A pledge to America's children. National Commission on Teaching and America's Future. Washington, D.C.

Nesbitt, D.L., & Mundt, J.P. (1993). An evaluation of the University of Idaho beginning agriculture teacher induction program. *Journal of Agricultural Education, 34*(2), 11-17. Retrieved from http://pub.aged.tamu.edu/jae/pdf/vol34/34-02-11.pdf

Oliver, J. D., & Hinkle, D. E. (1982). Occupational education research: Selecting statistical procedures. *Journal of Studies in Technical Careers, 4*(3), 199-209.

Park, T.D., Moore, D.M., & Rivera, J.E. (2007). New York agricultural science teacher professional growth: empowering teachers to improve their practice and the profession. *Proceedings of the 2007 AAAE Research Conference*, 34, 630-644.

Roberts, T.G. & Ball, A.L. (2009). Secondary agricultural science as content and context for teaching. *Journal of Agricultural Education*, *50*(1), 81-91. doi:10.5032/jae.2009.01081

Roberts, T.G., Harder, A., & Brashears. M.T. (Eds). (2016) American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Roberts, T.G., & Dyer, J.E. (2004). Inservice needs of traditionally and alternatively certified agriculture teachers. *Journal of Agricultural Education, 45*(4), 57-70. Retrieved from http://pubs.aged.tamu.edu/jae/pdf/vol45/45-04-057.pdf

Saucier, P.R., Tummons, J.D., Terry, R. & Schumacher, L.G. (2010). Professional development needs of Missouri agricultural educators. Paper presentation at American Association for Agricultural Education Research Conference, Omaha, Ne.

Smith, A., Lawver, R., Foster, D., & Thompson, E. (2017). National agricultural education supply and demand overview AAAE regions. AAAE teacher supply and demand. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Torres, R.M., Lawver, R.G., & Lambert, M.D. (2009). Job-related stress among secondary agricultural education teachers: a comparison study. *Journal of Agricultural Education, 50*(3), 100-111. Retrieved from https://eric.ed.gov/?id=EJ871219

Trotter, Y. D. (2006). Adult learning theories: Impacting Professional Development Programs: *Delta Kappa Gamma Bulletin, 72*(2), 8-13.

Washburn, S.G., & Dyer, J.E. (2006). Inservice needs of beginning agriculture teachers. Proceedings of the 2006 American Association for Agricultural Education Southern Agricultural Education Research Conference, Orlando, Fl, 577-589.

Washburn, S.G., King, B.O., Garton, B.L., & Harbstreit, S.R. (2001). A comparison of the professional development needs of Kansas and Missouri teachers of agriculture. *Proceedings of the 28th Annual National Agricultural Education Research Conference*, New Orleans, La, 396-408.

Wilson, E.B., & Curry, K.W. (2011). Outcomes of integrated agriscience processes: a synthesis of research. *Journal of Agricultural Education, 52*(3), 136-147. doi:10.5032/jae.2011.03136

Beginning Agricultural Education Instructor Perceived Benefit of Professional Development Experiences

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Discussant Remarks

This regional study sought to understand the differences in needs based on CASE certification and/or gender. Authors are commended for the work to broaden the scope of the sample to provide a regional perspective of professional development perceived value and suggested practices. The results of this study highlighted the perceived value of professional development opportunities that was quite telling. CASE certification and student teaching experiences were deemed the most impactful by these early career teachers while state department of education programming and workshops held the least value. This seems to support the often-discussed importance of sustained training that is grounded in relationships and teacher needs. Of particular interest was the finding that CASE certified teachers found the student teaching experience more valuable. Perhaps this is a selection bias of those that highly value the art and science of teaching or is it that CASE uniquely partnered with teacher preparation programs to enhance the effect. I was curious if these states include CASE certification as a part of teacher preparation?

Mezirow's transformative learning theory (2000) provided an interesting framework to guide the study. I would recommend that the authors more fully integrate the model throughout the manuscript. There seems to be a number of theoretical connections to teacher improvement and the findings of CASE and student teaching impact. The theory was addressed broadly, but it would be interesting to have a robust discussion of how the findings enhance or add to that theory in agricultural education.

Methodologically, this study, though never clearly stated, seemed to be a census of first through fifth year teachers in the selected states. A sample is then described as a convenience which did prompt of number of questions. A stronger description of the population and sampling strategy would provide some clarity in this regard. Though ANOVA tables were reported throughout, the specific means and standard deviations of professional development impacts by gender and CASE certification were never reported, which made analysis of the ANOVA difficult. That simple addition would add valuable clarity. Should ANOVA's be used in this situation if a census was attempted and is the data best classified as scaled, ordinal, or nominal and reported as such? Finally, it is recommended that the simple main effects be always noted first, followed by a decision to address or ignore main effects.

Overall, I found this study very interesting. Most notably, it seemed that the CASE certification intensified the impact of other professional development opportunities in a unique way. The findings of this study inform those developing teachers in this region (authors extend a bit too far to a national recommendation) of what is most impactful.

Early Career Agricultural Education Instructor Expectations for Professional Development Yields

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A wealth of professional development programming exists for agricultural educators, but which experiences provide knowledge, skills, and tools most sought by early career agricultural educators? The purpose of this study was to isolate specific desired professional development outcomes for early career agricultural educators, as well differences in specific expectations related to CASE certification. The target population was agricultural educators between zero and five years of experience from Iowa, Minnesota, Missouri, and Nebraska. A sample of 125 early career teachers completed a survey; descriptive statistics were applied to demographics and professional development expectations. The most desired outcomes included classroom procedures and ideas, practical advice and suggestions from both facilitators and co-participants, and hands-on practice from the student perspective. The least desired outcomes were math integration strategies, purchasing tips, and reading strategies. CASE-certified teachers showed more interest in gaining practical advice and suggestions from both the facilitator and other participants. Non-CASE certified teachers had more interest in ideas for interest approach, exit, and energizer activity ideas, laboratory strategy ideas, and equipment storage and organization suggestions. These conclusions pose questions about prioritization of academic integration as well as how experiences such as CASE professional development change expectations for professional development experiences.

Introduction

Increasing teacher attrition rates are symptomatic of issues in education; during the past two decades, researchers have suggested that somewhere between 17% – on the conservative side – and up to 50% of all new teachers might be leaving the classroom before or at the end of the fifth year of teaching (Gray, Taie, & O'Rear, 2015; Kaiser, 2011; Darling-Hammond & Sykes, 2003; NCTAF, 2003). Teacher salary, time management, self-efficacy, and student motivation are specific factors related to early career agricultural teacher attrition (Boone & Boone, 2009). Many young teachers reported feeling ineffective and overwhelmed by teaching responsibilities (Bennet, Iverson, Rohs, Lngone, & Edwards, 2002; Johnson & Birkeland, 2003). Teacher self-adequacy is not a new phenomenon. Fuller (1969) reported that new teachers feel concern for self-adequacy, themselves as teachers, and how they fit into the school environment. While most ag teachers report healthy professional and personal support, many feel job pressure of such a measure that they are near a tipping point due to working overtime, meeting deadlines, and excessive paperwork (Torres, Lawver, & Lambert, 2009). Another factor affecting retention of early career teachers is how difficult the transition from student to teacher is for new teachers. Despite years of classroom experience as a student, new teachers must tackle a challenging psychological shift to become an educator and classroom leader (Cruickshank & Callahan, 1983). Dewey (1938) stated that genuine education is a result of experience. Learning to teach includes process of construction of new knowledge and skills through experience, feedback, and reflection (Darling-Hammond & Bransford, 2005).

Add to those factors the dynamic nature of the agriculture industry and agricultural education itself. In 1915, Leake stated that school-based agricultural education programs were designed to prepare students for careers in production agriculture. Over time, this focus shifted to consumption-based curriculum and courses (Washburn & Dyer, 2006). Roberts and Ball (2009) found that agriculture and other domain content are best taught in complex social environments in order to contribute to a skilled agricultural workforce as well as agriculturally literate citizens. Agricultural educators must prepare students for today's agricultural careers, employment in a much faster-paced setting, in a positive learning classroom environment (Layfield & Dobbins, 2002). The fast-paced transformations facing agricultural education necessitates professional development opportunities to meet the changing demands (Washburn & Dyer, 2006).

Self-efficacy is the ability to assess personal capability to organize and complete specific actions (Bandura, 1997). Teachers who have high self-efficacy experience more success as classroom teachers (McKim, Velez, & Clement, 2017). New teachers, especially, struggle with self-efficacy during their first year (Knobloch & Whittington, 2003). Four sources of teacher self-efficacy, per Bandura's (1994) research are mastery experiences, physiological and emotional engagement, vicarious experiences, and social persuasion.

To develop self-efficacy in the classroom, professional development may be the answer. The goal of professional development is to provide essential knowledge, skills, and technical information required for effective performance by teachers in a dynamic classroom environment (Barrick, Ladewig, & Hedges, 1983; Birkenholz & Harbstreit, 1987; Nesbitt & Mundt, 1993; Washburn, King, Garton, & Harbstreit, 2001; Saucier, Tummons, Terry & Schumacher, 2010). Glasgow (1997) reported that the pedagogical success of problem-solving methodologies in a classroom depends on the agriculture teacher being prepared to facilitate them through planning and designing the student experience, properly executing the class experience, and assessing and evaluating the outcomes. Therefore, professional development experiences should provide opportunities for teachers to improve teaching skills to aid in student learning (Shoulders & Myers, 2011). In the past, teacher preparation and state agricultural education supervisory staff have played primary roles in professional development planning (Barrick, et al., 1983), with little input from in-service educators (Washburn, et al., 2001). When educator input is solicited, three methods are typically used: research (Layfield & Dobbins, 2000; Washburn, et al., 2001), personal experience (Barrick, et al., 1983; Saucier, et al., 2010), and informal inquiry with current agricultural educators (Barrick, et al., 1983; Roberts & Dyer, 2004).

Early career teacher concerns include discipline, motivation, accommodation of students, assessment of student work, relationships with parents, insufficient supplies, addressing individual student problems, insufficient time, and effective teaching methods (Stair, Warner, & Moore, 2012). Developing successful teaching professionals requires accurately identifying professional development needs in demand (Layfield & Dobbins, 2002). Park, Moore, and Rivera (2007) found that agricultural science educators found personalized professional development, tailored to their own needs, most meaningful. Garet, Porter, Desimone, Birman, and Yoon (2001) learned that the highest increase in student achievement resulted from content-focused, classroom-applied, and hands-on learning during professional development experiences. Garton and Chung (1996) recommended that professional development "should focus on enhancing instruction, program development and evaluation, and program administration" (p.58). Joerger (2002) proposed that inservice leaders assess the educational needs of these young teachers, collecting substantial background information for each, then "design in-service education activities and topics that reflect the priority rankings identified from the analyses of the in-service education needs assessment for each cohort" (p.22). This is a time-consuming task.

In 2000, the National Council for Agricultural Education established initiatives for improving agricultural education program quality. One initiative called for transformative professional development; another called for a sequence of courses to enhance the delivery model of agricultural education (NCAE, 2000). Enter the Curriculum for Agricultural Science Education (CASE) project in 2007. According to the CASE website, "CASE develops curriculum utilizing science inquiry for lesson foundation and concepts are taught using activity-, project-, and problem-based instructional strategies. In addition to the curriculum aspect of CASE, the project ensures quality teaching by providing extensive professional development for teachers…" (CASE, 2013). The professional development institute model for CASE provides "important background related to the pedagogy used in CASE curricula and practice teaching various lessons to prepare them for classroom instruction" by lead and master teachers modeling laboratory, math, and science integration strategies as well as provide practical suggestions and facilitation ideas for classroom delivery through "peer teaching and the development of a professional learning community during the course of the CASE Institute"(CASE, 2012). Lambert, Velez, and Elliott (2014) reported that several experienced teacher participants stated that CASE would have been "extremely beneficial" during their first few years of teaching. CASE allows teachers to refocus creative and curriculum development energies into different activities (Lambert, et al., 2014). Participation in a CASE curriculum institute significantly impacts science teaching efficacy (Ulmer, Velez, Lambert, Thompson, Burris, & Witt, 2013). Additionally, teachers whom participate in focused professional development "are more confident to teach science," (Wilson & Curry, 2011). Witt, Ulmer, Burris, Brashears, and Burley (2014) also studied delivery in CASE and non-CASE classrooms and found that "the use of the CASE curriculum had a significant positive impact on student academic engagement."

Incomplete literature exists that speaks to early career agricultural teacher expectancies for professional development experiences, or the skills and tools desired by those teachers. Even fewer research-based recommendations are available for professional development planning. Researchers seek to fill that disparity as well as consider how CASE certification and specific years of experience affect differences in expectations. What tools, skills, or knowledge do early career teachers expect to gain from professional development experiences?

Theoretical Framework

This study was guided by Mezirow's transformative learning theory (2000), which frames learning in adulthood as a transformative, rather than functional, process. Teacher professional development must engage the practical knowledge gained from their experiences of teachers as learners (Knowles, 1980; Trotter, 2006). In a functional professional development model, teacher development strengthens and clarifies existing mental models, and teacher improvement occurs through perfecting existing practice (Beavers, 2009). In contrast to functional models, transformative learning in adults takes place when teachers discard or set aside previously learned habits in order to act differently. In transformative learning, professional development facilitators lead teachers to critically examine their practice, then acquire new or alternative ways of understanding what they do (Cranton, 1996). Researchers seek to isolate the transformative nature of CASE inservice and how CASE participation affects early career teacher preferences for professional development formats.

Purpose / Objectives

The purpose of this study was to identify what distinctions exist for professional development expectations of early career teachers according to differences in years' experience and CASE certification. Data collected from this project may improve professional development planning for young teachers related to knowledge, skills, and tools early career teachers hope to gain through professional development experiences. Specific objectives included:

1. Describe population characteristics (state, years' experience, and CASE certifications)
2. Describe what early career teachers hope to receive from professional development
3. Determine to what extent early career teachers differ in what they hope to receive from professional development based on years' experience and CASE certification

This study addresses Research Priority Area Four: Meaningful Engaged Learning in all Environments within the American Association for Agricultural Education's National Research Agenda (Roberts, Harder, & Brashears, 2016). Limited research has focused on professional development preferences of early career teachers. Results of this study may influence professional development planning for early career teachers according to concerns and needs.

Methods / Procedures

The target population was early career inservice agricultural education instructors in Iowa (*n*=90), Minnesota (*n*=78), Missouri (*n*=173), and Nebraska (*n*=86). These states were chosen because they comprise a substantial population of early career CASE certified agricultural education instructors. The accessible population was current agriculture teachers in those states completing their first through fifth years of teaching with email access. The researchers emailed a link to the survey to agricultural education leaders in each state, and state leaders distributed an electronic link to the questionnaire to early career teachers. The survey was administered in the fall of 2016, following the onset of the academic year. Survey items include demographics (age, gender, state, years of teaching experience) and professional development expectations. Both non-CASE and CASE-certified instructors were asked to identify their top three expectations for professional development. CASE-certified instructors were also asked to reflect on the three most valuable non-content portions of CASE professional development. A total of (*n*=125) early career teachers responded to the survey, for a 29% response rate. As the surveys were distributed by state leaders, non-response follow-up was not possible. The respondents represent a time and place sample of past and future early career agricultural instructors, and therefore the use of inferential statistics is justified (Oliver & Hinkle, 1982).

Professional development expectation options included classroom procedures and expectations, equipment storage and organization suggestions, facilitation activity ideas (interest approaches, exit tickets, and energizers), facilitation ideas from a practicing teacher perspective, hands-on practice from the student perspective, laboratory strategy ideas, math integration strategy ideas, practical advice and suggestions from facilitators and other participants, purchasing advice or tips, and reading strategy ideas, all of which are best practices implemented during CASE professional development experiences.

Data collected from the survey were quantitative in nature, utilizing an *ex post facto* design. Teachers were asked to identify if they had earned a CASE certification, then marked their top three characteristics they hoped to receive from their professional development experiences. For objectives one and two, researchers calculated frequencies and percentages. For objective three, researchers utilized a Chi-squared analysis to calculate goodness of fit for frequency of response and years of experience, for both CASE and non-CASE certified teachers. The level of significance was set *a priori* at alpha = 0.05.

Results / Findings

Researchers sought to describe the characteristics of the 125 teachers in the sample for objective one. Within the sample, 32 teachers (26%) reported 1 year of teaching experience, 25 teachers (20%) had two years of experience, 28 teachers (22%) had three years experience, 17 teachers (14%) reported four years of experience, and 23 teachers (18%) in the fifth year. Eighty-seven participants (69%) of the sample identified as female, and 39 (31%) identified as male. Among the sample, 41 females and 10 males reported holding at least one CASE certification (41.8%), whereas 43 females and 28 males reported they had not earned a CASE certification (58.2%).

Among the teachers in the study, 41 taught in Iowa (33%), 32 in Missouri (26%), 28 in Minnesota (22%), and 24 in Nebraska (19%). State population data shared by state personnel prior to the survey indicates that about 38% of all school-based agricultural educators (SBAE) in these four states are early career teachers. The population of early career SBAE instructors in Nebraska is about 51%, Iowa 38%, Missouri 37%, and Minnesota 31% (see Table 1).

Table 1.
Demographics of Early Career Teachers

State	*n* (#)	Total Early Career Teachers (#)	Total SBAE Instructors (#)	Early Career Teacher Portion of State SBAE Population (%)
Iowa	41	90	236	38.1%
Minnesota	28	78	254	30.7%
Missouri	32	183	490	37.3%
Nebraska	24	86	170	50.6%
Total	125	437	1,150	38.0%

For objective two, researchers sought to describe what early career teachers hoped to receive from their professional development experience. Teachers responding to the survey were asked to select the three outcomes they most desired to receive during professional development. Over two-thirds (n=86) of all early career teachers surveyed hoped to receive classroom procedures and ideas from their professional development. Other top desired professional development outcomes included practical advice and suggestions from both the facilitator and other participants (n=68), hands-on practice from the student's perspective (n=66), and facilitation ideas from a practicing teacher's perspective (n=61). Less than 20% of all early career agriculture teachers surveyed indicated they hoped to receive equipment storage and organization suggestions (n=23), reading strategy ideas (n=14), purchasing advice or tips (n=12), and math integration strategy ideas (n=11) (see Table 2).

Researchers also sought to compare desired outcomes for CASE-certified early career teachers and non-CASE certified early career teachers. While overall rankings are only slightly different, a higher percentage of CASE-certified teachers value practical advice and suggestions from both the facilitator and other participants compared to non-CASE certified teachers (61% CASE teachers compared to 50% non-CASE teachers). On the other hand, higher percentages of non-CASE certified teachers value interest approach, exit, and energizer activity ideas for lesson planning (43% non-CASE compared to 29% CASE), laboratory strategy ideas (41% non-CASE compared to 28% CASE), and equipment storage and organization suggestions (24% non-CASE compared to 10% CASE) (see Table 2).

Table 2.
Frequency of Professional Development Outcomes Early Career Agriculture Teachers Hope to Receive from Professional Development Experiences (n=125)

Characteristic	CASE-certified[a] *f*(%)	Non-CASE certified[b] *f*(%)	Total[c] *f*(%)
Classroom procedures and ideas	35 (68.6%)	51 (68.9%)	86 (68.8%)
Practical advice and suggestions from facilitator and other participants	31 (60.8%)	37 (50%)	68 (54.4%)
Hands-on practice from the student's perspective	26 (51.0%)	42 (56.8%)	66 (52.8%)
Facilitation ideas from a practicing teacher's perspective	26 (51.0%)	35 (47.3%)	61 (48.8%)
Interest approach, exit, and energizer activity ideas for lesson planning	15 (29.4%)	32 (43.2%)	47 (37.6%)
Laboratory strategy ideas	14 (27.5%)	30 (40.5%)	44 (35.2%)
Equipment storage and organization suggestions	5 (9.8%)	18 (24.3%)	23 (18.4%)
Reading strategy ideas	6 (11.8%)	8 (10.8%)	14 (11.2%)
Purchasing advice or tips	7 (13.7%)	5 (6.8%)	12 (9.6%)
Math integration strategy ideas	4 (7.8%)	7 (9.5%)	11 (8.8%)

Notes. [a]*n*=51; [b]*n*=74; [c]*n*=125

CASE-certified teachers were asked to select the three most valuable non-content portions of CASE institute professional development. The tools and ideas ranked from top to bottom as follows: hands-on practice from student perspective (*n*=44), practical advice and suggestions from both the facilitator and other participants (*n*=29), facilitation ideas from a practicing teacher's perspective (*n*=27), classroom procedures and ideas (*n*=21), interest approach, exit, and energizer activity ideas (*n*=14), reading strategy ideas (*n*=12), purchasing advice or tips (*n*=12), laboratory strategy ideas (*n*=9), equipment storage and organization suggestions (*n*=5), math integration strategy ideas (*n*=5) (see Table 3). Contrasted with expectations for professional development, CASE certified teachers found more value in hands-on practice from the student perspective (86%) than they hope to receive in future professional development (51%). The values placed on reading strategy ideas (24%) and purchasing advice and tips (24%) are also higher than the future value of reading strategy ideas hoped to receive (12%) and purchasing advice and tips (14%). On the other hand, CASE-certified teachers hope to receive classroom procedures and ideas (69%) more than they valued the same from their CASE experience (41%). While 18% of the CASE-certified teachers placed laboratory strategy ideas in their top three, 28% of them now hope to receive laboratory strategy ideas during professional development (see Table 3.)

Table 3.
Frequency of Values from Non-Content Portions of Institutes by CASE-certified Teachers Compared to Outcomes CASE-certified Teachers Hope to Receive from Professional Development Experience (n=51)

Characteristic	Valued Non-Content Portions of Prior CASE Institute *f*(%)	Expected Outcomes for Professional Development *f*(%)
Classroom procedures and ideas	21 (41.2%)	35 (68.6%)
Practical advice and suggestions from facilitator and other participants	29 (56.9%)	31 (60.8%)
Hands-on practice from the student's perspective	44 (86.3%)	26 (51.0%)
Facilitation ideas from a practicing teacher's perspective	27 (52.9%)	26 (51.0%)
Interest approach, exit, and energizer activity ideas for lesson planning	14 (27.5%)	15 (29.4%)
Laboratory strategy ideas	9 (17.6%)	14 (27.5%)
Purchasing advice or tips	12 (23.5%)	7 (13.7%)
Reading strategy ideas	12 (23.5%)	6 (11.8%)
Equipment storage and organization suggestions	5 (9.8%)	5 (9.8%)
Math integration strategy ideas	5 (9.8%)	4 (7.8%)

For objective three, researchers tested to determine to what extent teachers differ in what they hope to receive from professional development based on years of experience. For first year teachers without CASE certification, the top three items they hope to receive from professional development include classroom procedures and ideas, hands-on practice from the student's perspective, and interest approach, exit, and energizer activity ideas. Second year non-CASE certified teachers identified classroom procedures and ideas, hands-on practice from the student's perspective, and interest approach, exit, and energizer activity ideas. Third year non-CASE certified teachers most hope to gain classroom procedures and ideas, hands-on practice from the student's perspective, and laboratory strategy ideas. Teachers in the fourth year of teaching expect hands-on practice from the student's perspective, practical advice and suggestions from both the facilitator and other participants, and laboratory strategy ideas. The most experienced group, the fifth-year non-CASE certified teachers, selected classroom procedures and ideas, and practical advice and suggestions from both the facilitator and other participants; they are the only cohort to identify facilitation ideas from a practicing teacher's perspective as a top priority (see Table 4). Researchers conducted a Chi-Square goodness of fit to identify any significant (p<0.05) differences between observed and expected frequencies for each item. Researchers failed to reject the null hypothesis for any of the items listed for non-CASE teachers.

Table 4.
Distribution and Chi-square Goodness of Fit for Frequency of Professional Development Characteristics for Non-CASE-certified Early Career Teachers (n=71)

	Years of Teaching Experience					
	1[a]	2[b]	3[c]	4[d]	5[e]	χ^2
Characteristic	*f*(%)	*f*(%)	*f*(%)	*f*(%)	*f*(%)	(*p*)
Classroom procedures and ideas	15 (83.3%)	9 (60.0%)	11 (64.7%)	4 (44.4%)	12 (80.0%)	5.82 (0.21)
Practical advice and suggestions from both facilitator and participants	10 (55.6%)	5 (33.3%)	6 (35.3%)	5 (55.6%)	11 (73.3%)	6.74 (0.15)
Hands-on practice from the student's perspective	11 (61.1%)	7 (46.7%)	9 (52.9%)	6 (66.7%)	9 (60.0%)	1.29 (0.86)
Facilitation ideas from a practicing teacher's perspective	8 (44.4%)	6 (40.0%)	6 (35.3%)	4 (44.4%)	11 (73.3%)	5.47 (0.24)
Interest approach, exit, and energizer activity ideas for lesson planning	11 (61.1%)	7 (46.7%)	6 (35.3%)	2 (22.2%)	6 (40.0%)	4.53 (0.34)
Laboratory strategy ideas	7 (38.9%)	6 (40.0%)	7 (41.2%)	5 (55.6%)	5 (33.3%)	1.19 (0.88)
Equipment storage and organization suggestions	5 (27.8%)	5 (33.3%)	2 (11.8%)	1 (11.1%)	5 (33.3%)	3.75 (0.44)
Reading strategy ideas	3 (16.7%)	1 (6.7%)	2 (11.8%)	0 (0.0%)	2 (13.3%)	2.11 (0.72)
Purchasing advice or tips	2 (11.1%)	2 (13.3%)	0 (0.0%)	0 (0.0%)	1 (6.7%)	3.46 (0.49)
Math integration strategy ideas	3 (16.7%)	0 (0.0%)	2 (11.8%)	0 (0.0%)	2 (13.3%)	3.97 (0.41)

Notes: [a]n=18; [b]n=15; [c]n=17; [d]n=9; [e]n=15

Among first year teachers holding CASE certification(s), the top three items they hoped to receive from professional development included classroom procedures and ideas, hands-on practice from the student perspective, and facilitation ideas from a practicing teacher's perspective. Second year CASE-certified teachers selected classroom procedures and ideas, practical advice and suggestions from both the facilitator and other participants, and facilitation ideas from a practicing teacher's perspective. The third-year CASE-certified teacher group indicating interest in practical advice and suggestions from both the facilitator and other participants and classroom procedures and ideas. Nearly half of this group also selected interest approach, exit, and energizer activity ideas as well as laboratory strategy ideas as a top three expectation. Fourth-year CASE-certified teachers selected practical advice and suggestions from both the facilitator and other participants, hands-on practice from the student's perspective, classroom procedures and ideas, and facilitation ideas from a practicing teacher's perspective. Expectations identified by the fifth-year CASE-certified teacher cohort were classroom procedures and ideas, practical advice and suggestions from both the facilitator and other participants, hands-on practice from the student perspective, and facilitation ideas from a practicing teacher's perspective (see Table 5).

Table 5.
Distribution and Chi-square Goodness of Fit for Frequency of Professional Development Characteristics for CASE-certified Early Career Teachers (n=51)

	Years of Teaching Experience					
	1[a]	2[b]	3[c]	4[d]	5[e]	χ^2
Characteristic	*f*(%)	*f*(%)	*f*(%)	*f*(%)	*f*(%)	(*p*)
Classroom procedures and ideas	11 (78.6%)	6 (60.0%)	6 (54.5%)	5 (62.5%)	7 (87.5%)	3.465 (*0.64)*
Practical advice and suggestions from facilitator and other participants	6 (42.9%)	6 (60.0%)	7 (63.6%)	6 (75.0%)	6 (75.0%)	3.28 (0.51)
Hands-on practice from the student's perspective	7 (50.0%)	4 (40.0%)	4 (36.4%)	6 (75.0%)	5 (62.5%)	3.70 (0.49)
Facilitation ideas from a practicing teacher's perspective	7 (50.0%)	5 (50.0%)	4 (36.4%)	5 (62.5%)	5 (62.5%)	1.80 (0.77)
Interest approach, exit, and energizer activity ideas for lesson planning	4 (28.6%)	4 (40.0%)	5 (45.5%)	1 (12.5%)	1 (12.5%)	6.52 (0.16)
Laboratory strategy ideas	2 (14.3%)	3 (30.0%)	5 (45.5%)	2 (25.0%)	2 (25.0%)	3.09 (0.54)
Equipment storage and organization suggestions	1 (7.1%)	1 (10.0%)	2 (18.2%)	0 (0.0%)	1 (12.5%)	1.92 (0.75)
Reading strategy ideas	0 (0.0%)	4 (40.0%)	1 (9.1%)	0 (0.0%)	1 (12.5%)	10.69* (0.03)
Purchasing advice or tips	2 (14.3%)	2 (20.0%)	0 (0.0%)	2 (25.0%)	1 (12.5%)	2.96 (0.57)
Math integration strategy ideas	1 (7.1%)	2 (20.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	3.91 (0.42)

Notes: [a]n=14; [b]n=10; [c]n=11; [d]n=8; [e]n=8

Researchers conducted a Chi-Square goodness of fit to identify any significant (p<0.05) differences between observed and expected frequencies for each item. Researchers identified one area of professional development, reading strategy ideas, where year two frequencies were significantly (p<0.05) higher than expected. Researchers failed to reject the null hypothesis for any of the other constructs listed for CASE-certified teachers.

Conclusions, Recommendations, and Implications

Agricultural education leaders, teacher induction programming planners, young teacher mentors, and professional development planners at national, regional, state, and local levels may wish to consult these lists of expectations for professional development planning for early career agricultural educators as Park, et al. (2007) found that agricultural science educators profoundly valued personalized professional development tailored to their own needs. Study results should be inferred with caution as early career teachers from only four states were surveyed.

Per objective one, demographics include the following. The sample includes a higher proportion (58.2%) of CASE-certified teachers (compared to 41.8% who have not experienced a CASE institute) than the national average. In the U.S., 1,539 teachers from 45 states hold one or more CASE certifications (CASE, 2017), representing less than 14% of all agricultural educators (n=11,557.5) in the U.S. (Smith, Lawver, Foster, & Thompson, 2017). Researchers selected states with higher CASE certification incidence, so this is not surprising. Researchers also conclude that the four states in this study had a large proportion of their teaching population in their first five years of their career. Over one-third (38%) of the total agricultural education instructor population in the four states are within the first five years of experience. High attrition rates in a population can dilute institutional knowledge and change the culture of an organization. Therefore, researchers recommend planning intentional, sustained, and impactful professional development to support early career teachers in the target states.

Related to objective two, a substantial proportion of early career teachers in this study hope to receive professional development with the following characteristics: 1) classroom procedures and ideas, 2) practical advice and suggestions from facilitator and other participants, 3) hands-on practice from the student's perspective, and 4) facilitation ideas from a practicing teacher's perspective. Researchers recommend providing early career professional development in the above areas. Conversely, less than one in three teachers in this study prioritized the following professional development outcomes: 1) Interest approach, exit, and energizer activity ideas for lesson planning, 2) laboratory strategy ideas, 3) purchasing advice or tips, reading strategy ideas, equipment storage and organization suggestions, and 4) math integration strategy ideas. Are these math, science, and literacy integration outcomes that educational leaders deem appropriate (Shinn, Briers, Christiansen, Harlin, Lindner, Murphy, Edwards, Parr, & Lawver, 2003; Stone, Alfeld, & Pearson, 2008; Myers & Thompson, 2009), yet early career teachers do not find value in? According to the National Research Center for Career and Technical Education (n.d.), "iterations of the Perkins legislation represent a major development in CTE—notably, an increased emphasis on academic achievement as well as occupational skills. Notably, Perkins IV requires the integration of rigorous and challenging academic and career and technical education in programs of study and career pathways." Therefore, researchers recommend exploring how additional in servicing might highlight the need for, or importance of, such content in the agricultural education in a way to meet the top needs felt by early career teachers. Additional study related to perceived need for such strategies by early career agricultural education instructors in other states – and the need for the same strategies for instructors by administrators in all states – may be of value for professional development planners.

Researchers conclude early career CASE teachers do not have identical expectations for the professional development construct as they appreciated from the non-content portions of CASE training. This may be a symptom of the transformative learning theory (Mezirow, 2000) wherein these teachers have set aside previous thinking and doing. More than 50% of respondents among the sample valued the following non-content portions of CASE training: 1) hands-on practice from the student perspective, 2) practical advice from the facilitator and other participants, and 3) facilitation ideas from a practicing teacher's perspective. Overall expected professional development outcomes from CASE completers exceeding 50% agreement included: 1) classroom procedures and ideas, 2) practical advice and suggestions from facilitator and other participants, 3) hands-on practice from the student perspective, and 4) facilitation ideas from a practicing teacher’s perspective. As these characteristics are hallmarks of good professional development (Garton & Chung, 1996; Garet, et al., 2001), professional development experiences should, at a minimum, provide these tools for all early career teachers.

Objective three sought to identify differences in expected professional development outcomes by CASE certification and years’ experience. Researchers conclude there are non-significant differences in the desired professional development outcomes for both CASE- and non-CASE certified early teachers in this study. Only one construct, reading strategy ideas (CASE-certified), was significantly different than the expected value where four of the six CASE-certified teachers in their second year of teaching valued reading strategies. Researchers recommend investigating how participation in CASE professional development can create even more transformative changes for future professional development yields.

Researchers conclude the desired professional development outcomes of the early career teachers in this study, including classroom procedures and ideas, practical advice and suggestions from both facilitator and participants, hands-on practice from the student’s perspective, and facilitation ideas from a practicing teacher’s perspective, are both static and persistent. Are current professional development programs not addressing these needs? Do experienced teachers value these same outcomes, suggesting agriculture teachers universally value these outcomes? For the participants in this study, researchers recommend professional development be implemented around the outcomes most frequently identified as priorities by new teachers (see Figure 1). Further research should identify current professional development characteristics and consumption of both early career and all agriculture teachers.

Although the frequencies were not significantly different, researchers noticed an increase in the frequency for classroom procedures and ideas from years three and four to year five. Over 80% of year five teachers still identify classroom procedures and ideas as a priority for professional development outcomes. Why did this frequency increase for year five teachers? Researchers recommend following up with teachers who left the profession to find out to what extent their needs differed from teachers who persisted.

Future research topics include the value of professional development topics for early career teachers and how CASE professional development aids teachers.

Year 1		Year 2		Year 3		Year 4		Year 5	
CASE	Non-CASE	CASE	Non-CASE	CASE	Non-CASE	CASE	Non-CASE	CASE	Non-CASE
Classroom procedures and ideas[b]	**Classroom procedures and ideas[a]**	Classroom procedures and ideas[c]	Classroom procedures and ideas[c]	Practical advice and suggestions from the facilitator and other participants[c]	Classroom procedures and ideas[c]	Practical advice and suggestions from the facilitator and other participants[b]	Hands-on practice from the student's perspective[c]	**Classroom procedures and ideas[a]**	**Classroom procedures and ideas[a]**
Hands-on practice from the student perspective[d]	Hands-on practice from the student's perspective[c]	Practical advice and suggestions from the facilitator and other participants[c]		Classroom procedures and ideas[c]	Hands-on practice from the student's perspective[d]	Hands-on practice from the student's perspective[b]	Practical advice and suggestions from the facilitator and other participants[d]	Practical advice and suggestions from the facilitator and other participants[b]	Practical advice and suggestions from the facilitator and other participants[b]
Facilitation ideas from a practicing teacher's perspective[d]	Practical advice and suggestions from the facilitator and other participants[c]	Facilitation ideas from a practicing teacher's perspective[c]				Classroom procedures and ideas[c]	Laboratory strategy ideas[d]	Hands-on practice from the student perspective[c]	Facilitation ideas from a practicing teacher's perspective[b]
						Facilitation ideas from a practicing teacher's perspective[c]		Facilitation ideas from a practicing teacher's perspective[c]	Hands-on practice from the student's perspective[c]

Figure 1. Professional items for early career agriculture teachers with over 50% agreement by years of experience (organized by frequency). *Notes:* [a]**≥80% agreement;** [b] 70-79% agreement; [c]60-69% agreement; [d]50-59% agreement

References

Bandura, A. (1994). *Self-efficacy*. In V.S. Ramachaudran (Ed.), Encyclopedia of Human Behavior, 4, 71-81. New York, Ny: Academic Press.

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: Freeman.

Barrick, R.K., Ladewig, H.W., & Hedges, L.E. (1983). Development of a systematic approach to identifying technical inservice needs of teachers. *The Journal of American Association of Teacher Educators in Agriculture, 24*(1), 13-19.

Beavers, A. (2009). Teachers as learners: Implications of adult education for professional development. *Journal of College Teaching and Learning, 6*(7), 25-30.

Bennett, P.N., Iverson, M.J., Rohs, F.R., Lngone, C.A., & Edwards, M.C. (2002). Job satisfaction of agriculture teachers in Georgia and selected variable indicating their risk of leaving the teaching profession. Paper presented at the Southern Agricultural Education Research Conference, Orlando, Fl.

Birkenholz, R.J., & Harbstreit, S.R. (1987). Analysis of the inservice needs of beginning vocational agricultural teachers. *The Journal of the American Association of Teacher Educators in Agriculture, 28*(1), 41-49.

Boone, H., & Boone, D. (2009). An assessment of problems faced by high school agricultural education teachers. *Journal of Agricultural Education, 50*(1), 21-32. doi:10.5032/jae.2009.01021

Cranton, P. (1996). Types of group learning. New Directions for Adult and Continuing Education, 1996: 25–32. doi:10.1002/ace.36719967105

Cruickshank, D., & Callahan, R. (1983). The other side of the desk: stages and problems of teacher development. *The Elementary School Journal, 83*(3), 251-258.

Curriculum for Agricultural Science Education. (2012). Understanding the CASE model. Retrieved from www.case4learning.org

Curriculum for Agricultural Science Education. (2013). Curriculum for agricultural science education website. Retrieved from www.case4learning.org

Curriculum for Agricultural Science Education. (2017). CASE certified teachers. Retrieved from www.case4learning.org/index.php/certification

Darling-Hammond, L, & Bransford, J. (2005). *Preparing teachers for a changing world: what teachers should learn and be able to do*. San Francisco, Ca: Jossey-Bas.

Darling-Hammond, L., & Sykes, G. (2003). Wanted: A national teacher supply policy for education: The right way to meet the “highly qualified teacher” challenge. *Education Policy Analysis Archives, 11*(33), 1–55.

Dewey, J. (1938). *Experience and education*. New York, Ny: Simon & Schuster.

Fuller, F.F. (1969). Concerns of teachers: a developmental conceptualization. *American Educational Research Journal, 6*(2), 207-226. doi:10.2307/1161894

Garet, M.S., Porter, A.C., Desimone, L, Birman, B.F., & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945. doi:10.3102/00028321038004915

Garton, B.L., & Chung, N. (1996). The inservice needs of beginning teacher of agriculture as perceived by beginning teachers, teacher educators, and state supervisors. *Journal of Agricultural Education, 37*(3), 52-58. doi:10.5032/jae.1996.03052

Glasgow, N.A. (1997). *New curriculum for new times*. Thousand Oaks, Ca: Corwin Press, Inc.

Gray, L., Taie, S., & O'Rear, I. (2015). *Public school teacher attrition and mobility in the first five years: Results from the first through fifth waves of the 2007–2008 Beginning Teacher Longitudinal Study*. Washington, DC: U.S. Department of Education. http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED556348&site=ehost-live

Joerger, R.M. (2002). A comparison of the inservice education needs of two cohorts of beginning Minnesota agricultural education teachers. *Journal of Agricultural Education, 43*(3), 11-24. doi:10.5032/jae.2002.03011

Johnson, S.M., & Birkeland S. (2003). Pursuing a "sense of success": new teachers explain their career decisions. *American Educational Research Journal, 40*(3), 581-617.

Kaiser, A. (2011). Beginning teacher attrition and mobility: Results from the first through third waves of the 2007-08 beginning teacher longitudinal study. First Look. NCES 2011-318. National Center for Education Statistics. http://eric.ed.gov/?id=ED523821

Knoblock, N.A., & Whittington, M.S. (2003). The influence of the initial ten weeks of the school year on novice teacher efficacy in agricultural education. *NACTA Journal, 47*(4), 16-21. Retrieved from www.jstor.org/stable/43765800

Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy* (2nd edition). New York, Ny: Cambridge Books.

Lambert, M.D., Velez, J.J., & Elliott, K.M. (2014). What are the teachers' experiences when implementing the curriculum for agricultural science education? *Journal of Agricultural Education, 55*(4), 100-115. doi:10.5032/jae.2014.04100

Layfield, K.D., & Dobbins, T.R. (2000). An assessment of South Carolina agriculture teachers' inservice needs and perceived competencies. *Proceedings of the 2000 National Agricultural Education Research Conference,* San Diego, Ca, 572-584.

Layfield, K.D., & Dobbins, T.R. (2002). Inservice needs and perceived competencies of South Carolina agricultural educators. *Journal of Agricultural Education, 43*(4), 46-55. Retrieved from http://pubs.agedu.tamu.edu/jae//pdf/vol43/43-04-46.pdf

Leake, A.H. (1915). *The means and methods of agricultural education*. Boston, Ma & New York, Ny: The Riverside Press Cambridge, 83.

McKim, A.J., Velez, J.J., & Clement, H.Q. (2017). Exploring relationships between personal variables, programmatic variables, and self-efficacy in school-based agricultural education. *Journal of Agricultural Education, 58*(2), 284-298. doi:10.5032/jae.2017.02284

Mezirow, J. (2000). *Learning as Transformation: Critical Perspectives on a Theory in Progress. The Jossey-Bass Higher and Adult Education Series*. San Francisco, Ca.: Jossey-Bass Publishers.

Myers, B.E. & Thompson, G.W. (2009). Integrating academics into agriculture programs: A delphi study to determine perceptions of the national agriscience teacher ambassador academy participants. *Journal of Agricultural Education, 47*(4):77-88. doi:10.5032/jae.2009.04077

National Commission on Teaching & America's Future (2003). No dream denied: A pledge to America's children. National Commission on Teaching and America's Future. Washington, D.C.

National Council on Agricultural Education. (2000). The national strategic plan and action agenda for agricultural education: Reinventing agricultural education for the year 2020. Alexandria, Va. Retrieved from https://www.ffa.org/SiteCollectionDocuments/plan2020.pdf

National Research Center for Career and Technical Education. (n.d.). Curriculum integration. Retrieved from www.nrccte.org/core-issues/curriculum-integration

Nesbitt, D.L., & Mundt, J.P. (1993). An evaluation of the University of Idaho beginning agriculture teacher induction program. *Journal of Agricultural Education, 34*(2), 11-17. Retrieved from http://pub.aged.tamu.edu/jae/pdf/vol34/34-02-11.pdf

Oliver, J. D., & Hinkle, D. E. (1982). Occupational education research: Selecting statistical procedures. *Journal of Studies in Technical Careers, 4*(3), 199-209.

Park, T.D., Moore, D.M., & Rivera, J.E. (2007). New York agricultural science teacher professional growth: empowering teachers to improve their practice and the profession. *Proceedings of the 2007 AAAE Research Conference, 34*, 630-644.

Roberts, T.G. & Ball, A.L. (2009). Secondary agricultural science as content and context for teaching. *Journal of Agricultural Education, 50*(1), 81-91. doi:10.5032/jae.2009.01081

Roberts, T.G., & Dyer, J.E. (2004). Inservice needs of traditionally and alternatively certified agriculture teachers. *Journal of Agricultural Education, 45*(4), 57-70. Retrieved from http://pubs.aged.tamu.edu/jae/pdf/vol45/45-04-057.pdf

Roberts, T.G., Harder, A., & Brashears. M.T. (Eds). (2016) American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Saucier, P.R., Tummons, J.D., Terry, R. & Schumacher, L.G. (2010). Professional development needs of Missouri agricultural educators. Paper presentation at American Association for Agricultural Education Research Conference, Omaha, Ne.

Shinn, G.C., Briers, G.E., Christiansen, J.E., Edwards, M.C., Harlin, J.F., Lawver, D.E., Lindner, J.R., Murphy, T.H., and Parr, B.A. (2003). Improving student achievement in mathematics: An important role for secondary agricultural education in the 21st Century. Unpublished manuscript. Texas A&M University, College Station, Tx. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=9E721FB466FB932090ADC3B25BA54E0C?doi=10.1.1.130.5829&rep=rep1&type=pdf

Shoulders, C., & Myers, B. (2011). Considering professional identity to enhance agriculture teacher development. *Journal of Agricultural Education*, *52*(4), 88-108. doi:10.5032/jae.2011.04098

Smith, A., Lawver, R., Foster, D., & Thompson, E. (2017). National agricultural education supply and demand overview AAAE regions. AAAE teacher supply and demand. Retrieved from http://aaaeonline.org/Teacher-Supply-and-Demand

Stair, K., Warner, W.J., & Moore, G.E. (2012). Identifying concerns of preservice and in-service teachers in agricultural education. *Journal of Agricultural Education, 53*(2), 153-164. doi:10.5032/jae.2012.02153

Stone, J. R. III, Alfeld, C., & Pearson, D. (2008). Rigor “and” relevance: Enhancing high school students’ math skills through career and technical education. *American Educational Research Journal, 45*(3), 767-795.

Torres, R.M., Lawver, R.G., & Lambert, M.D. (2009). Job-related stress among secondary agricultural education teachers: a comparison study. *Journal of Agricultural Education, 50*(3), 100-111. Retrieved from https://eric.ed.gov/?id=EJ871219

Trotter, Y. D. (2006). Adult learning theories: Impacting Professional Development Programs: *Delta Kappa Gamma Bulletin, 72*(2), 8-13.

Ulmer, J.D., Velez, J.J., Lambert, M.D., Thompson, G.W., Burris, S., & Witt, P.A. (2013). Exploring science teaching efficacy of CASE curriculum teachers: a post-then-pre-assessment. *Journal of Agricultural Education, 54*(4), 121-133. doi:10.5032/jae.2013.04121

Washburn, S.G., & Dyer, J.E. (2006). Inservice needs of beginning agriculture teachers. *Proceedings of the 2006 American Association for Agricultural Education Southern Agricultural Education Research Conference*, Orlando, Fl, 577-589.

Washburn, S.G., King, B.O., Garton, B.L., & Harbstreit, S.R. (2001). A comparison of the professional development needs of Kansas and Missouri teachers of agriculture. *Proceedings of the 28th Annual National Agricultural Education Research Conference*, New Orleans, La, 396-408.

Wilson, E.B., & Curry, K.W. (2011). Outcomes of integrated agriscience processes: a synthesis of research. *Journal of Agricultural Education, 52*(3), 136-147. doi:10.5032/jae.2011.03136

Witt, P.A., Ulmer, J.D., Burris, S., Brashears, T, & Burley H. (2014). A comparison of student engaged time in agriculture instruction. *Journal of Agricultural Education, 55*(2), 16-32. doi:10.5032/jae.2014.02016

Early Career Agricultural Education Instructor Expectations for Professional Development Yields

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Discussant Remarks

This study, a companion to the other study presented by Bloom, Tummons, and Smalley, seeks to understand what teachers *expect* when seeking professional development. This study seems to focus on what students *hope* to gain from professional development, while the other study reported the perceived benefit following the experience. Table 2 provided interesting exploratory insight into what early career agriculture teachers hope for in professional development. The authors identified participating states interested in CASE to better understand their self-reported hopes and needs, and it appears that this data has provided insight into that interest.

One concern noted while reading this manuscript is the vast amount of text that is directly pulled from the companion article. In comparing the two documents, published in the proceedings of the conference, there are sections that do not convey new ideas or approaches, and use identical language. This could be a concern in moving this manuscript forward for terminal publication. One suggestion, if the authors intend to publish this piece separately from the other noted manuscript, is to reframe the study from the ground up using expectancy value theory. The entire study seems to focus on what teachers expect and value, yet the framework utilized doesn't seem to highlight those variables or processes.

Methodologically, as shared earlier, there is very little clarification of the sampling approach for this study. It seems to be either a census study that achieved only 27% of the population, or convenience sample. Either option poses methodological challenges to the chosen approach to analysis. If this is determined a census study (my personal recommendation) then the simple parameters should be reported and analysis terminated. The time and place sample was noted as rationale for the convenience sampling and use of inferential statistics. One question I might pose is how well does this "sample" represent the population of whom you hope to refer? Do you feel comfortable making inferences? A stronger approach to sampling would provide more external validity and minimize a number of threats inherent to the chosen design of this study. Perhaps an attempt at a random sample using the frame would have been more appropriate if inferential statistics were deemed necessary.

My final question is related to the use of the Chi-Square goodness of fit analysis. It is my understanding that this analysis is used to determine if a given sample distribution deviates from a hypothesized distribution of some type (normal, bimodal, log-normal). I think the use of the Chi-Square analysis would open this manuscript to scrutiny by reviewers and does not seem to add much to the findings and conclusions. As mentioned, I would stick to the reporting of parameters in a census approach. It is my belief that this study can lead to some great exploratory conversations around what teachers hope for and value. Perhaps this also is a launch pad for future research that holds more validity, and thus generalizability.

Discussant – Matt Raven; Timekeeper - Tyler D'Angelo

Workforce Development
African Entrepreneurs’ Perceptions on the Mentoring Aspects of a Cross-cultural, Professional Development Experience: Implications for Future Programs *Dr. Lisa Taylor, Dr. M. Craig Edwards, Dr. Marshall Baker, Dr. Craig Watters, Dr. James Rutledge*
Student perceptions of workforce readiness in agriculture *Ms. Rachel E. Hendrix, Dr. Carley C. Morrison*
Assessing the Perceived Preparedness and Importance of Discipline Specific Items of Agriculture Teachers in Pennsylvania *Laura L. Rice, Daniel D. Foster, John C. Ewing, Mark D. Threeton*
South Carolina Agricultural Sciences Students' Perceptions of Career Readiness Skills *Victoria C. Willis, Catherine A. DiBenedetto*

African Entrepreneurs' Perceptions on the Mentoring Aspects of a Cross-cultural, Professional Development Experience: Implications for Future Programs

Dr. Lisa K. Taylor, University of Nevada Reno

Dr. M. Craig Edwards, Oklahoma State University

Dr. Marshall A. Baker, Oklahoma State University

Dr. Craig E. Watters, Oklahoma State University

Dr. James A. Rutledge, Oklahoma State University

Abstract

Describing views of 22 individuals from Kenya, South Africa, and Uganda (8 women; 14 men) regarding entrepreneurial learning experiences after participation in a five-week, cross-cultural exchange program in the United States was the primary purpose of this study. The program was delivered by Oklahoma State University and funded by the U.S. Department of State. The multicase investigation assessed impacts identified by Entrepreneur Fellows, especially the program's mentoring component, on agripreneurial activities after returning to their countries. The study's semi-structured interviews included six research questions and related probes. Verbatim transcriptions and member checking were decisive steps taken to ensure the data's accuracy and trustworthiness (Creswell, 2007). Their views were expressed as 22 cases, crystallizing facets of the study's quintain (Stake, 2006). The identification of 2,059 codes, 15 categories, and five themes reflected two interpretive frameworks, human capital theory and theory of planned behavior. Mentoring relationships was one of five significant themes that emerged as findings. Recommendations for practice include additional training of entrepreneur mentors and suggestions for facilitating quality field experiences, and funding to facilitate ongoing entrepreneurial mentoring. Future research should further investigate mentor and mentee perceptions of entrepreneurial field experiences; especially regarding agricultural enterprises, and how such may be improved.

Introduction/Conceptual Framework

"The innovative, inventive, and creative activities that have brought growth, progress, and perspective to our global communities have become the impetus for every challenge that we face globally" (Andenoro, Baker, Stedman, & Pennington Weeks, 2015, p. 58). This is one premise of the 2016-2020 *National Research Agenda* of the American Association for Agricultural Education (AAAE) Research Priority 7: Addressing Complex Problems, Question 1: What methods, models, and programs are effective in preparing people to solve complex, interdisciplinary problems (e.g. Climate change, food security, sustainability, water conservation, etc.)? This priority focuses on programs and related methods that could be effective in preparing the human capital, including youth, to solve interdisciplinary, complex problems such as food security and sustainability (Andenoro et al., 2015).

Moreover, "[t]he world now has the largest generation of young people in history. . . . They are part of the first generation that can end poverty and the last that can avoid the worst impacts of climate change" (United Nations, n.d, para. 3). Young people are more likely to produce a greater future if they have real influence, negotiating muscle, political weight, and decent jobs (United Nations, n.d.). "[S]ocieties of the bottom billion can only be rescued from within. . . . [T]here are people working for change, but usually they are defeated by the powerful internal forces stacked against them. We should be *helping the heroes*" (Collier, 2007, p. 96). These *heroes* could be energized and aspiring entrepreneurs, including individuals focused on agricultural endeavors and interested in advocacy for marginalized populations such as women, youth, and individuals with disabilities (Oklahoma State University Grant Proposal, 2013).

"With few exceptions, international comparative studies of entrepreneurship are rare, hampered by barriers such as the difficulty in gaining access to entrepreneurs in other countries, the expense involved, and the lack of reliable published data" (Thomas & Mueller, 2000, p. 289). The project examined here provided entrepreneurial training that created relationships with and *access to* (Thomas & Mueller, 2000) agricultural and allied sector entrepreneurs, including agricultural producers, Extension educators and researchers, and business educators and entrepreneurs. As a consequence, researching the mentoring experiences of the participants after they returned home was one aim of the larger study.

Twenty-three *heroes* – called Entrepreneur Fellows – chosen for the training program, owned existing entrepreneurial enterprises, or had aspirations for developing ventures mainly in the agricultural sector. The Fellows were provided with numerous opportunities for enhanced education and cross-cultural exchanges with U.S. citizens. More than 60 field experience providers from agricultural operations, educational entities, entrepreneurial ventures, government departments, and non-profit organizations voluntarily participated as mentors. Internships, job shadowing, and concurrent mentoring were considered essential parts of the Entrepreneur Fellows' professional development experiences while in the United States (Oklahoma State University Grant Proposal, 2013).

The conceptual framework supporting this study was human capital theory (HCT) from the viewpoint that "individuals and society derive economic benefits from investment in people" (Sweetland, 1996, p. 341). "Researcher[s] posited the derived economic as well as socio-cultural benefits from the investment of U.S. educational, monetary, social, and physical resources in their personal and professional development" (Taylor, 2017, pp. 57-58) was worthy of investigation.

The study was also supported by the theory of planned behavior (TPB) (Ajzen, 1991). According to the TPB, modifications to entrepreneurial behaviors caused as a result of U.S. experiences were reliant on intentions they had prior to their involvement and experiences occurring during the program. The researchers anticipated the Entrepreneur Fellows' attitudes would be informed by the skills and knowledge they perceived learning during the program, i.e., their future perceived behavior control (Ajzen, 1991) as well as the inspiration likely to impact their future agripreneurial endeavors (Kuckertz & Wagner, 2009).

Statement of the Problem

"Africa is at the crossroads. Persistent food shortages are now being compounded by new threats arising from climate change" (Juma, 2011, p. xiv). New opportunities that could facilitate transformation of African agriculture to be an economic force for growth, according to Juma (2011), are being guided by a fresh group of African leaders. These leaders, who in many cases are entrepreneurs, will need assistance. "National, regional, and local economic development agencies use entrepreneurial mentoring as one ingredient in a wide assortment of assistance programs to help entrepreneurs and small business owners. . . . [S]uch programs have been in operation since the early 1990s" (Bisk, 2002, p. 262), but more such endeavors are sorely needed.

Study Participants

The project that provided this study's data supported 23 Entrepreneur Fellows from each of three countries, including nine women and 14 men, visiting the United States during one of two Fellowship cycles (12 in cycle one; 11 in cycle two) and a total of 12 U.S. citizens visiting Kenya, South Africa, and Uganda (see Figure 1) over two cycles. In May of 2014, the first group of 12 Entrepreneur Fellows trained in Oklahoma for four weeks and a second group of 11 participated during October of 2014. Each of the Fellows' groups received a fifth week of professional development in Washington, DC. While in the U.S. capital, they interacted with 200-plus Fellows from more than 40 countries and territories and "worked together to address issues of mutual importance, develop[ed] new insights into professional approaches to common issues, and broadened their understanding of foreign working environments, practices[,] and society" (Harrison, Cecchini, Aabye, & Ettinger, 2014, p. 5). Twenty-two of the 23 Entrepreneur Fellows provided data for this study.

Figure 1. Kenya, South Africa, and Uganda, home countries of the Entrepreneur Fellows.

The eight women
and 14 men

participating in the study ranged in age from 26 to 47, with an average age of 34 years. The Fellows were primary owners/managers of 32 businesses and social ventures, with 10 businesses being directly involved with agricultural production activities. At the time of the study's interviews, six Fellows described providing direct assistance to agriculture producers; ten entrepreneurs specified holding agricultural education, management, and leadership positions with government or higher educational institutions. More than one organization and/or venture were identified as being led by 15 of the 22 Fellows while seven indicated involvement in one primary venture, e.g., agricultural media consulting, a career development organization for adolescents, and an upmarket coffee shop. The Fellows defined professional training and advanced educational studies as part of their personal goals. At the time of the fellowship program, one woman held an advanced degree in veterinary medicine. Two Fellows were working toward earning doctoral degrees, three Fellows reported having earned master's degrees, and eight indicated they were working on completion of such degrees. The 22 participants reported achieving a national diploma with a majority having received additional training and/or certifications supporting their professional development.

Purpose/Objectives

The purpose of this study was to describe the Entrepreneur Fellows' perceptions of the fellowship program's impact, especially its mentoring component, on their entrepreneurial endeavors after returning to their home communities in Sub-Saharan Africa. In addition, the unique entrepreneurial training and support needs of women and other marginalized groups comprising a portion of the Fellows' cohort were explored.

Methods/Procedures

Purposeful steps were taken to ensure the quality of this qualitative multicase study based on protocols identified by Stake (2006), Tracy (2010), and Saldaña (2013). The entire group or *quintain* (Stake, 2006) was made up of eight women and 14 men, primarily owners and executives of 32 enterprises and social ventures, participating in one of two fellowship cohorts during 2014. Face-to-face interviews with 15 Entrepreneur Fellows were completed in May of 2015. The other seven interviews were conducted in summer of 2015 using Skype and Google Hangout virtual conferencing tools. Each interview was transcribed verbatim by the lead researcher and provided to the Entrepreneur Fellows through electronic mail. The message accompanying the transcription contained a request for review of the interview transcript and reporting of any changes that should be made. This communication and an additional follow up electronic mail messages to non-respondents were sent reflecting Creswell's (2007) member checking procedure to ensure credibility and accuracy of the transcriptions.

Three main criteria guided the analysis and compilation of the data derived from the study's individual cases: how each case was relevant to the quintain; the diversity of the cases across the general context; and how each case provided an opportunity to learn about the contexts and complexities of the quintain (Stake, 2006). In concordance with Stake (2006), "the transcriptions and codes were triangulated and then a cross-case analysis was conducted by the researcher" (p. 39). Knowledge was mobilized from each case during cross-case analysis. This mobilization occurred first as case knowledge was acquired; second, when cases were compared and contrasted; and, finally, new knowledge was produced (Khan & VanWynsberghe, 2008) by the lead researcher's development and interpretation of meaning.

Coding was performed at open, axial, and selective levels (Strauss & Corbin, 1990). Responses provided during interviews of 22 Fellows, in addition to changes provided by nine, were subjected to initial word-for-word content analysis using conventional methods resulting in coding categories directly derived from interview text data (Hsieh & Shannon, 2005). Segmenting data into groups of information and comparing such for similarities was completed next, which reflected Creswell's (2007) open coding process. Constantly comparing the data during coding increased the likelihood of eliminating ambiguity and identifying meaning across codes (Creswell, 2007). More codes emerged as comparison of the data continued. Related memos and additional background information were also analyzed (Creswell, 2007).

Axial coding was expedited by NVIVO to compare existing codes using search methods for both terms and key phrases, which enabled recognition of the essence of the perceptions expressed by the study's quintain. Selective coding practices were used in the exploration of relationships between codes and primary categories identified along with the examination of missing relationships expected to emerge (Strauss & Corbin, 1990). This entire process culminated in the distillation of five predominant themes (Creswell, 2007), of which *mentoring* is featured in this paper.

NVIVO's capability to compare phrases identified through key phrase and term searches of various groupings of the data enabled axial coding. The analysis moved beyond words in transcriptions and background information to an explanatory and interpretive phase (Strauss & Corbin, 1990). To that end, selective coding involved the identification of central categories, review of relationships between categories, considering the identified relationships, and developing and refining the ultimate categories (Strauss & Corbin, 1990). Although codes were applied to the data, ultimately themes emerged with links to the conceptual and theoretical frameworks of HCT (Sweetland, 1996) and TPB (Ajzen, 1991) from the selective coding conducted during the cross-case analysis process (Stake, 2006).

Researcher Reflexivity

As a constructivist (Crotty, 1998), the lead researcher believes that different individuals construct meaning in different and specific ways, even regarding an identical phenomenon. In this study, the meaning of the Fellows' perspectives was co-constructed by the lead researcher and the 22 study participants through interactions and reflections on and interpretations from such discourses. Engagement and resulting interactions with the Fellows allowed for the exploration of unique ways to examine the phenomenon in light of the myriad voices and the perspectives they echoed.

Background and Work Experiences

The lead researcher kept a reflexive journal to record impressions and preferences that may have influenced the interpretation of the collected data. Most relevant to the study's activities, she acknowledges potential bias due to involvement with the development and delivery of many aspects of the grant-supported project that made the research study possible. Daily participation interacting with team members, invited experts, the Entrepreneur Fellows, and the Fellows' internship/job shadowing mentors also provided opportunities to attain and manifest bias. In addition, the lead researcher's program involvement included a two-week exchange in which she and five other Oklahoma State University collaborators traveled to South Africa and Uganda during May of 2015.

The lead researcher was educated to work with marginalized groups, including women and those with disabilities, as an undergraduate vocational home economics, pre-service educator at Oklahoma State University. For example, during teacher training, she studied, developed, and delivered a six-week unit with a 35-year-old Nigerian vocational home economics teacher to five teenage males with developmental disabilities living in a group home. Working with her Nigerian colleague was the lead researcher's first experience teaching with a Sub-Saharan African.

Throughout the lead researcher's professional career, women of all ages were provided with support, training, and leadership development in the secondary classroom, in animal agriculture industry positions as a state, regional, and national leader, and during youth and adult development positions with Cooperative Extension Service units in Colorado and in Oklahoma. She has agrarian values and inclinations instilled during a childhood spent living on a rural farm north of Denver, Colorado.

Mentoring Aspect of the Fellowship Program, Related Findings, and Interpretation

The findings of the larger study resulted from analysis of more than 235 pages of data revealed in interview transcriptions and related background material from the 22 Entrepreneur Fellows. Analysis of the interview data resulted in 15 significant categories. The categories aggregated into five themes including their mentoring relationships.

Mentoring Relationships Theme. Job shadowing and mentoring experiences were unique to
each Fellow. Outcomes of those experiences were generally described in three ways: impactful connections with a variety of U.S. contacts, ongoing relationships with at least one Oklahoma mentor, and entrepreneurial interactions among the Fellows (see Table 1).

Table 1

Examples of Significant Perspectives held by the Entrepreneur Fellows as related to the Study's Mentoring Relationships Theme

“In the U.S. people share information with each other. And currently I have a group of U.S. people who we get together and we are able to share information. . . . I can now get information from the Internet which I learned in my program and it is applicable in my work and I am able to share it with my workers to better the jobs they are doing.” (P19 Interview)
“I had different types of mentors showing me how to plant crops, how to grow, and how to harvest all those things. I took them back to my country and taught the women I am working with. . . . The mentors were even teaching me types of irrigation skills. Here in South Africa, in the area where I am, we used to use the bucket system. Where we were sprinkling and it takes so long. It discourages women from continuing planting and food gardening. But when I went there, I learned drip irrigation system to put in under the ground. It just sprinkles itself. And creating a pond so in a drought you can pull the water out. . . . Now we can compete with others. . . . I know that we are totally different from my coming there in the U.S. I came [home] being a different person and I implemented these things and they are working.” (P03 Interview)
“[The relationship with my mentor is] linking in terms of curriculum development and exchange programs.” (P22 Interview)
“[Name] helped me design an easier way of breaking down the curriculum to help people who did not go to school. . . . I apply my knowledge in my business and she[, my mentor,] continues to guide me.” (P15 Interview).
“[My mentor] put it plainly to me [that] they would like to visit Africa in two years and visit my farm. I set myself a goal to have a farm where I could host them in two years. But the bigger picture of that is that there is an opportunity in creating an activity or an experience where American business people or entrepreneurs or researchers can come and live on a farm in Africa and pick a different experience. Probably combine it with a safari and so on, agritourism if you like. But in that way, here we will be benefiting from some kind of knowledge transfer. . . . [J]ust having those folks around for a month and so forth would be of tremendous benefit and so forth [including c]oaching [and] knowledge transfer.” (P13 Interview)
“[Another Fellow] moved from Nyahururu to Nairobi and I moved from Nairobi to Nyahururu so we have been linking. . . . My mom has a small farm there. . . . I have told him when I set up my new agribusiness farm, I will let him market his fertilizer from that location. In this way, we can have an enterprise together. . . . That’s a way of connecting markets, you can both make a profit. Also, I would like to learn how he does [composting] so we will keep sharing new ideas and other information.” (P16 Interview)
“I did talk with [another Fellow] because it has been very funny that where our company is located near where he grew up and his mother lives. And where [another Fellow] works is where I come from. Where my father lives. It’s been quite an exchange.” (P17 Interview)
“I never quite got a specific mentor like [another Fellow] did. . . . But, I consider [Name of Team Member] a really strong mentor and yourself [, i.e., the lead researcher] and the rest of the team.” (P18 Interview)

Two broad purposes Kram (1988) identified for mentoring were facilitating a career-defining purpose for mentees as well as achieving the psychosocial purposes of role modeling, acceptance, counseling, and friendship. Members of the Oklahoma State University fellowship project team recruited more than 100 individuals to assist the Fellows at professional, technical, and/or personal levels as mentors for internships and job shadowing experiences.

An analysis of the Fellows' interview responses related to the relationships they had with their mentors identified eight who described ongoing associations as impactful on their entrepreneurial activities. In addition, 12 other Fellows indicated communicating with two Oklahoma State University project team members who assisted in select facets of their entrepreneurial ventures. Select members of the Oklahoma State University project team recruited internship and job shadowing mentors on a person-by-person basis to select the most appropriate mentors possible for the Fellows. A majority of mentor-mentee pairings were cross-cultural according to analysis of the Fellows' interview transcriptions and background information. Implications of Milner's, Ostmeier's, and Franke's (2013) study, *Critical Incidents in Cross-cultural Coaching: The View from German Coaches,* existed in regard to the cross-cultural nature of the relationships inherent in the fellowship's internship and job shadowing experiences. Milner et al. (2013) identified four critical areas to mentor-mentee relationships, including coach-client relationships, coaching settings, communication, and role understanding.

Overall, the Fellows confirmed Clutterbuck's and Megginson's (1999) assertion that mentoring enables one person to assist another in transitioning their knowledge, thinking, and work practices with long-ranging, important ramifications on a variety of levels, from individuals to communities to whole societies. The Fellows' responses reflected the gratitude they held for the efforts and resources spent to provide internship and job shadowing experiences during the fellowship. The Fellows spoke about how the relationships with their mentors had changed their perspectives and entrepreneurial practices. In addition, the Fellows offered their views about what they had expected would result from the internship and job shadowing experiences. Such was represented in one Fellow's comment: "The American people should not take for granted the fact that their money provided through the fellowship is making an impact in our countries. It may not be an immediate difference but it long-term will make an impact." (P01 Interview)

Conceptual framework. HCT has application in understanding the mentoring experiences of the Fellows through the economic benefits derived from investments they reported in regard to individual and community efforts. For example, descriptions of the efforts supervisors made to guide and mentor employees were reported as resulting in positive financial outcomes by the Entrepreneur Fellows due to adapting similar practices in their own enterprises. In addition, the human capital (Sweetland, 1996) resulting from involving more than 100 Oklahoma professionals in training and delivery of internship and job shadowing experiences provided a unique group of potential contacts for related and future entrepreneurship programs.

Theoretical framework. The intentions of a majority of the Entrepreneur Fellows to develop networks and/or collaborative relationships were evident in many of their goals, as identified prior to the fellowship program. Such reflected attitudes towards a behavior (Ajzen, 1991). Moreover, Ajzen (1991) indicated subjective norms as "perceived social pressure to perform or not to perform [a] behavior" (p. 188), which were described as important determinants of the Fellows' intentions. During interviews, the Fellows explained the impact of networks and colleagues influencing aspects of their entrepreneurial activities after returning to their home countries. Examples described by the Entrepreneur Fellows included: a Fellow's business partner was integral to the development and start-up of a pork processing, packaging, and delivery business; employees provided input as a result of trying a variety of marketing strategies to increase frozen yogurt sales for another Fellow; and a board of female community leaders advised a Fellow about the scope and direction of empowerment activities for rural girls, including agricultural enterprises.

The initiative the Entrepreneur Fellows described in regard to attempting to use the strategies and practices they experienced during the fellowship experience reflected another critical component of the TPB, i.e., *motivation to comply* (Ajzen, 1991). The principle was evident in the Fellows' descriptions of the relationships inherent in their entrepreneurial activities such as coordinating a poultry marketing group, hiring youth to work in a property management enterprise initiated after the fellowship, and marketing products globally to potential customers using Facebook. Expressions of increased *perceived behavioral control* (Ajzen, 1991) were revealed in the Fellows' statements about building relationships with their employees, worksite colleagues, and community members. Their willingness to practice what they viewed as successful U.S. relationships by business owners with organizational and entrepreneurial colleagues conveyed confidence and enablement to use the acquired knowledge and skills to follow through with their intentions to exploit entrepreneurial opportunities of benefit to themselves and others (Drucker, 1985).

Recommendations, Implications, and Discussion

In regard to mentoring relationships, this study's phenomenon, i.e., the fellowship experience, provided three unique learning opportunities for the Fellows: 1) an internship with one mentor; 2) combination experiences with more than one internship experience and compatible job shadowing activities; or 3) a series of job shadowing experiences. Investigations intended to gain perspectives on the experiences of both mentors and mentees depending on the type of encounter could provide recommendations for use in developing training curricula and facilitating field experiences for future fellowship programs.

Cross-cultural training of mentors and mentees prior to a fellowship was identified as potentially creating empathy that could reduce the apprehension leading up to an exchange and improve understanding from the beginning of couplings and thereby the resulting experiences (Pires, 2000). In addition, the variety of internship and job shadowing placements was influenced by unanticipated factors. These included biohazard incidents that eliminated potential internships from consideration for international visitors; disease epidemics causing Oklahoma producers to restrict access to their livestock operations to reduce the potential of additional transmission risk; and competitive global marketing of food products that restricted access to proprietary elements of manufacturing facilities.

The Fellows expressed mixed reactions to such restrictions that resulted in short-term job shadowing experiences being arranged rather than primarily internships with one mentor. For example, one Fellow who had multiple mentors indicated “the many experiences I had, the contacts I have made, the work I am now doing, the courses I am taking, they are having impacts in Uganda” (P01 Interview). In contrast, another Fellow commented: “I really did not have any one person[, i.e., a mentor] and that was a really big disappointment for me” (P18 Interview). A third Fellow reflected about his field experiences which were short-term, job shadowing placements:

> [G]rowing up under apartheid [in South Africa], it was a very nice experience to be treated as a person. And where your color played no role. To be accepted amongst people as a person with and being treated as a person not a second class citizen . . . was what I noticed and what I appreciated. (P07 Interview)

These unique perspectives on field experiences, as facilitated by mentors, conveyed the breadth of impacts described during the study’s interviews. A longitudinal study of the impacts of U.S. entrepreneurial internships and job shadowing experiences for international entrepreneurs could provide insight about intended and unintended consequences and outcomes resulting from participation in fellowship programs similar to the one investigated.

Mentoring relationships, internship and job shadowing settings, understanding of roles, and the type and substance of communication were four critical aspects of the program’s field experiences and representative of and congruent with critical indicators of compatibility in cross-cultural pairings (Milner et al., 2013). Additional inquiries to explore the perceptions of program participants and their mentors about shared internship and job shadowing experiences with regard to these four indicators could be instructive for the selection of participants for similar programs in the future. Table 2 lists recommendations for practice by agricultural and Extension educators responsible for recruitment of and arrangements with volunteer mentors in cross-cultural exchange programs, especially those involving aspects of entrepreneurship.

Table 2

Recommendations for Practice for Leaders of Exchange Programs Responsible for Recruitment of and Arrangements with Volunteer Entrepreneur Mentors

1. Recruiting and selecting volunteer mentors who value global relationships can aid in creating compatible mentoring experiences.

2. Focus mentor recruitment on identifying long-term opportunities that can give the richest experiences and meet goals of both mentees and mentors.

3. After the mentor and program participant selection has taken place, develop and deliver pre-program training for mentees and mentors to build common understanding, increase future rapport, and decrease the apprehensiveness of both groups.

4. Develop, maintain, and promote *new media* sites and related mobile telephone apps as a common reference center for scheduling of fellowship events, training agendas and materials, internship arrangements, emergency information, travel specifics, and institutional opportunities. Level of access could be managed for a breadth of audiences, i.e., Entrepreneur Fellows, mentors, family members, and/or content experts.

5. Develop and examine field experience plans with primary mentors prior to a fellowship to provide clear expectations, answer questions, and clarify arrangements and responsibilities.

6. After internships or job shadowing experiences are underway, conduct onsite visits early in the experience to follow up on activities, relationships, and to adjust plans and placements, as needed.

7. Conduct a celebration and/or a recognition ceremony to acknowledge all participants for their contributions to the Fellows' field experiences.

8. Promote internship/job shadowing activities as opportunities for local media contacts to conduct interviews, film interactions, and highlight outcomes.

9. Strategize possible alternative experiences in case unforeseen events occur hindering field placement plans, such as threats to biosecurity or proprietary rights issues.

The quintain indicated overall positive impressions of follow-up provided by Oklahoma State University team members during reciprocal exchange visitations to their respective countries and through the use of electronic mail and telephone communication. However, some Entrepreneur Fellows voiced interests in participating in additional long-term facilitation, including ongoing mentoring, after returning to their enterprises. These interests warrant leaders of similar entrepreneurial education programs to include grant application budget requests to address such needs by seeking supplemental funding to provide the Fellows' with mentoring that continues after the program's delivery funding is exhausted.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211. Retrieved from https://scholar.google.com/scholar?hl=en&q=icek+ajzen+&btnG=&as_sdt=1%2C37&as_sdtp=

Andenoro, A. C., Baker, M., Stedman, N. L. P., & Pennington Weeks, P. (2016). Research Priority 7: Addressing complex problems. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds), *American Association for Agricultural Education national research agenda: 2016-2020*. Gainesville, FL: Department of Agricultural Education and Communication. Retrieved from http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_2016-2020.pdf

Bisk, L. (2002). Formal entrepreneurial mentoring: The efficacy of third party managed programs. *Career Development International*, *7*(5), 262-263. Retrieved from http://dx.doi.org/10.1108/13620430210440082

Clutterbuck, D., & Megginson, D. (1999). *Mentoring executives and directors*. Oxford, United Kingdom: Butterworth Heinemann. Retrieved from https://books.google.com/books?hl=en&lr=&id=QizsZQDTr0MC&oi=fnd&pg=PR3&dq=Clutterbuck,+D.+1999+Mentoring+executives+and+directors&ots=LOpwWXbn62&sig=O7wXpiTMWzTEhJx3rp5tAH6NvAU#v=onepage&q&f=false

Collier, P. (2007). *The bottom billion: Why the poorest countries are failing and what can be done about it*. London, United Kingdom: Oxford University Press. Retrieved from https://paulbacon.files.wordpress.com/2010/10/bottom-billion1.pdf

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage. Retrieved from https://books.google.com/books?hl=en&lr=&id=DLbBDQAAQBAJ&oi=fnd&pg=PP1&dq=qualitative+inquiry+%26+research+design&ots=-go639EWWu&sig=pKASGAh6SO5iNdpd03_MnEFD7fE#v=onepage&q=qualitative%20inquiry%20%26%20research%20design&f=false

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process* (1st ed.). Thousand Oaks, CA: Sage Publications. Retrieved from https://books.google.com/books?hl=en&lr=&id=Op_SDKrf1ZQC&oi=fnd&pg=IA1&dq=Crotty,+M.+(1998).+The+foundations+of+social+research:+Meaning+and+perspective+in+the+research+process+(1st+ed.).+Thousand+Oaks,+CA:+Sage+Publications.&ots=RtDBYbp-w_&sig=NZDq1AMGv1-mhuwiwI-6bw2MYt4#v=onepage&q&f=false

Drucker, P. (1985). *Innovation and entrepreneurship*. New York, NY: Harper Business. doi:10.1002/hrm.3930240410

Harrison, P., Cecchini, E., Aabye, M., & Ettinger, L. (2014). *2014 fall professional fellows congress program book*. World Learning -- Washington, DC & Bureau of Educational and Cultural Affairs, U.S. Department of State. Retrieved from http://issuu.com/worldlearning/docs/Professional_fellows_congress_progr/0

Hsieh, H., & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research 15*(9), 1277-1288. doi:10.1177/1049732305276687

Juma, C. (2011). *The new harvest: Agricultural innovation in Africa*. New York, NY: Oxford Press. doi:10.1093/acprof.oso/9780190237233.001.0001

Khan, S., & VanWynsberghe, R. (2008, January). Cultivating the under-mined: Cross-case analysis as knowledge mobilization. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research, 9*(1). Retrieved from http://www.qualitative-research.net/index.php/fqs/article/viewArticle/334/729

Kram, K. E. (1988). *Mentoring at work: Developmental relationships in organizational life.* Lanham, MD: University Press of America. doi:10.1002/hrm.3930250410

Kuckertz, A., & Wagner, M. (2010). The influence of sustainability orientation on entrepreneurial intentions -- Investigating the role of business experience. *Journal of Business Venturing*, *25*(5), 524-539. Retrieved from http://www.dge.ubi.pt/msilva/papers_mece/paper_4.pdf

Milner, J., Ostmeier, E., & Franke, R. (2013). Critical incidents in cross-cultural coaching: The view from German coaches. *International Journal of Evidence Based Coaching and Mentoring, 11*(2), 19. Retrieved from http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1402&context=gsbpapers

Oklahoma State University Grant Proposal. (2013). *Empowering aspiring entrepreneurs for economic success: A professional fellowship for Kenya, South Africa, and Uganda.* Oklahoma State University: Author.

Pires, M. (2000). Study-abroad and cultural exchange programs to Africa: America's image of a continent. *African Issues*, *28*(1/2), 39-45. Retrieved from https://doi.org/10.1017/S1548450500006831

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). Thousand Oaks, CA: Sage. Retrieved from https://doi.org/10.1108/QROM-08-2016-1408

Stake, R. E. (2006). *Multiple case study analysis*. New York, NY: Guilford. Retrieved from https://books.google.com/books?id=rQWT5aDHiZYC&printsec=frontcover&dq=Multiple+Case+study+analysis+stake+2006&hl=en&sa=X&ved=0ahUKEwj-t9ipvN3YAhXLwVQKHUmWDf4Q6AEIKTAA#v=onepage&q=Multiple%20Case%20study%20analysis%20stake%202006&f=false

Strauss, A. L., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Newbury Park, CA: Sage Publications. Retrieved from file:///C:/Users/Downloads/BASIC+OF+QUALITATIVE+RESEARCH-Strauss&Corbin+1998.pdf

Sweetland, S. (1996). Human capital theory: Foundations of a field of inquiry. *Review of Educational Research, 66*(3), 341-359. Retrieved from http://www.jstor.org/stable/1170527

Taylor, L. K. (2017). *Entrepreneurial learning and mentoring: A multicase study of the experiences of African entrepreneurs in Oklahoma and impacts on their business ventures in Kenya, South Africa, and Uganda*. (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses Global. (10276798)

Thomas, A. S., & Mueller, S. L. (2000). A case for comparative entrepreneurship: Assessing the relevance of culture. *Journal of International Business Studies, 31*(2), 287–301. Retrieved from http://www.jstor.org/stable/155638

Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative Inquiry*, *16*(10), 837-851. Retrieved from https:\\journals.sagepub.com/doi/abs/10.1177/1077800410383121

United Nations. (n.d.). *Give young people decent jobs and they will create a better future-UN Chief* (Online press release). Author. Retrieved from http://www.un.org/sustainabledevelopment/blog/2015/06/give-young-people-decent-jobs-and-they-will-create-a-better-future-un-chief/

African Entrepreneurs' Perceptions on the Mentoring Aspects of a Cross-cultural, Professional Development Experience: Implications for Future Programs

Matt R. Raven
Discussant Remarks

This study was a pleasure to read and very informative. Moreover, it addresses an important topic that is global in nature. It is increasingly important for agriculture, food and natural resource education (AFNRE) to recognize that we need to have classroom that is global in nature and not restricted to a physical classroom, a state, or a country given the need for cooperation on a global scale if we are to address some of the wicked problems facing us today. The authors did a brilliant job introducing their research based on a number of reports from the United Nations, well know theories and connecting it back to the AAAE National Research Agenda, specifically Research Priority 7.

Two theoretical frameworks were used to guide this study and both were appropriate although Ajzen's Theory of Behavioral Change is often more associated with quantitative techniques, specifically Linear Structural Modeling. However, the main concepts behind TBC made sense in the case of this study.

This is a qualitative study that was meticulously described in terms of methodology so that even this quantitative researcher with enough experience in mixed methods to be dangerous was able to know exactly what was done in terms of establishing validity and reliability while taking into account any researcher bias. The population of the study appear to be highly educated. Was this a criterion for selection into the project? I would like to know more about how the subjects were selected and what the criteria was for that selection.

The results were presented in a clear, organized and structured manner with relevant quotes accenting the most relevant conclusions. Some of the findings were similar to some of the work we have done in Michigan where we found that relationships formed within the cohort are some of the most important relationships formed and maintained. Granted this was with American producers but it is interesting to see that was also significant finding within a global cohort. The quote regarding the investment of American dollars is especially telling given the current political environment in the United States.

Overall the authors did an excellent job with the results, the conclusions, relevant discussion and their recommendations. This paper was extremely well written, interesting and a clear example of the role that AFNRE can play in addressing the complex issues facing society on a global scale. Their recommendations for further research especially regarding the impacts on this side of the Atlantic and any unintended consequences was very insightful. The only criticism that I would put forward is the invention of the word "agripreneurial".

Student perceptions of workforce readiness in agriculture

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Abstract

The purpose of this study was to examine postsecondary agriculture students' perceptions of and their personal competence in various workforce readiness skills. In addition, we sought to determine students' views of the importance of workforce readiness skills. The findings indicate that the participants felt most confident in their abilities to work independently and without supervision, demonstrate loyalty, and act in a manner that displays responsibility and respect for others. They felt least confident in all areas of communication, but especially in written formats such as formal reports and documents. Rankings of skill importance revealed that participants believed maintaining harmony in the workplace and building positive relationships were considered to be most essential, with personal responsibility and communication close behind. Finally, an analysis of entry-level job announcements indicates that the skills most sought by employers include communication, teamwork, attitude, creativity, flexibility, and independence.

Introduction

If the United States is to continue feeding and clothing an ever-increasing population, it is essential that today's college students be properly prepared to fill the agricultural jobs of tomorrow (Goerker, Smith, Fernandez, Ali, & Goetz, 2015). Providing students with career-based content knowledge has long been a key part of this preparation, but recently employers have begun seeking graduates that exemplify higher-order "personal traits" and behavioral skills such as attitude, adaptability, and maturity (Bentley University, 2014, p. 6; Paranto & Kelkar, 2000). Unfortunately, a gap exists between the workforce readiness expectations of future employees and their employers. Few young people recognize the relationship of behavioral skills and workplace success, and many express overconfidence in their own behavioral skill competencies (Larson, 2014; Jaschick, 2015).

Through 2020, 58% of projected agricultural job openings are expected to be agricultural business, education, communication, management, or governmental positions (Goerker et al., 2015) that actively require behavioral, interpersonal, leadership, and decision-making skills. In order to succeed in these future agricultural careers, students must not only possess vocation-specific capabilities, but also master such abilities as critical thinking, leadership, teamwork, communication, creativity, and accountability (Casner-Lotto, Barrington, & Wright, 2006; Landrum, Hettich, & Wilner, 2010; Partnership for 21st Century Learning, 2015; Rateau, Kaufman, & Cletzer, 2015).

Regarding the agriculture industry, Dailey, Conroy, and Shelley-Tolbert (2001) explored how secondary agricultural education can be used as a context for teaching life skills such as “public speaking,” “communication,” “leadership,” and “responsibility and dedication” (p. 16) that have been “identified as crucial for the workforce” (p. 11). Robinson and Garton (2008) assessed the employability skills of graduates from the University of Missouri’s College of Agriculture and Natural Resources and identified that the ability “to solve problems, work independently, deal with stress, stay positive, and listen” were seen as key qualities to workplace success.

Purpose and Objectives

Studies show that graduates, at large, do not value these skills and even overestimate the level at which they competently display them (Bentley University, 2014; Casner-Lotto, Rosenblum, & Wright, 2009; Casner-Lotto et al., 2006; Coplin, 2004; Jaschik, 2015; NACE, 2016). Previous studies have examined this issue in other career fields, (Hickey, 2009; Hodge & Lear, 2011; Kaminski, Switzer, & Gloeckner, 2009; Kavanagh & Drennan, 2008; Landrum et al., 2010), but little has been done to examine the self-perceived behavioral skill competencies of agriculture students. If colleges are to adequately prepare students for their future careers in the agricultural industry, it is important to first understand how these students view their own levels of workplace readiness, and how such views relate to the expectations and needs of the modern workforce. Such a disparity in the definition of workforce readiness has made this issue an important priority in the American Association for Agricultural Education’s National Research Agenda (AAAE, 2016). This study intends to explore college agriculture student perceptions of workforce readiness skills and identify possible methods through which these skills might be taught. The following research objectives guided this study:

1. Identify agriculture students’ perceptions of their personal workforce readiness.
2. Identify agriculture students’ perceptions of the importance of workforce readiness skills.
3. Identify skills sought by employers in the American agricultural industry by examining entry-level position announcements
4. Identify methods through which students might learn and develop important workforce readiness skills

Theoretical Framework

This study is based upon the Human Capital Theory, which was largely developed by economist Gary Becker. Human capital has been defined as an investment in “the abilities and qualities of people that make them productive” (Gary Becker’s Concept, 2017). While there are many factors that can impact a person’s productivity, one’s knowledge is usually considered to be the most influential. Becker (1993) wrote that “education and training are the most important investments in human capital” (p. 17), and van Loo and Rocco (2004) stated that human capital was “an investment in skills and knowledge” (p. 99).

Human capital is divided into two varieties: specific and general. Specific human capital is “knowledge directly tied” to one’s workplace, and is thus non-transferrable from career to career (Gary Becker's Concept, 2017). As such, employers are usually willing to train employees in such knowledge as a means of improving employee productivity. However, general human capital is more nebulous, and can often be learned from and applied across many different locations, experiences, and industries. As such, many employers expect new hires to proactively exhibit human capital skills, regarding the teaching of such while on the job as a waste of time, effort, and resources.

The workforce readiness competencies studied in this research can all be considered general human capital, as they can be learned through many different channels and applied in myriad ways. By understanding how secondary and postsecondary educational opportunities can invest in human capital through the impartation of vital knowledge and skills, it is possible to create a workforce that is not only more valuable and desirable to employers (Paranto & Kelkar, 2000), but also better equipped to face the challenges that arise in everyday life.

In addition to the Human Capital Theory, the Employability Skills Framework developed by the United States Department of Education's Office of Career, Technical and Adult Education was also used to provide a theory base for this study. According to the framework, skills fall into 3 categories: applied knowledge, effective relationships, and workplace skills.

Applied knowledge is defined as "the thoughtful integration of academic knowledge and technical skills, put to practical use in the workplace" (U.S. Department of Education, 2017). This category involves students using reading, writing, mathematical, and scientific principles to understand the world around them and become productive employees and members of society. It also includes the use of critical thinking and decision-making skills in organizational, analytical, and problem-solving activities.

Effective relationships involve using "a combination of interpersonal skills and personal qualities" to build positive and collaborative understanding between employees, employers, and customers (U.S. Department of Education, 2017). Interpersonal skills focus on concepts such as communication, teamwork, attitude, and motivation, and personal qualities include professionalism, responsibility, flexibility, and integrity. Knowledge of the needs and emotions of oneself and others, as well as an understanding of cultural differences fall into this category.

Workplace skills "are the abilities employees need to successfully accomplish work tasks" (U.S. Department of Education, 2017). This category covers a wide range of competencies including management of time and resources, communication across many formats, and in recognizing and understanding how systems function and operate. This category also includes the implementation and application of emerging techniques and technologies.

Methodology

Participants in this study (N = 59) were members of two undergraduate agriculture classes in the School of Human Sciences at Mississippi State University. Both classes focus on teaching students behavioral and communication skills they will need in their professional careers.
All participants were offered five extra credit points in their class for completing the survey.

This study utilized a survey instrument originally developed by Landrum et al. (2010) to examine workforce readiness perceptions of Boise State University psychology graduates. Two experts in the field of agriculture education examined the instrument for relevancy to the agriculture industry, and ultimately recommended that, as the items were applicable to many career areas, no changes be made regarding item content. However, references to participant competency levels at the time of or after graduation were removed, as this study examined current university students instead of graduates. Reliability coeffients were not calculated for the instrument, as its intent was "not to create a scale where individuals receive scores that predict future preparedness or competence," but to understand "multiple individual ideas and emotional qualities rather than broad concepts and factor analyzed outcomes" (R.E. Landrum, personal communication, April 10, 2018).

Section I of the instrument provided respondents with 54 skills related to workforce readiness. Sample items included "work well with others," "identify, prioritize, and solve problems," "present information verbally to others," and "possess the ability to work without supervision." Participants were asked to rate their current perceived levels of competence regarding each item along a 3-point scale, with 1 = low and 3 = high.

Section II of the survey asked participants to look back at the items in Section I and list which skills most important to success in the workplace from 1 = most important and 10 = least important. From this, two lists of students' most important behavioral skills were derived. In addition, participants were asked to provide possible activities (either academic or non-academic) that might help a typical undergraduate student develop each of their top 10 behavioral skills.

Section III of the survey collected demographic information from participants such as age, gender, ethnicity, major, and planned post-graduation career field. IRB approval was obtained prior to data collection. Students were asked to sign a consent form before the questionnaires were distributed. Class time was provided for participants to complete the instrument. Data were analyzed using descriptive statistics including means, standard deviations, and frequencies.

In addition to the survey instrucment, 50 job announcements from all across the United States were reviewed to formulate a list of behavioral skills sought by employers in the agriculture industry. Job announcements were collected from AgCareers.com, AgHires.com, and the National FFA Organization's Employment Skills Leadership Development Event. All announcements were examined by the researchers and selected for their relevance to the agriculture industry and their appropriateness for recent university graduates.

Results

Student participants (*N* = 59) ranged in age from 20 to 50 years old (*M* = 22.10, *SD* = 3.89), with 42 men (71.2%) and 16 women (27.1%). One respondent chose not to identify their gender. The majority of respondents were White (93.2%). Ninety-four percent of students (*n* = 55) were pursing an agriculture-related degree at the time of the survey, and 84% (*n* = 50) indicated that they would enter an agriculture-related career upon graduation.

Section I of the survey asked students to rate their perceived levels of competence regarding 54 behavioral skills deemed as useful in the workplace. Respondents rated each item using a scale of 1 = low and 3 = high. Table 1 is sorted in descending order based upon students' perceptions of their competence in each area.

Table 1

*Means and Standard Deviations of Workforce Readiness Items (*N *= 59)*

	Student Level of Competence		
Workforce Readiness Items	*n*	*M*	*SD*
Work without supervision	59	1.89	.35
Demonstrate loyalty to the organization and its goals	59	1.83	.37
Work independently	59	1.81	.39
Act responsibly and conscientiously	59	1.79	.44
Appreciate the importance and value of humor at work	59	1.79	.40
Teach and learn from others on the job	59	1.79	.44
Appreciate the need for organization, supervision, policies, and procedures	59	1.77	.49
Possess self-discipline, including punctual attendance and dependability	59	1.76	.46
Take steps to achieve career goals	59	1.74	.43
Handle conflict maturely	59	1.72	.44
Show respect for the opinions, customs, and individual differences of others	59	1.69	.50
Possess the ability to work under supervision	59	1.69	.46
Assist in continuous improvement	59	1.64	.48
Demonstrate pride in accomplishment	59	1.62	.52
Possess a positive attitude towards work	59	1.62	.52
Identify, prioritize, and solve problems	59	1.61	.49
Demonstrate initiative, motivation, and perseverance	59	1.59	.52
Work well with others	59	1.59	.49
Meet the needs of others, such as clients or customers	59	1.57	.56
Manage several tasks at once	59	1.52	.59
Monitor progress towards goals	59	1.52	1.16
Participate in reaching group decisions	59	1.50	.53
Understand how the work flows through the system	59	1.49	.56
Receive and use both positive and negative feedback	59	1.49	.56
Respond appropriately to constructive criticism	59	1.49	.53
Consider and evaluate alternative solutions	59	1.47	.56
Set priorities and allocate time efficiently in order to meet deadlines	59	1.47	.59
Provide leadership and followership as appropriate	59	1.45	.53
Contribute ideas and answers to solve problems	59	1.45	.53
Determine the costs, time, or resources necessary for a task	59	1.45	.56
Gather information effectively	59	1.45	.59
Make defensible/appropriate decisions	59	1.45	.56
Function effectively in stressful situations	59	1.44	.53
Motivate oneself to function at optimal levels of performance	59	1.44	.56
Demonstrate self-motivated learning	59	1.42	.64
Give direction and guidance to others	59	1.38	.61
Apply knowledge from formal educational experiences	59	1.37	.58

Table 1 (*continued)*

	Student Level of Competence		
Workforce Readiness Items	*n*	*M*	*SD*

Apply thinking/problem-solving skills to technology situations	59	1.37	.61
Evaluate own interests, strengths, and weaknesses	59	1.35	.63
Understand simple probability and statistics	59	1.33	.60
Interpret charts, tables, and graphs	59	1.33	.60
Organize information in a logical and coherent manner	59	1.33	.63
Demonstrate highly-developed social skills	59	1.32	.70
Regulate your emotions effectively	59	1.25	.63
Identify and resolve sources of conflict between oneself and others, or among other people	59	1.23	.59
Adapt to change	59	1.23	.62
Recognize the political and ethical implications of decisions	59	1.23	.56
Accurately monitor others' emotional states	59	1.23	.77
Present information verbally to others	59	1.20	.60
Participate effectively in discussions	59	1.18	.62
Apply the rules of correct spelling, punctuation, and capitalization	59	1.15	.69
Apply information to new or broader contexts	59	1.03	.55
Write formal reports and business correspondence	59	.83	.62

Note. Based on a 3-point rating scale with 1 = low and 3 = high.

Results indicate respondents felt the most competent about their ability to maintain harmony at work by modulating personal behaviors and actions. This is best demonstrated through the higher ratings received for skills such as "work without supervision" (*M = 1.89, SD = .35*), "work independently" (*M = 1.81, SD = .39*), "act responsibly and conscientiously" (*M = 1.79, SD = .44*), and "possess self-discipline, including punctual attendance and dependability" (*M =1.76, SD = .46*).

Respondents provided varying ratings for critical thinking-related skills. Students felt the most competent in their problem-solving abilities, as illustrated by the higher ratings for the items "identify, prioritize, and solve problems" (*M = 1.61, SD = .49*), "consider and evaluate alternative solutions" (*M = 1.47, SD = .56*), "contribute ideas and answers to solve problems" (*M = 1.45, SD = .33*), "determine the time, cost, or resources necessary for a task" (*M = 1.45, SD = .56*), and "make defensible/appropriate decisions" (*M = 1.45, SD = .56*). In contrast, ratings revealed that respondents' felt less confident in their abilities to use extant knowledge to address new or unfamiliar situations and recognize possible outcomes. "Apply knowledge from formal educational experiences" (*M = 1.37, SD* = .58), "adapt to change" (*M = 1.23, SD = .62*), "recognize the political and ethical implications of decisions" (*M =, SD=*), and "apply information to new and broader contexts" (*M = 1.03, SD = .55*) were all ranked demonstrably lower.

Overall, respondents did not feel particularly competent in emotion-related skills. They did indicate higher levels of competence for the skills "demonstrate pride in accomplishment" (*M = 1.62, SD = .52*), "possess a positive attitude towards work" (*M = 1.62, SD = .52*), and "work well with others" (*M = 1.59, SD = .49*), but lower levels for those that involved understanding, evaluating, and motivating oneself as well as controlling one's own emotions. Interestingly, respondents did not feel as competent in their abilities to "accurately monitor others' emotional states" (*M = 1.23, SD = .77*).

Respondents indicated noticeably lower levels of competence regarding both written and oral communications skills such as “present information verbally to others” (*M = 1.20, SD = .60*), “participate effectively in discussions” (*M = 1.18, SD = .62*), “apply the rules of correct spelling, punctuation, and capitalization” (*M = 1.15, SD = .69*), and “write formal reports and business correspondence” (*M = .83, SD = .62*). However, they did feel more confident when communicating through mathematical concepts such as statistics, charts, and graphs.

Section II of the survey asked students to select and rank the top 10 behavioral skills they viewed as most integral to success. From this, two top 10 lists were created. Table 2 examined the top 10 skills by frequency, which actually amounted to 16 skills when ties between items were taken into account. Table 3 utilized student rankings to eliminate ties and develop an overall list of top 10 necessary career skills.

Table 2

*Top 10 workforce-readiness skills identified by undergraduate students (*N *= 59)*

Rank	Item (Question #)	*f*	%
1	Work well with others (Q1)	39	66.0
2	Adapt to change (Q37)	30	50.8
3	Work independently (Q10)*	24	40.6
3	Teach and learn from others on the job (Q52)*	24	40.6
4	Manage several tasks at once (Q5)	23	38.9
5	Handle conflict maturely (Q28)*	21	35.5
5	Possess a positive attitude towards work (Q30)*	21	35.5
6	Demonstrate highly developed social skills (Q21)	19	32.2
7	Function effectively in stressful situations (Q8)	18	30.5
8	Possess self-discipline, including punctual attendance and dependability (Q31)*	16	27.1
8	Possess the ability to work without supervision (Q32)*	16	27.1
9	Show respect for the opinions, customs, and individual differences of others* (Q26)	13	22.0
9	Apply knowledge from formal educational experiences (Q4)*	13	22.0
10	Identify, prioritize, and solve problems (Q12)*	12	20.3
10	Receive and use both positive and negative feedback (Q47)*	12	20.3
10	Present information verbally to others (Q2)*	12	20.3

Note. Items with the same frequency value are denoted with an *.

Table 3

*Top 10 workforce readiness skills identified by undergraduate students according to student rankings (*N *= 59)*

Rank	Item (Question #)	*f*	%
1	Work well with others (Q1)	39	66.0
2	Adapt to change (Q37)	30	50.8
3	Work independently (Q10)	24	40.6
4	Teach and learn from others on the job (Q52)	24	40.6
5	Manage several tasks at once (Q5)	23	38.9
6	Possess a positive attitude towards work (Q30)	21	35.5
7	Handle conflict maturely (Q28)	21	35.5
8	Demonstrate highly developed social skills (Q21)	19	32.2
9	Function effectively in stressful situations (Q8)	18	30.5
10	Possess self-discipline, including punctual attendance and dependability (Q31)	16	27.1

These lists indicate that respondents had a distinct preference for maintaining independence, dignity, and harmony at work despite challenges. "Work well with others" was the most commonly listed item across all top 10 lists, and it was also the item that received the most #1 rankings. Related items such as "teach and learn from others on the job," "possess a positive attitude towards work," and "demonstrate highly developed social skills," demonstrate the value that respondents placed upon building positive relationships with their co-workers and customers.

The unranked list also includes "show respect for the opinions, customs, and individual differences of others," a social skill that did not earn enough high rankings to find a place in the final top 10. The high rankings given to "adapt to change," "manage several tasks at once," "handle conflict maturely," and "function effectively in stressful situations," shows that respondents recognize the necessity of continuing to grow both personally and professionally in the face of obstacles.

Openings being advertised included 8 positions in agriculture education and extension (16%); 7 in veterinary or animal science (14%); and six each 6 in livestock management (12%); agricultural sales, business, and economics (12%); and horticulture, plant science, and natural resources (12%). Five positions were in the field of agricultural communications (10%), 4 were in mechanics, 3 each were in transportation (6%) and food science (6%), and 2 positions were in government or agricultural policy and law (4%). Sample jobs selected included veterinary assistant, cattle ranch manager, florist, biotechnologist, welder, salesperson, FFA camp manager, aquaculturist, social media director, engine mechanic, Congressional lobbyist, and agriculture economist.

Communication skills were the most in demand, with verbal skills being referenced on 33 job opening announcements (66%) and written skills on 21 (42%). One posting specifically sought employees that possessed "effective communication skills, both oral and written," that could "handle controversial issues with tact and a professional manner." Others stressed "excellent communications and math skills," "the ability to read and follow written and oral instructions," "the ability to read and write very well," and being able to "communicate with co-workers and the public." Skills such as teamwork, cooperation, and attitude were also highly sought after, being listed on 23 (46%) of announcements. In this case, employers wanted people who were "friendly and outgoing," "thoughtful and passionate about [their] work," and able to "work cooperatively with others and follow directions." Other important skills identified in job postings included time management and organization (n = 15, 30%), flexibility and adaptability (n = 11, 22%), working independently and/or without supervision (n = 10, 20%), meeting customer needs (n = 9, 18%), problem and conflict management (n = 8, 16%), learning on the job (*n* = 4, 8%), and personal integrity and responsibility (n = 4, 8%). Job postings sought candidates who could "organize large amounts of information," demonstrate "creativity and flexibility," "work independently as well as be a team player," "learn, implement, and teach new protocols," and be "punctual for every shift, courteous to every guest, and diligent in their duties."

Finally, participants were asked to list ways in which college students like themselves might be able to learn or develop each of their top 10 skills. Many indicated that the regular events of college life could be easily used as a training ground for workforce readiness skills. Table 4 shows some of the most common responses received for each item on the final, ranked top 10 list.

Table 4

Student Suggestions for Development of Workforce Readiness Skills

Workforce Readiness Skill	Student Suggestions
1. Work well with others	Group projects Clubs/student organizations Social events Intramural sports
2. Adapt to change	Change in the classroom (due dates, new projects, different teaching styles etc.) Working with new technology Trying new things Learning on the job
3. Work independently	Individual class assignments Homework Tests
4. Teach and learn from others on the job	Mentor others/receive mentoring Allow students to teach Group projects Tutor others/receive tutoring Work part-time while in school

Table 4 *(continued)*

Workforce Readiness Skill	Student Suggestions
5. Manage several tasks at once	Take several classes in one semester Managing due dates Work part time while in school
6. Possess a positive attitude towards work	Positive classroom atmospheres Offer incentives for students to work hard Group projects Keeping a positive attitude in life
7. Handle conflict maturely	Conflict during group projects Debate and discussion activities Problem-solving activities/workshops Disagreements with professors or classmates
8. Demonstrate highly developed social skills	Structured social events Activities requiring communication and collaboration Public speaking activities School promotion activities (tour guide, etc.)
9. Function effectively in stressful situations	Class deadlines and due dates Timed tests/assignments Managing school, work, and life Exposure to new or uncomfortable situations
10. Possess self-discipline, including punctual attendance and reliability	Required attendance to class Rewarding students for continued punctuality/attendance Managing school, work, and life

Conclusions

Results were mostly concurrent with previous studies exploring student and employer perceptions of workforce readiness skills. The importance of key traits such as the ability to solve problems and work independently, function on a team, communicate with others, think critically, and relate with clients and co-workers have been stressed numerous times across varying career fields (Billing, 2003; Landrum & Harrold, 2003; Landrum et al., 2010; Robinson & Garton, 2008; Schmidt, 1999). This indicates that participants had at least some understanding of the competencies that are required in the modern workplace.

It is interesting to note the differing levels of importance that employers and respondents placed upon communication skills. These skills were the most frequently requested by employers and appeared in well over half of the analyzed job announcements, but they were viewed as less important by respondents. “Demonstrate highly developed social skills,” “receive and use both positive and negative feedback,” and “present information verbally to others” all made the first, unranked top 10 list, but they placed relatively low, with the first being #6 and the latter two tying for #10. Of these skills, only "demonstrate highly developed social skills" made the final, ranked top 10 list, receiving the #8 place.

Verbal communications skills also provided the greatest example of a disparity between participant perceptions of skill importance and competence. Even though participants believed that the communication-related items "demonstrate highly developed social skills," "receive and use both positive and negative feedback," and "present information verbally to others," were some of the most important workforce readiness skills to possess in Section II of the questionnaire, these same items all received consistently lower competence ratings in Section I. In other words, survey participants saw value in speaking effectively to others, but they saw themselves as unable to do it well.

No written communication skills made either top 10 list, which indicates that universities may not be doing enough to stress the value of functional, work-related communication such as formal reports, letters, emails, and memos. Written communication items also received extremely low competence ratings overall, with the ability to "write formal reports and business correspondence" receiving the lowest competence ranking of all.

When considering competency areas other than communications, students and employers were able to find more common ground. Just under half of the job announcements used in this study sought applicants who could demonstrate such behaviors as friendliness, cooperation, passion, and teamwork while on the job. Not only did students report high levels of competence regarding these attributes, they also included them frequently on their top 10 lists of most important workforce readiness skills.

Employers also sought applicants who were organized, flexible, independent, and capable of learning on the job. Students rated themselves as particularly able to work independently and/or without supervision, and ranked it quite highly in importance as well. Students also indicated they felt highly competent in their ability to teach and learn from others in the workplace, a construct that was also ranked highly on many top 10 lists. Finally, while students reported slightly lower competence levels in the areas of organization, flexibility, and response to stressful or changing situations, they still recognized the value of such skills by including them as some of the most important. Indeed, the final top 10 list generated from all responses is largely made up of these core competencies, which indicates that on many counts both students and employers recognize the same attributes as being vital to workplace success.

Recommendations

It is recommended that agriculture educators of all levels assess their students' perceptions of career readiness in some manner. This information can help educators better design their agricultural education programs and courses with career-based outcomes in mind. It can also assist educators in recognizing what skills students possess or lack, and ways in which weaker skills might be strengthened. Participants in the study frequently mentioned group work, presentations, in-class debates, and public speaking as common methods through which behavioral skills are practiced. However, educators can expand upon these ideas by creating lessons and activities that require students to think in an industry-based setting. For example, if writing is a weakness (as it was in this study), a teacher might identify examples of writing or correspondence that are actually used in a particular agricultural industry and have students practice constructing and editing such documents. Educators should also create lessons that require students to think critically while gathering evidence, constructing arguments, making decisions, and solving problems in an industry-specific context. A possible activity might include asking students to perform their own research about industry needs and writing recommendations for students like themselves. Of course, classroom activities need not be limited to behavioral skills; rather they should be expanded to include specific capital skills that are tailored to students' career goals and local industries' needs if possible.

Educators and students are also recommended to develop positive relationships with local industry employees and employers. Educators can use personal relationships to gain insight into current industry trends and demands, and provide students with firsthand accounts of working life via guest lectures, field trips, or interviews. Students who build relationships with industry personnel can benefit from the internships, job openings, recommendations, and other learning opportunities that are offered to those with industry connections.

It is also recommended that agricultural educators help their students to recognize ways in which behavioral skills can be developed or exercised in everyday life. Study participants recommended joining clubs or sports teams, building relationships with classmates, and mentoring or tutoring others as ways to accomplish these goals. Participating in community-engaged learning activities, club competitions, and Supervised Agricultural Experience (SAE) programs are also other possibilities, as is taking on a leadership role in any of these opportunities.

Further research in this area is also recommended so that more specific career needs can be identified. American agriculture is a very broad industry, and it is possible that certain sectors may require or prefer some workforce readiness skills above others. Further research could also be performed to discover the workforce readiness competencies of students in other areas of the United States. This study investigated students from a Southern state, and Robinson and Garton examined students from the Midwest/South. It is possible that students (or employers) from different areas of the country may view or value the examined competencies in a different manner. Finally, it is recommended that this study be repeated with a larger sample of students from agricultural degree programs.

References

American Association for Agricultural Education, (2016). *National Research Agenda*. Retrieved
From
http://aaaeonline.org/resources/Documents/AAAE_National_Research_Agenda_
2016-2020.pdf

Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference*
to education (3rd ed.). Chicago: The University of Chicago Press.

Bentley University (2014). The preparedu project an in-depth look at Millennial preparedness
for today's workforce. Retrieved from https://www.bentley.edu/files/prepared/
1.29.2013_BentleyU_Whitepaper_Shareable.pdf

Billing, D. (2003). Generic cognitive abilities in higher education: An international analysis of
skills sought by stakeholders. *Compare*, *33*(3), 335-350.

Casner-Lotto, J., Barrington, L., & Wright, M. (2006). *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century US workforce*. New York, NY: The Conference Board, Inc.

Casner-Lotto, J., Rosenblum, E., & Wright, M. (2009). *The ill-prepared U.S. workforce: Exploring the challenges of employer-provided workplace training.* New York, NY: The Conference Board, Inc.

Coplin, B. (2004, September 3). Lost in the life of the mind. *The Chronicle of Higher Education*.
Retrieved from http://chronicle.com/weekly/v51/i02/02b00501.htm

Dailey, A. L., Conroy, C.A., and Shelly-Tolbert, C.A. (2001). Using agricultural education as the
context to teach life skills. *Journal of Agricultural Education, 42*(1).

Gary Becker's Concept of Human Capital. (2017). *The Economist.* Retrieved from: https://www.economist.com/news/economics-brief/21725757-becker-made-people-central-focus-economics-second-our-series-big

Goerker, A. D., Smith, E., Fernandez, J.M., Ali, R., & Goetz, R. (2015). *Employment opportunities for college graduates in food, agriculture, renewable natural resources, and the environment*. Retrieved from https://www.purdue.edu/usda/employment/

Hickey, M. T. (2009). Preceptor perceptions of new graduate nurse readiness for practice.

Journal for Nurses in Staff Development, *25*(1), 35-41. doi: 10.1097/NND.0b013e318194b5bb

Hodge, K. A. & Lear, J.L. (2011). Employment skills for the 21st century workplace: The gap
between faculty and student perceptions. *Journal of Career and Technical Education*, *26*(2), 28-31. Retrieved from https://ejournals.lib.vt.edu/JCTE/article/view/523/722

Jaschik, S. (2015, January 20). Well prepared in their own eyes. *Inside Higher Ed.* Retrieved
from https://www.insidehighered.com/news/2015/01/20/study-finds-big-gaps-between-student-and-employer-perceptions

Kaminski, K., Switzer, J., & Gloeckner, G. (2009). Workforce readiness: A study of university
students' fluency with information technology. *Computers & Education*, *53*(2), 228-233. Retrieved from http://www.sciencedirect.com/science/article/pii/S0360131509000396?via%3Dihub

Kavanagh, M. H., & Drennan, L. (2008). What skills and attributes does an accounting graduate
need? Evidence from student perceptions and employer expectations. *Accounting & Finance*, *48*(2), 279-300.

Landrum, R. E., & Harrold, R. (2003). What employers want from psychology graduates. *Teaching of Psychology, 30*(2), 131-133. http://dx.doi.org/10.1207/S15328023TOP3002_11

Landrum, R. E., Hettich, P. I., & Wilner, A. (2010). Alumni perceptions of workforce readiness.
Teaching of Psychology, *37*, 97-106. doi: 10.J080/00986281003626912

National Association of Colleges and Employers (2016, September 28). *Class of 2016 believes it*
is "career ready," but is it?. Retrieved from http://www.naceweb.org/career-readiness/student-attitudes/class-of-2016-believes-it-is-career-ready-but-is-it/

Paranto, S. R. & Kelkar, M. (2000). Employer satisfaction with job skill of business college
graduates and its impact on hiring behavior. *Journal of Marketing for Higher Education*, *9*(3), 73-89. doi: 10.1300/J050v09n03_06

Partnership for 21st Century Learning. (2015). *P21 framework definitions*. Retrieved from http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf

Rateau, R. J., Kaufman, E. K., & Cletzer, D. A. (2015). Innovative classroom strategies that
prepare college graduates for workplace success. *Journal of Agricultural Education*, *56* (3), 52-68. doi: 10.5032/jae.2015.03052

Robinson, J. S., & Garton, B. L. (2008). An assessment of the employability skills needed by
graduates in the college of agriculture, food, and natural resources at the University of Missouri. *Journal of Agricultural Education, 49*(4).

Schmidt, S. J. (1999). Using writing to develop critical thinking skills. *North American Colleges
and Teachers of Agriculture Journal*, *43*(4), 31-38.

van Loo, J. B. & Rocco, T.S. (2004). *Continuing professional education and human capital
theory*. Paper presented at the Academy of Human Resource Development International Conference (AHRD), 98-105.

Student Perceptions of Workforce Readiness in Agriculture

Matt R. Raven
Discussant Remarks

This research is very timely given the growing number of jobs going unfilled. The authors did a very good job of introducing the topic and establishing the need for the study. As the authors described there are numerous studies out there indicating what employers are looking for and but not many in terms of what students think they have. The purpose and the objectives were clear. This discussant especially appreciated Research Objectives 3 and 4 as they bring a different lens to this area of research.

The review of literature was complete and the use of Human Capital Theory as the theoretical framework was appropriate. The methods used in this study could be improved. Even though the researchers were not interested in internal consistency and consequently did not report a Cronbach's alpha they still reported on each item individually. Therefore, they should have conducted a test-retest to establish the reliability and stability of each item. A pilot should have also been conducted not only to establish the reliability and stability of the items but to also establish face and content validity.

The results were reported in a clear fashion. However, the data were ordinal in nature and the first table reported means and standard deviations. This data should have been reported with frequencies as were the other table given the ordinal level of the data. Nevertheless, the results were interesting in what the students thought they were good at performing and what they did not they were proficient. It was very interesting that they thought they were competent at working without supervision but did not think they were competent in professional correspondence. I happen to teach one of these classes at one time and one of the focuses of the class is exactly that – business correspondence. When was this instrument given, at the beginning of the end of the semester as that would impact the respondents' answer on that item.
Should have done a test-retest for reliability and stability also a pilot for face and content validity

The analysis of the job postings added to this paper and showed that what employers were seeking was opposite to what students thought they were competent in a number of areas such as written and verbal communications. The results of Objective 4 were also interesting and students were very perceptive in that many of these competencies could be acquired outside of their formal education. The question that arises is how do colleges of agriculture ensure that all students partake in a sufficient number of external activities to make sure that they become proficient. Then how do colleges of agriculture assess if they have indeed become proficient. A perusal of the list of Workforce Readiness Items one would be hard pressed to find many of them listed in most university course syllabi.

Overall this study, even though it has some methodological weaknesses, provides a wealth of information. Of special interest to this discussant was the students' suggestions of how to acquire the readiness items. The authors are to be commended on this important research and adding to our knowledge of workforce readiness.

Assessing the Perceived Preparedness and Importance of Discipline Specific Items of Agriculture Teachers in Pennsylvania

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Abstract

Post-secondary education in agriculture has a responsibility to prepare graduates that possess the skills and knowledge for their position, but also have the confidence in their own capacity for success. The Agricultural and Extension Education program at the Pennsylvania State University surveyed graduates from the previous five years of their teacher preparation program. This was done to determine their perceptions of importance and their perceptions of their preparedness on discipline specific items, including pedagogical knowledge, managing work-based learning, managing a career and technical student organization, and technical agricultural content expertise. For the purpose of this study, a census was conducted with a frame of 78 Agricultural and Extension Education graduates with a response rate of 74%. Mean Weighted Discrepancy Scores to indicate the difference in graduates' perceived preparation and importance on items were calculated and analyzed. Findings indicate opportunity for improvement in areas of Classroom Environment, Assessment, and Support Diverse Learners. The findings may be useful to teacher educators as well as teacher preparation programs within the U.S.

Introduction

Preparing effective agriculture teachers has direct impact on the learning and success of students and their agricultural programs (Roberts, Dooley, Harlin, & Murphrey, 2007). What the teacher knows and can do in the classroom is the most powerful factor in increasing a student's achievement (Cunningham & Allington, 2003; Darling-Hammond, 2000; Jackson, 2009; Marzano, 2007). Effective teaching has been broadly understood as teaching that is oriented to and focused on students and their learning. Bransford et al. (2005) outlined a framework for organizing and understanding teaching and learning, that suggested that to be an effective teacher one must have a solid base and expertise in three broad areas. Effective teachers must have a knowledge of their students' development as learners, a sound understanding of the subject being taught, and finally a knowledge of teaching (2005). To meet the new and more rigorous college- and career-ready standards for student learning, all of today's students must have access to effective teaching. As teachers and school leaders are increasingly held accountable for implementing consistently effective teaching, demands to hold the programs that prepare teachers accountable have increased. Strong teacher preparation programs lead to better learning for students (Darling-Hammond, 1999). Post-secondary education in agriculture not only has a distinct responsibility to prepare graduates to possess the skills and knowledge for their position, but also have the confidence in their own capacity for success.

Teaching agriculture involves skill and mastery in agriculture content, pedagogical processes, leadership, financial literacy, and program planning competencies associated with managing the total program of agricultural education. Previous researchers have investigated various constructs related to pre-service and in-service needs of agriculture teachers. Dobbins and Camp (2000) indicated a needed understanding in curriculum development, learning styles, technical areas, teaching methods, teaching techniques, and academic integration methods. Edwards and Briers (1999) evaluated the competencies of facilitating student learning in classroom and laboratory settings, leadership and personal growth, student agricultural experiences, in teacher competencies related to student services, program management, personal roles and relationships, and planning and managing educational tools. The research revealed the competency areas ranked highest in need for in-service education were: "Facilitating Change in Curriculum and Technologies," "Facilitating Balance in Personal and Professional Roles," "Facilitating Positive Public Image," "Facilitating Student Leadership and Personal Growth," "Facilitating Student Learning in Classroom and Laboratory Settings," "Facilitating Student Agricultural Experiences," "Facilitating Student Career Success," "Facilitating Personal Professional Improvement," and "Planning and Managing Learning Environments." Joerger's (2002) categories of professional teaching competencies needed for success and survival were classroom management, leadership and SAE development, technical agriculture, and program design and maintenance. Layfield and Dobbins (2002) sought to determine the in-service needs of both beginning and experienced agriculture teachers in South Carolina and found similarities among results from their study with results of Joerger (2002). Ricketts, Duncan, Peake, and Uesseler (2006) conducted a similar study targeting Georgia agriculture teachers. According to the Georgia agriculture teachers, the most important training need for either pre-service teacher education or professional development was advising students about post-secondary education in agriculture. Other highly rated pre-service/in-service training needs included preparing FFA proficiency award applications and FFA degree applications, developing an effective public relations program, and developing Supervised Agricultural Experience (SAE) opportunities for students. A study conducted in 2010 of Utah Agriculture teachers (Sorensen, Tarpley, & Warnick, 2010), found the top five competencies in which agriculture teachers were most in need of in-service were: (a) utilizing the community in providing opportunities for students i.e. advisory committees, agricultural organizations, etc.; (b) developing supervised agricultural experience (SAE) opportunities for all students; (c) identifying and preparing FFA proficiency award applications; (d) planning and implementing student recruitment activities; and (e) teaching learning disabled students. In contrast, the five competencies in which agriculture teachers required the least amount of in-service were: (a) describing how to set up the meeting room; (b) conducting parent/teacher conferences; (c) explaining the history and organization of the FFA; (d) explaining FFA degree areas; and (e) explaining proper dress and characteristics of a good FFA leader.

Research findings confirm that most beginning agricultural education teachers experience similar challenges (Steffy, Wolff, Pasch & Enz, 2000) and have need for some common in-service education programming (Davis & Jayaratne, 2015; Joerger, 2002). Given the findings and recommendations of previous studies, the researchers conducted this study to identify the items related to teacher preparation of [Pennsylvania agricultural education teachers to attempt to improve the existing structure.

Problem Statement

Teacher education programs are tasked with preparing effective teacher candidates that are able to enter classrooms and laboratories to guide their students. Without timely information from recent graduates, these teacher preparation programs may not be providing the best possible education program for the teacher candidates.

Theoretical/Conceptual Framework

The theoretical framework for this study lays in Bandura's (1986) Social Cognitive Theory and Herzberg's Motivation-Hygiene Theory (McClelland, 2004). The Social Cognitive Theory would purport that belief in one's own ability to be successful would impact the actual ability to be successful. Grounded in Bandura's Social Cognitive Theory is the Teacher Self–Efficacy theory. Bandura stated, self–efficacy beliefs influence the choices and goals people make, the amount of effort they apply toward these goals, how long they persevere at a task in times of failure or difficulty, and the amount of stress that is experienced (Frederickson & Turner, 2003). This theory provides a basis to further understand needs and behaviors of agriculture teachers. In addition, Motivation-Hygiene Theory would posit that value put on the task (i.e. how important is this); impacts desire to put forth effort to be successful. The interaction of these two theories can explain the outcomes of this study. The feelings of preparedness are significantly related to teachers' sense of efficacy and their confidence about their ability to achieve teaching goals. Teachers' sense of preparedness and sense of self-efficacy are related to their feelings about teaching and their plans to stay in the profession (Darling-Hammond, Chung & Frelow, 2002). When teachers show high levels of efficacy and are confident in their teaching abilities, they are more likely to increase their student's mastery of basic skills (Ashton & Webb, 1986; Costa & Garmston, 2002). Teachers with a high sense of efficacy show higher levels of planning and organization (Milner, 2001; Purdum-Cassidy, 2005) and are more accepting to new ideas and more likely to experiment with new teaching methods (Milner, 2001; Purdum-Cassidy, 2005). In effect, this study will highlight the areas Pennsylvania beginning agriculture teachers deem to be of high importance but have low perception of preparedness. This will help to inform the teacher preparation program of where they can assist in helping improve self-efficacy in the profession.

The survey instrument used in this study adapted Darling-Hammond, et al. (2002) teacher preparedness survey. The survey contains questions regarding teachers' opinions about their preparation, belief, practice, and career. The researchers examined a set of Likert scale and interview data from a study that sought to determine whether teacher pre-service education has significant effects on teacher efficacy as well as what things teachers feel well prepared to do in the classroom (Darling-Hammond, Chung, & Frelow, 2002). It was concluded that a combination of the content and pedagogy classes embedded in teacher preparation programs as well as the quality of field experience component had an effect on teacher's perceptions of preparedness and efficacy.

Purpose and Objectives

The purpose of this study was to determine how well graduates of a Pennsylvania agricultural education teacher preparation program felt prepared to teach, over the past five years. The results could be useful to other teacher preparation programs, in order to identify, analyze, and correct areas in need of attention. The objective of this study was to determine what new and beginning agriculture teachers perceived about their level of preparation in technical agriculture, teaching and learning skills, and skills associated with managing the total program of agricultural education. For the purpose of this study, new and beginning teachers were defined as having graduated in the last 5 years, in their first through fifth year of teaching service in agricultural education. The study was conducted to discover which items have a high importance but low perception of preparedness in order to better serve candidates by improving self-efficacy; thus, confidence in the profession.

Methods and Procedures

The conceptual framework for this study specifically is derived from the pre-service/in-service needs work of Borich (1980). Borich's (1980) model has been integrated into scholarly research of agriculture education by the early work of Garton and Chung (1996, 1997) and Joerger (2002). The Borich needs assessment model (1980) was used for this study because it allowed professional development needs to be prioritized and ranked. Borich (1980) developed his Needs Assessment Model in an effort to design such a survey instrument that would allow one to collect data that can be weighted and ranked in order of priority. The Borich model allowed researchers to utilize competencies, skills, and knowledge in the form of statements in order for teachers to individually assess the importance and their perceived levels of preparedness for each statement concerning technical agriculture, teaching and learning skills, and skills associated with managing the total program of agricultural education. The Borich model (1980) has a history of being used to determine the professional development needs of school-based agriculture teachers (Barrick & Doerfert, 1989; Edwards & Briers, 1999; Layfield & Dobbins, 2002; Sorensen et al., 2010). By doing so, responses can be utilized in strategic planning to enhance teacher preparation.

The surveyed population of the research study were graduates prepared through the Agricultural and Extension Education program at the Pennsylvania State University since 2010. The survey instrument was developed based off of the Darling-Hammond, et al. (2002) research on teacher preparedness. The primary instrument was unchanged, but specialized items, including technical agriculture content expertise, FFA, and Supervised Agricultural Experience, were added to the instrument specific to the teacher preparation area examined in this study. The target population for this study were graduates from Pennsylvania State University; within a five-year time frame. The selection of the population was representative of the specific time frame in which the researchers were interested in investigating. Due to the nature of these selected participants, the population is considered a convenience sample. A census of the convenience sample was contacted. The population of interest for this research study represents only a small portion of the overall population of Pennsylvania agricultural educators. The findings from the convenience sample are not generalizable. The Dillman, Smyth, and Christian's (2014) method for survey research was utilized to obtain the highest possible response rate from the participants. A total of 78 surveys were sent. A response rate of 74% was received from the Agricultural and Extension

Education graduates. Early respondents were compared to late respondents to control for non-response error (Miller & Smith, 1983). No difference was found between these two groups. Data was analyzed using descriptive statistics, including calculation of Mean Weighted Discrepancy Scores (MWDS) (Borich, 1980). A mean-weighted discrepancy score was calculated to determine the difference in graduates' perceived preparation and importance on an item.

Respondents were asked to rate their perceptions of importance of knowledge and their perceptions of their preparedness of knowledge on items related to teacher success. A 7-point Likert-type scale ranging from 1=Not at all to 7=Extremely was used. Grounded in Darling-Hammond, et al. (2002), items were organized into six domains including:

- Design Curriculum and Instruction to Promote Learning;
- Support Diverse Learners;
- Use Assessment to Guide Learning and Teaching;
- Create a Productive Classroom Environment/Teach Critical Thinking;
- Professional Development, and
- Use of Technology.

These specific domains were piloted in a study conducted involving 26 Malaysian Living Skills teachers. A reliability coefficient was calculated using SPSS. The results for the pilot study are shown in Table 1. Based on Nunnally (1978), alpha at .70 is high enough for an instrument to be considered reliable. Most researchers look for coefficient to be at least .80 or higher. Cronbach's Alpha Coefficient for the instrument in this study was above .90 for all six variables of the survey.

Table 1
Reliability Coefficient

Variables	Cronbach's Alpha	Number of Items
Designing Curriculum and Instruction to Promote Learning	0.911	12
Support Diverse Learners	0.976	9
Use Assessment to Guide Learning and Teaching	0.982	4
Create a Productive Classroom Environment	0.975	8
Use Technology	0.959	5

Develop Professionally	0.970	5

Three additional discipline specific domains pertaining explicitly to teacher preparation in Agricultural and Extension Education were also asked of participants. These included:

- Managing work-based learning/Supervised Agricultural Experience (SAE)
- Managing a career and technical student organization (FFA)
- Technical Agricultural content expertise (United States Department of Education Career Pathways)

The aim was to discover which items have a high importance but low perception of preparedness. The following analysis utilizes the mean weighted discrepancy score to determine this discrepancy for each of the items. It is worth noting, some items may have negative mean weighted discrepancy scores.

Mean Weighted Discrepancy Score Formula

$$\text{Mean Weighted Discrepancy Score} = \frac{\text{(importance rating-preparedness rating) x importance rating}}{\text{number of observations}}$$

Results/Findings

The objective of this study was to determine new and beginning Pennsylvania agriculture teachers perceived preparation in technical agriculture, teaching and learning skills, and skills associated with managing the total program of agricultural education.

Since 2010, the Pennsylvania State University has graduated 78 students in the Agricultural and Extension education program, all of which were contacted to complete the survey instrument. Fifty-eight participants completed the survey instrument for a response rate of 74%.

The findings in Table 2 provide the Perception of Preparedness and Importance, respectively. The teachers indicated that overall, they did not feel extremely prepared in any of the aspects, but overall felt somewhat prepared. The teachers indicated in each category for importance as slightly higher than that of being prepared.

The findings regarding the six domains, as ranked by Mean Weighted Discrepancy Score, are displayed in Table 3. The surveyed teachers indicated Classroom Environment as the domain they deemed most important but least prepared. Technology was ranked third (tie) on the importance scale but teachers felt most prepared. Specific items within the Classroom Environment domain for Agricultural and Extension Education respondents with the highest discrepancy scores were: Help students become self-motivated and self-directed (MWDS = 10.70); Maintain discipline and an orderly, purposeful learning environment (MWDS = 10.37); Help all students achieve high academic standards (MWDS = 7.99).

Table 2
Preparedness and Importance Scores of the Six Domains for Pennsylvania Beginning Agricultural Education Teachers

Aspects of Teaching Preparedness	*Preparedness*		*Importance*	
	M	*SD*	*M*	*SD*
Design Curriculum and Instruction to Promote Learning	5.51	1.24	6.21	1.06
Support Diverse Learners	5.08	1.36	5.97	1.28
Use Assessment to Guide Learning and Teaching	5.11	1.24	6.13	1.08
Create a Productive Classroom Environment /Teach Critical Thinking	5.00	1.33	6.41	0.97
Professional Development	5.13	1.47	6.15	1.09
Use Technology	5.70	1.35	6.15	1.09

Note. Not at All=1, Extremely=7

Table 3
Domains Ranked by Mean Weight Discrepancy Score

Domain	MWDS
Classroom Environment	8.00
Assessment	5.83
Support Diverse Learners	5.54
Professional Development	4.45
Curriculum and Instruction	4.34
Technology	2.90

Table 4 provides the findings on the topics specifically related to a teacher managing a complete agricultural education program. Each domain included a series of questions that targeted the teachers' perceived preparedness and the importance of each aspect as a part of their program. Technical content was perceived as the most important domain; however, the domain in which teachers felt least prepared.

Table 4
Program Specific Topics Domain Mean Weight Discrepancy Score

Domain	MWDS
Technical Content	5.94
FFA	4.95
Supervised Agricultural Experience	3.27

The following highlights the individual items within the highest MWDS for each domain:

<u>Technical Content:</u>
Food Products and Processing Systems (FPP)—the study of product development, quality assurance, food safety, production, sales and service, regulation and compliance, and food service within the food science industry (MWDS = 9.07).

Biotechnology Systems (BS)—the study of data and techniques of applied science for the solution of problems concerning living organisms (MWDS = 9.05).

<u>FFA:</u>
Help students secure adequate financing for the FFA Chapter (MWDS = 6.91).

Recruit and retain a diverse membership in the FFA Chapter (MWDS = 6.73).
<u>SAE:</u>
Design a reporting procedure to school administration that measures and validates student learning outcomes and instructor involvement as a result of year-round SAE supervision (MWDS = 4.51)

Create a sequential curriculum to guide student through SAEP selection and creation (MWDS = 4.24)

Conclusions

The extent to which content, pedagogy, and classroom practice elements are included in a teacher formal training has a significant effect on teacher self-efficacy and job satisfaction. The more teachers report the inclusion of these three elements in formal training, the higher levels of self-efficacy and job satisfaction (OECD, 2014).

The teachers surveyed deemed all the categories as important, however, only felt somewhat prepared in each category. Respondents identified Classroom Environment, Assessment, and Support Diverse Learners as areas of greatest discrepancy. Additionally, respondents identified Technology as the area with the least amount of discrepancy between their preparation and importance.

Efficacy is the belief of an individual that they have the resources needed to face situations they encounter. Costa and Garmston (2002, 2007) described people with high efficacy as being optimistic, engaging in cause-and-effect thinking, and able to operationalize concepts and translate them into deliberate actions. Efficacy is the belief in "knowing I have the capacity to make a difference through my work and being willing to take the responsibility to do so" (Costa & Garmston, 2007, p. 11). The researchers recognize attention needs to be made to the identified areas with discrepancies to improve teacher efficacy in agriculture education.

Discussion

The beginning years of teaching can be very challenging. Beginning teachers who exhibit a higher sense of efficacy are more likely to persist and remain in the profession (Knobloch & Whittington, 2003). Education, experience, and support can help new and beginning teachers feel more successful and be more effective teachers. Teachers are the single most important variable related to student achievement (Darling-Hammond, 1997) and their expertise and beliefs influence the success of an agricultural education program (Anderson, 1977). Therefore, a teacher's beliefs, attitude, and disposition of being a confident, efficacious teacher needs further investigation in preparing teachers in agricultural, career, and technical education.

Access to appropriate and timely in-service education activities is critical to the initial success, effectiveness, continued development, and retention of beginning agricultural education teachers. To fully answer the question of whether educators are adequately prepared to teach agriculture students requires extensive, in-depth studies of teachers (including their practices) and student outcomes-both of which are beyond the scope of this report. The Agricultural and Extension Education program plans to continue to analyze data in each of the construct areas. Special focus will be given to the areas of Classroom Environment, Assessment, and Support Diverse Learners. Additionally, item evaluation within each of the construct areas will continue to identify potential gaps in preparation of candidates. There are future plans to conduct this survey with graduates on a three-year rotation. Plans include investigating student outcomes within the surveyed teachers' respective programs to develop a better understanding of how the teacher preparation program can better serve the needs of pre-service teachers.

Additional environmental factors that may impact the participants responses, including school administration leadership/support, impact of local/state mandates, and programming enhancements should be investigated and mixed research methods such as focus group interviews should be conducted with new and beginning teachers in the quest for grounded theory of understanding variables that influence teacher preparedness. New and beginning teachers are influenced by various contextual factors. By knowing which factors contribute to a feeling of preparedness and positive growth and performance of teachers, instructional leaders will be better able to cultivate and facilitate new teachers' development to become effective, contributing teachers in agricultural education.

Limitations of Study

As with any research, there are limitations that should be considered when examining the results of this study. A limitation of the current study was the self-reported data gathered from the survey is subjected to the subjective perceptions and insights of the respondents regarding the competencies possessed by them. The study examined how respondents felt and perceived about their teaching competencies, therefore, study findings does not demonstrate the participants' level of teaching competencies. In addition, the parameters of being a new and beginning teacher limited the sample size to those in their first through fifth years of teaching.

References

Anderson, B. H. (1977). An over the shoulder look at the contemporary philosophy and standards in vocational agriculture. *Journal of the American Association of Teacher Educators in Agriculture*, *18*(1), 1-8.

Ashton, P. T., & Webb, R. B. (1986). *Making a difference: Teacher efficacy and student achievement.* [Monograph]. White Plains, NY: Longman.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Borich, G. D. (1980). A needs assessment model for conducting follow-up studies. The *Journal of Teacher Education, 31*(3), 39-42. doi: 10.1177/002248718003100310

Bransford, J., Darling–Hammond, L., & Lepage, P. (2005). Introduction. In L. Darling–Hammond & J. Bransford (Eds.), *Preparing teachers for a changing world* (pp.1–39). San Francisco, CA: Jossey–Bass.

Costa, A., & Garmston, R. (2002). *Cognitive coaching: A foundation for renaissance schools*. Norwood, MA: Christopher-Gordon Publishers, Inc.

Costa, A. L., & Garmston, R. J. (2007). *Cognitive coaching foundation seminar: Learning guide* (7th ed.). Canada: Center for Cognitive Coaching.

Cunningham, P. M., & Allington, R. (2003). *Classrooms that work: They can all read and write* (3rd ed.) Boston, MA: Allyn & Bacon.

Darling-Hammond, L. (1997) *Doing what matters most: Investing in quality teaching.* New York, NY: National Commission on Teaching and America's Future.

Darling-Hammond, L. (1999b). *Teaching quality and student achievement: A review of state policy evidence.* Seattle, WA: Center for the Study of Teaching and Policy, University of Washington.

Darling-Hammond, L. (2000). *Teacher quality and student achievement: A review of state policy evidence. Education Policy Analysis Archives*, 8(1). Retrieved from http://www.nctaf.org

Darling-Hammond, L., Chung, R., & Frelow, F. (2002). Variation in teacher preparation: How well do different pathways prepare teachers to Teach? *Journal of teacher education,* 53(4), 286-302.

Davis, R. J., & Jayarantne, K. S. U. (2015). In-service training needs of agriculture teachers for preparing them to be effective in the 21st century. *Journal of Agricultural Education, 56*(4), 47-58. doi:10.5032/jae.2015.04047

Dillman, D.A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley.

Dobbins, T. R. & Camp, W. G. (2000). *Clinical experiences for agricultural teacher education programs in North Carolina, South Carolina, and Virginia*. Proceedings of the 27th Annual National Agricultural Education Research Conference. 543-555.

Duncan, D. W., Rickets, J. C., Peake, J. B., & Uesseler, J. (2006). Teacher preparation and in-service needs of Georgia agriculture teachers. *Journal of Agricultural Education, 47*(2), 24-35.

Edwards, M. C., & Briers, G. E. (1999). Assessing the in-service needs of entry phase agriculture teachers in Texas: A discrepancy model versus direct assessment. *Journal of Agricultural Education*, *40*(3), 40-49.

Frederickson, N., & Turner, J. (2003). Utilizing the classroom peer group to address children's social needs: An evaluation of the Circle of Friends intervention approach. *Journal of Special Education, 36*, 234–245. doi: 10.1177/002246690303600404

Garton, B. L., & Chung, N. (1997). An assessment of the in-service needs of beginning teachers of agriculture using two assessment models. *Journal of Agricultural Education, 38*(3), 51-58.

Jackson, R. R. (2009). *Never work harder than your students and other principles of great teaching.* Alexandria, VA: Association for Supervision and Curriculum Development.

Joerger, R. M. (2002). A comparison of the in-service education needs of two cohorts of beginning Minnesota agricultural education teachers. *Journal of Agricultural Education, 43*(3), 11-24.

Knobloch, N. A., & Whittington, M. S. (2003). Differences in teacher efficacy related to career commitment of novice agriculture teachers. *Journal of Career and Technical Education, 20*(1), 87-98.

Layfield, K. D., & Dobbins, T. R. (2002). In-service needs and perceived competencies of South Carolina agricultural educators. *Journal of Agricultural Education*, *43*(4), 46-55.

Marzano, R. J. (2007). *The art and science of teaching*. Alexandria, VA: Association for Supervision and Curriculum Development.

McClelland, D. (2004). Frederick Herzberg – *2 factor hygiene and motivation theory*. Retrieved May 13, 2016, from http://www.accel-team.com/human_relations/hrels_05_herzberg.html

Miller, L. E., & Smith, K. L. (1983). Handling nonresponse issues. *Journal of Extension*, *21*(5), 45-50.

Milner, H. R. (2001). *A qualitative investigation of teachers' planning and efficacy for student engagement.* (Unpublished doctoral dissertation). The Ohio State University, Columbus, OH.

OECD (2014), *TALIS 2013 Results: An International Perspective on Teaching and Learning*, OECD Publishing, Paris. doi: http://dx.doi.org/10.1787/9789264196261-en

Purdum-Cassidy, B. (2005). *Preservice teacher efficacy: The impact of a year-long, field based experience in a professional development school.* (Doctoral dissertation). Baylor University, Waco, TX.

Roberts, T. G., Dooley, K. E., Harlin, J. F., & Murphrey, T. P. (2007). Competencies and Traits of Successful Agricultural Science Teachers. *Journal of Career and Technical Education, 22*(2), 1-11.

Sorensen, T. J., Tarpley, R., & Warnick, B. K. (2010). Inservice needs of Utah agriculture teachers. Journal of Agricultural Education, *51*(3), 1-11. doi: 10.5032/jae.2010.03001

Steffy, B. E., Wolfe, M. P., Pasch, S. H., & Enz, B. J. (Eds.). (2000). *Life cycle of the career teacher.* Thousand Oaks, CA: Corwin Press, Inc.

Assessing the Perceived Preparedness and Importance of Discipline Specific Items of Agriculture Teachers in Pennsylvania

Matt R. Raven Remarks

This paper addresses an important and timely topic. As accreditation agencies such as CAEP move toward more of an outcome based assessment of teacher education programs it is important that these programs assess what their graduates perceive they are lacking. This research builds upon a growing literature base in agriculture, food and natural resources education and adds to it.

The case for the study and the statement of the problem were clear as well as were the purpose and research objectives. The theoretical framework used was also appropriate and the use of the Borich Needs Assessment model was the appropriate choice. There is a reason the AFNRE uses the Borich model as it applies to so many of our research topics especially in the areas of pre-service and in-service needs of our educators.

The methods were sound although this discussant continues to have issues with the use of late respondents to earl respondents as a control for non-response error. There are other much more effective methods to account for non-response. For example the researchers probably had access to know population characteristics (e.g. gender, cohort make-up) that could have been use to compare the population to the respondents. Internal consistency was report for five domains but was not reported for the three additional domains that they were included – Technical Content, FFA and SAE. Furthermore, since the individual items were analyzed it would have been appropriate to also conduct a test-retest to establish the reliability and stability of the individual items that were analyzed. Why were Malaysian teachers used for the pilot test rather than a population that more closely resembled the population being study? For example pre-service teachers at PSU would have been a more appropriate population for the pilot test.

The results were clearly reported, both within the text as well as appropriate tables. The results were not surprising, but it would have been useful to compare these results to the results from the previous studies in AFNRE literature regarding needs assessment. This research clearly provides some important information for teacher educators in Pennsylvania that will help direct in-service activities especially for these early career educators. The researchers are to be commended for planning on continuing to conduct these assessment on a periodic basis to detect trends. These longitudinal data could be easily used for assessment at the university level or for accreditation purposes with organizations such as CAEP. This discussant will share these results with his colleagues as we continue in Michigan to try improve the preparation of our pre-service and in-service teachers. The authors are to be commended on this important research and adding to our knowledge of teaching readiness.

Clemson University Agricultural Sciences Students' Perceptions of Career Readiness Skills

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Abstract

The purpose of this study was to administer a needs assessment to students enrolled in the Agricultural Sciences department at Clemson University to determine areas of discrepancy based on perceived levels of proficiency and importance of knowledge, skills, and dispositions for career readiness. The Borich needs assessment model was used to discern between student's perceived competency and importance of career readiness skills within nine constructs. Constructs were analyzed and ranked using mean and grand mean weighted discrepancy scores. Findings included Career Skills, Interdisciplinary Skills, Life Skills, and Learning Skills as the top areas of need perceived by students. Some differences were revealed among the three majors in the department. Students consistently ranked Career Skills as their highest priority need. Students were asked who they believed were most responsible for teaching career readiness skills. Findings indicated the majority of the students believed they were most responsible for developing skills to prepare themselves to be career ready. Recommendations included expanded data collection among faculty, secondary education teachers and students, and post-secondary students enrolled at technical colleges. Conducting a pre/post survey of students as they enter their first semester and complete their final semester to determine any change in student perception was also recommended.

Introduction

Students graduating from high school and entering college do so with the goal of finding a career after graduation. While students are graduating college with the proper academic backgrounds, other career readiness skills may be lacking (Stone & Lewis, 2012). Students should learn in contextual environments that provide opportunities for transfer and application of the knowledge they gain (Carnevale, 2013). Accordingly, "In an era when agricultural education is concerned with informing people about agriculture, students must be literate in the subject matter, have the skills to effectively communicate, and be successful in finding employment after graduation" (Garton & Robinson, 2006, p. 31). Soft skill knowledge as well as academic knowledge is just as important for college graduates to excel in the workforce. When faced with problems in the workforce, students must be able to respond by independently applying their academic knowledge and skills to the specific situation (Carnevale, Smith, & Melton, 2011; Schmidt et al., 2012). One question that has arisen for debate within the education system posed, "Is it possible that colleges and universities are failing in their role to prepare graduates for the expectation of the workforce?" (Robinson, Garton & Vaughn, 2007, p.19). Similarly, Wardlow and Osborne (2010) proposed, "Public education in America should seek to develop independent-minded individuals who possess intellectual autonomy that allows them to conceptualize and effectively respond to problems encountered in daily living and in their professional pursuits" (p. 24). The debate of whose responsibility it is to prepare graduates with these skills is still a challenge presented within the education realm. Research Priority three of the American Association for Agricultural Educators (AAAE) National Research Agenda (NRA) calls for a "Sufficient

Scientific and Professional Workforce that Addresses the Challenges of the 21st Century." Research priority questions three and six pose the questions "What competencies are needed for an agriculture and natural resource workforce?" and "What competencies are needed to effectively educate, communicate, and lead?" (Roberts, Harder, & Brashears, 2016). This research sought to provide answers to address the AAAE NRA questions.

Review of Literature

While research on employer and teacher perceptions of college and career readiness skills exists, a limited amount of literature is published regarding the topic from the post secondary student's perspective. By addressing this gap in the literature and analyzing postsecondary student's perceived importance and competency level of college and career readiness skills, an effort can be made to more effectively address the areas of need and provide industry with students that are prepared for and knowledgeable of workforce expectations.

In order to properly prepare students to be college and career ready in the 21st century, it is necessary to promote a collaborative environment among secondary schools, colleges and universities, as well as policy makers and business leaders (DiBenedetto & Myers, 2016). In 2016 DiBenedetto and Myers developed nine constructs, which address knowledge, skills, and dispositions required of high school students to be career ready in the 21st century. The constructs developed by DiBenedetto and Myers (2016) served as a product of an extensive summary of literature, which identified 21st century career readiness skills. The question of who is responsible for preparing students for career readiness is up to debate amongst the general public, secondary schools, and postsecondary schools. "There has been some question with regard to who has been responsible for preparing students with the college and career readiness skills needed to be successful in the 21st century workplace" (DiBenedetto & Myers, 2016 p.28).

Theoretical/Conceptual Framework

Bandura's Social Cognitive Theory (Bandura, 1986) and Bronfenbrenner's Biological Theory of Human Development (Bronfenbrenner, 2005) served as the theoretical framework that guided this research as conceptualized by DiBenedetto and Myers (2016) Model of Student Readiness in the 21st Century, which includes home, community, school and world environments. Recommendations from DiBenedetto and Myers (2016) suggested further research on the perceptions of teachers, administrators, industry leaders, parents, and students, in an effort to improve the preparation of high school students for college and career readiness. The career readiness constructs created from DiBenedetto and Myers (2016) were utilized by this research to determine the perceived level of importance and competency level of postsecondary students career and college skills. By having students self-report their perceived importance and competency levels of various knowledge, skills, and dispositions for career readiness, they provided personal perceptions of their self-efficacy towards their beliefs of the knowledge they possess (Bandura, 1986). As the education system reflects upon priority areas, leaders and administrators will be better equipped to improve career readiness skills within the curriculum and improve program effectiveness to better prepare students for the workforce.

Purpose and Objectives

The purpose of this research was to describe the perceptions of post-secondary students towards career readiness skills they possess and to provide guidance for future career ready curriculum integration. To achieve the purpose of this research we administered a needs assessment to determine areas of discrepancy based on perceived levels of proficiency and importance of knowledge, skills, and dispositions for career readiness to students enrolled in courses in the Agricultural Sciences department at Clemson University during the fall of 2017. The following objectives guided our research:

1. Describe the demographic and academic profile of students enrolled in Clemson University Agricultural Sciences courses during the fall of 2017;
2. Determine student's self-perceived competency level and importance level on knowledge, skills, and dispositions required to be career ready using mean weighted discrepancy scores (MWDS) within the Agricultural Sciences department and separate majors;
3. Determine student's self-perceived competency level and importance level on knowledge, skills, and dispositions required to be career ready using grand mean weighted discrepancy scores (GMWDS) for the Agricultural Sciences department and separate majors;
4. Determine student's perception of who is responsible for teaching dispositions within each career ready construct, for the overall department and by major;
5. Determine specific priority needs for student development in an effort to make students more career ready and drive curricular decisions within the Agricultural Sciences department at Clemson University

Methods and Procedures

A non-experimental, quantitative, descriptive survey design was used for this research. The study received approval by the Clemson University Institutional Review Board and was deemed exempt. The population for the study consisted of a census of post-secondary students enrolled in any course in the Agricultural Sciences department at Clemson University during the fall 2017 semester. The instrument used to collect data was originally developed to describe teachers' perceptions of knowledge, skills, and dispositions required of students to be career ready (DiBenedetto, 2015). Cognitive interviews ($N = 11$) were performed prior to conducting a pilot test to determine face and content validity of the instrument. Slight language changes were made to fit the student population of interest. A pilot test was then conducted by sending a link to the Qualtrics® powered survey via email to a total of 79 alumni students. Complete responses were collected from 19 individuals. Cronbach's alpha measures the internal consistency or the extent to which items in an instrument are inter-correlated and has been the most widely used reliability coefficient for tests with levels of agreement (Cronbach, 1971). Cronbach alpha reliability coefficients were $\alpha = .91$ for proficiency, $\alpha = .72$ for importance. Achieving reliability when personality variables are measured can be difficult; therefore reliability coefficients of .60 to .70 are acceptable (Ary, Jacobs & Sorensen, 2010).

After the pilot test was conducted, in person contact was made with the faculty within the Agricultural Sciences department who were teaching courses during the fall of the 2017 semester. The personal contact was made to explain the research project and distribute an informative letter explaining the purpose and objectives of the study. Increased response rates tend to occur when prior notification of a survey has been accomplished (Dillman, 2000). On September 26, 2017 a link to the survey was emailed to a census of the 17 Agricultural Sciences faculty to request them to post the link for their students in the campus' online course management system. Follow-up emails were sent in weeks two, three, and five to the faculty requesting distribution of the survey link to the students enrolled in their course. Direct student contact was made by a member of the research team by attending an Agricultural Business and Agricultural Education class, describing the study, and requesting completion of the questionnaire. Some faculty members did not permit direct student contact in their courses. During the fifth week of data collection, an additional email was sent from the Student Services office to students to encourage completion of the questionnaire. Students were reminded to take the survey only one time. Data collection yielded 163 total responses with a 44% response rate. Initial data analysis revealed 43 incomplete responses; therefore 120 complete responses were included in the data set for further analysis. We recognized a potential limitation of the study as the extended length of the instrument possibly caused by respondent fatigue resulting in a 26% dropout rate. Instrument length was also a limitation described by DiBenedetto (2015).

The survey consisted of nine career readiness constructs including learning skills, life skills, career skills, social skills, interdisciplinary topics, knowledge competencies, incidental learning skills, dispositions, and experiences. A variety of knowledge, skills, and dispositions were listed within each construct in an effort to determine student's perceived level of competency and importance of the variables. After each construct, students were asked to answer who they believed was most responsible for teaching the construct in order to prepare them to be career ready. The responsibility choices consisted of I am, my parents are, my community is, my K-12 education system is, my high school guidance counselor is, my technical school is, my college/university education is, my student organizations is, and my employer is responsible.

The Borich Model (1980) was used for the instrument design to rank concepts and determine priority area of need. When using the Borich (1980) Model for assessing need, four steps were followed 1) competencies were listed 2) college students were surveyed 3) competencies were ranked; 4) high priority competencies (skills) were compared with the nine identified constructs of career readiness. Training needs are described as "a discrepancy between an educational goal and trainee performance in relation to the goal" (Borich, 1980). Using a discrepancy between two measures of an item allows respondents to provide their perceptions of competency related to the given topic and their relative belief about the importance of the topic as it relates to career readiness. Mean weighted discrepancy scores (MWDS) were calculated to establish rankings based on priority area of need where (Discrepancy = importance level - ability level for each topic) and MWDS = [(Importance Rating - Ability Rating) x (M Importance Rating)]/ Number of Observations (Borich, 1980). The importance and competency level scale used a Likert scale ranging from no proficiency, low proficiency, and moderate proficiency to high proficiency (1 - 4). The MWDS was calculated for each skill within a construct, which included the student's perceived importance and competency level. A grand (G)MWDS was then calculated from the MWDS summary table data by taking each variable's MWDS, within a particular construct, and calculating the average. MWDS and GMWDS were analyzed to determine priority area needs for career readiness curriculum development within the Agricultural Sciences department. Findings from this study can only be generalized to the respondents, Clemson University students enrolled in an Agricultural Sciences course, however, this study may provide guidance for other agricultural sciences departments at other institutions to consider and expand upon by replicating this research.

Findings

The first objective of the study was to describe the demographic and academic profile of students enrolled in a Clemson University Agricultural Sciences course. Refer to Table 1 for demographic data of respondents. The majority of the students were male (62.7%), between the ages of 17-20 (56.8%), and Caucasian (95.7 %). The majority of the students were pursuing a Bachelor's degree (90.7 %). Approximately one third of the students represented each of the three majors in the Agricultural Sciences department (Agribusiness, 31.4%, Agricultural Education 28.0%, and Agricultural Mechanization, 23.5%); respectively providing an equal distribution among the three majors in the department. Pursuing a major outside of the department was reported by 18%.

Table 1 *Demographic Data for Students Enrolled in the Agricultural Sciences Department*

Demographic	**n**	***f***	**%**
Gender	118		
Male		74	62.7
Female		36	37.3
Age	118		
17-20		67	56.8
21-24		47	39.8
25-29		2	1.7
30 and over		2	1.7
Race/Ethnicity	117		
African American		2	1.7
Alaska Native		0	0.0
Asian		0	0.0
Caucasian/White		112	95.7
Native American		1	0.8
Multiracial or Other		2	1.7
Hispanic or Latino(a)	117	3	2.5
Degree	118		
Bachelors		107	90.7
Masters		11	9.3
Major	118		
Agricultural Business		37	31.4
Agricultural Education		33	28.0
Agricultural Mechanization		28	23.5
Plant and Environmental Science		1	0.8
Agriculture		15	12.7
Environmental and Natural Resources		3	2.5
Biochemistry		1	0.8
Management		1	0.8

Note. Totals may not reach 100% due to rounding.

The second objective of the study was to determine student's self perceived competency level and importance level on knowledge, skills, and dispositions required to be career ready using MWDS among the Agricultural Sciences department majors. The top MWDS for the **Learning Skills** construct variables for Agricultural Education students (n = 33) were problem solving (1.97), contextual learning (1.44), and critical thinking (1.32). The top MWDS for the Learning Skills construct variables for Agricultural Mechanics students (n = 28) were perseverance/grit (2.20), self-direction (2.14), and initiative (2.08). The top MWDS for the Learning Skills construct variables for Agricultural Business students (n = 37) were critical thinking (2.0), initiative (1.89), and problem solving (1.79).

The top MWDS for the **Life Skills** construct variables for Agricultural Education (n = 33) were time management (2.68), organizational skills (2.03), and goal management (1.34). The top MWDS for the Life Skills construct variables for Agricultural Mechanics students (n = 28) were time management (3.0), accountability (1.88), and goal management (1.58). The top MWDS for the Life Skills construct variables for Agricultural Business (n = 37) were time management (2.1), goal management (1.62), and organizational skills (1.35). The top MWDS for the **Career Skills** construct variables for Agricultural Education (n = 33) were job search skills (2.85), career decision making (2.78), and productivity (1.5). The top MWDS for the Career Skills construct variables for Agricultural Mechanics (n = 28) were job search skills (3.21), career decision making (1.71), and productivity (1.36). The top MWDS for the Career Skills construct variables for Agricultural Business (n = 37) were career decision making (3.8), job search skills (3.65), and work habits/ethics (1.66).

The top MWDS for the **Social Skills** construct variables for Agricultural Education (n = 33) were integrity (.84), ethical responsibility (.78), and honesty (.72). The top MWDS for the Social Skills construct variables for Agricultural Mechanics (n = 28) were understanding diversity (1.47), ethical responsibility (1.17), and social responsibility (.53). The top MWDS for Social Skills construct variables for Agricultural Business (n = 37) were social responsibility (1.02), understanding diversity (.75), and a tie between honesty and integrity (.73). The top MWDS for the **Interdisciplinary Topics** construct variables for Agricultural Education (n = 33) were economics (3.09), global awareness (2.82), and civics (2.39). The top MWDS for the Interdisciplinary Topics construct variables for Agricultural Mechanics (n = 28) were economics (2.08), technology (2.01), and health (1.25). The top MWDS for the Interdisciplinary Topics construct variables for Agricultural Business (n = 37) were global awareness (2.58), economics (2.35), and civics (2.09).

The top MWDS for the **Knowledge Competencies** construct variables for Agricultural Education (n = 33) were proficiency (2.16), innovation (1.64), and decision making (1.61). The top MWDS for the Knowledge Competencies construct variables for Agricultural Mechanics (n = 28) were personal productivity (1.24), decision making (1.22), and teamwork (0.8). The top MWDS for the Knowledge Competencies construct variables for Agricultural Business (n = 37) were innovation (1.72), decision making (1.21), and personal productivity (.91). The top MWDS for the **Incidental Learning Skills** construct variables for Agricultural Education (n = 33) were decision making (1.72), proficiency (1.48), and confidence (1.26). The top MWDS for the Incidental Learning Skills construct variables for Agricultural Mechanics (n = 28) were confidence (2.18), people skills (1.62), and productivity (1.24). The top MWDS for the Incidental Learning Skills construct variables for Agricultural Business (n = 37) were leadership (1.76), confidence (1.66), and productivity (1.65).

The top MWDS for the **Dispositions** construct variables for Agricultural Education (n = 33) were self-esteem (1.36), innovation (1.09), and creativity/creative thinking (.99). The top MWDS for the Dispositions construct variables for Agricultural Mechanics (n = 28) were self-esteem (1.62), self-direction/self-discipline (1.22), and creativity/creative thinking (1.02). The top MWDS for the Dispositions construct variables for Agricultural Business (n = 37) were self-esteem (1.54), personal productivity (1.41), and creativity/creative thinking (1.29). The top MWDS for the **Experiences** construct variables for Agricultural Education (n = 33) were international engagement (2.42), cross disciplinary connections (1.54), and project management (1.22). The top MWDS for the Experiences construct variables for Agricultural Mechanics (n = 28) were career related work experience/internships (1.38), cross disciplinary connections (1.26), and international engagement (1.23). The top MWDS for the Experiences construct variables for Agricultural Business (n = 37) were career related work experience/internships (2.47), international engagement (2.43), and leadership (1.21).

The third objective of the study was to determine student's self perceived competency level and importance level on knowledge, skills, and dispositions required to be career ready using GMWDS. As shown in Table 2 GMWDS were ranked for all students in the Agricultural Sciences department from highest need to lowest need. Perceived areas of need were ranked as Career Skills, Interdisciplinary Topics, Life Skills, Learning Skills, Experiences, Incidental Skills, Knowledge Competencies, and Social Skills.

Table 2 *Overall GMWDS for All Students Enrolled in Agricultural Sciences Department Courses during fall 2017 Semester (N = 120)*

Construct	**GMWDS**
Career Skills	1.81
Interdisciplinary Topics	1.74
Life Skills	1.59
Learning Skills	1.56
Experiences	1.13
Incidental Learning Skills	1.10
Knowledge Competencies	1.01
Dispositions	0.93
Social Skills	0.66

A comparison of the GMWDS among the three majors within the Agricultural Sciences Department was presented in Table 2. Career Skills were consistently ranked as a top priority need among students in all three majors, while Social Skills were consistently ranked as the lowest priority need. Interdisciplinary Topics and Incidental Learning Skills were consistently ranked among all three majors.

Table 3 *Comparison of GMWDS among Majors in Agricultural Sciences Department Courses during the fall 2017 Semester*

Career Readiness Construct	Grand Mean Weighted Discrepancy Scores (GMWDS) by Agricultural Sciences Major		
	Business (n = 37)	Education (n = 33)	Mechanization (n = 28)
Career Skills	2.40	1.78	1.53
Dispositions	1.29	0.76	0.78
Experiences	1.40	1.34	0.89
Incidental Learning Skills	1.36	1.08	1.12
Interdisciplinary Topics	2.13	2.02	1.26
Knowledge Competencies	1.10	1.48	0.96
Learning Skills	1.65	1.10	1.90
Life Skills	1.32	1.53	1.92
Social Skills	0.70	0.62	0.72

The fourth objective was to determine student's perception of who is responsible for teaching dispositions within each career ready construct, within the overall department and by major. When analyzing the data for the overall students responding enrolled in an Ag Sciences course (N = 120), students revealed the top people responsible for **Learning Skills** were I am (58%), college/university education (14%), and a tie between parents and K-12 education (12%). For **Life Skills**, the top responsible people were I am (60%), parents (20%), and college/university education (8%). For **Career Skills**, the top responsible people were I am (51%), college/university education (25%), and a tie between parents and K-12 education (9%). For **Social Skills**, the top responsible people were I am (57%), parents (28%), and college/university education (7.5%). For **Interdisciplinary Skills**, the top responsible people were college/university education (52.5%), I am (29%), and K-12 education (10%). For **Knowledge Skills**, the top responsible people were I am (65%), parents (12.5%), and community (7.5%). For **Incidental Learning Skills**, the top responsible people were I am (65%), student organizations (9%), and K-12 education (7.5%). For **Dispositions**, the top responsible people were I am (67%), parents (13%), and K-12 education (6%). For **Experiences**, the top responsible people were I am (45%), college/university education (32.5%), and community (7%). Of the 120 respondents, 21 reported majors outside of the Agricultural Sciences department.

When analyzing the responsibility data by major, students revealed the top people responsible for **Learning Skills** within Agricultural Education (n = 33) were I am (55%), K-12 education (18%), and a tie between parents and college/university education (9%). The top people responsible for Learning Skills within Agricultural Mechanics (n = 28) were I am (54%), college/university education (18%), and a tie between parents and K-12 education (14%). The top people responsible for Learning Skills within Agricultural Business (n = 37) were I am (59%), college/university education (25%), and parents (14%).

When analyzing the responsibility data by major, students revealed the top people responsible for **Life Skills** within Agricultural Education (n = 33) were I am (42%), parents (21%), and K-12 education (18%). The top responsible people for Life Skills within Agricultural Mechanics (n = 28) were I am (78.5%), parents (14%), and college/university education (7%). Student's perceptions of the top responsible people for Life Skills within Agricultural Business (n = 37) were I am (59%), a tie between parents and college/university education (16%), and K-12 education (5%).

When analyzing the responsibility data by major, students perceptions indicated the top people responsible for **Career Skills** within Agricultural Education (n = 33) were I am (42%), college/university (21%), and K-12 education (18%). The top responsible people for Career Skills within Agricultural Mechanics (n = 28) were I am (68%), college/university education (21%), and a tie between parents, K-12 education, and student organizations (3.5%). The top responsible people for Career Skills within Agricultural Business (n = 37) were I am (49%), college/university education (27%), and parents (11%).

When analyzing the responsibility data by major, the students revealed the top people responsible for **Social Skills** within Agricultural Education (n = 33) were I am (33%), parents (27%), and college/university education (18%). The top responsible people for Career Skills within Agricultural Mechanics (n = 28) were I am (53.5%), parents (36%), and K-12 education (7%). The top responsible people for Career Skills within Agricultural Business (n = 37) were I am (73%), parents (22%), and K-12 education (5%).

When analyzing the responsibility data by major, student perceptions indicated the top people responsible for **Interdisciplinary Topics** within Agricultural Education (n = 33) were college/university education (40%), K-12 education (24%), and I am (18%). The top responsible people for Interdisciplinary Topics within Agricultural Mechanics (n = 28) were college/university education (61%), I am (32%), and a tie between K-12 education and High School Guidance Counselor (3.5%). The top responsible people for Interdisciplinary Topics within Agricultural Business (n = 37) were college/university education (54%), I am (38%), and a tie among parents, K-12 education, and employer (3%).

When analyzing the responsibility data by major, student perceptions indicated the top people responsible for **Knowledge Competencies** within Agricultural Education (n = 33) were I am (48%), K-12 education (21%), and student organizations (15%). The top responsible people for Knowledge Competencies within Agricultural Mechanics (n = 28) were I am (79%), college/university education (9%), and K-12 education (7%). The top responsible people for Knowledge Competencies within Agricultural Business (n = 37) were I am (70%), K-12 education (13.5%), and community (5%).

When analyzing the responsibility data by major, students perceptions revealed the top people responsible for **Incidental Learning Skills** within Agricultural Education (n = 33) were I am (39%), student organizations (21%), and K-12 education (18%). The top responsible people for Incidental Learning Skills within Agricultural Mechanics (n = 28) were I am (82%), K-12 education (7%), and a tie between parents, community, and college/university education (3.5%). The top responsible people for Incidental Learning Skills within Agricultural Business (n = 37) were I am (81%), a tie between parents, community, and student organizations (5%), and K-12 education (3%).

When analyzing the responsibility data by major, the top people responsible for **Dispositions** within Agricultural Education (n = 33) were I am (39%), parents (18%), and community (15%). The top responsible people for Dispositions within Agricultural Mechanics (n = 28) were I am (86%), parents (7%), and a tie between K-12 education and college/university education (3.5%). The top responsible people for Dispositions within Agricultural Business (n = 37) were I am (73%), parents (13.5%), and community (5%).

When analyzing the responsibility data by major, student perceptions revealed the top people responsible for **Experiences** within Agricultural Education (n = 33) were college/university (36%), I am (27%), and a tie between community/K-12 education (12%). The top responsible people for Experiences within Agricultural Mechanics (n = 28) were I am (64%), college/university education (29%), and a tie between community and employer (3.5%). The top responsible people for Experiences within Agricultural Business (n = 37) were I am (51%), college/university education (27%), and both parents, community, and K-12 education (5%).

The fifth objective was to determine specific priority needs for student development in an effort to make students more career ready. When analyzing the overall GMWDS, a need was revealed for Career Skills (1.81), Interdisciplinary Topics (1.74), Life Skills (1.59), and Learning Skills (1.56). Agricultural Education's GMWDS revealed a need for Interdisciplinary Topics (2.02), Career Skills (1.78), and Life Skills (1.53). Agricultural Mechanics' GMWDS revealed a need for Life Skills (1.92), Learning Skills (1.90), and Career Skills (1.53). Agricultural Business' GMWDS revealed a need for Career Skills (2.40), Interdisciplinary Skills (2.13), and Learning Skills (1.65). When analyzing the top MWDS for each major, common themes were found among the variables within each construct and presented in Table 4.

Table 4 *High Need Variables within each Career Readiness Construct (N = 98)*

Construct	High Need Variables (skills) After Analyzing Top MWDS for Each Major
Learning Skills	Critical Thinking, Problem Solving, Initiative
Life Skills	Time Management, Organizational Skills, Goal Management
Career Skills	Job Search Skills, Career Decision Making, Productivity
Social Skills	Ethical Responsibility, Honesty, Integrity, Social Responsibility, Understanding Diversity
Interdisciplinary Topics	Economics, Civics, Global Awareness
Knowledge Competencies	Innovation, Decision Making, Personal Productivity
Incidental Learning Skills	Confidence, Productivity
Dispositions	Self Esteem, Creativity/Creative Thinking

Experiences	International Engagement, Cross Disciplinary Connections, Career Related Work Experience/Internships

Since a majority of the data revealed that students reported they believed they were the most responsible person for teaching the various constructs to be career ready, the second highest responsible individual for the constructs was analyzed to determine differences and similarities among majors. An overview of the second highest responsible individuals for teaching career readiness constructs as perceived by post-secondary students is presented in Table 5.

Table 5 *Second Top Highest Responsible Entity for Career Readiness Skills by Major*

	Agricultural Sciences Major		
Career Readiness Construct	Education (n =33)	Mechanization (n = 28)	Business (n = 37)
Learning Skills	K-12	College	College
Life Skills	Parents	Parents	Parents/College
Career Skills	College/University	College/University	College/University
Social Skills	Parents	Parents	Parents
Interdisciplinary Topics	K-12	I am	I am
Knowledge Competencies	K-12	College	K-12
Incidental Learning	Student Organizations	K-12	Tie between Parents, Community, and Student Organizations
Dispositions	Parents	Parents	Parents
Experiences	I am	College	College

Discussion, Conclusions, and Recommendations

Students in the Agricultural Sciences Department consistently ranked Career Skills as a top priority need followed by Interdisciplinary Skills, Life Skills and Learning Skills. All three majors listed job search skills and career decision making as one of the top two needs within Career Skills. Productivity was listed as the third top need for both Agricultural Education and Agricultural Mechanics. Within Interdisciplinary Topics, economics was revealed as the top need for Agricultural Education and Agricultural Mechanization, while Agricultural Business ranked economics as the second highest need. Time Management was revealed as the top need for all three majors within Life Skills. Within Learning Skills, it was interesting to see that Agricultural Education and Agricultural Business listed critical thinking as one of their top needs, whereas Agricultural Mechanics did not list critical thinking as a top need. Agricultural Mechanics students may be more comfortable with critical thinking skills due to the requirement of a capstone project. Additionally within Knowledge Competencies, decision making was revealed as a common need among all three majors. Within Incidental Learning Skills, confidence emerged as a need for all three majors. In Dispositions, self-esteem ranked as the top highest need among all three majors while creativity/creative thinking ranked the third highest need among all three majors. The second highest skills were inconsistently ranked as education - innovation, mechanization - self-direction/self-discipline, and business - personal productivity.

For a majority of the constructs, all three majors agreed they were the most responsible for preparing themselves with the skills needed to be career ready, however, for Interdisciplinary Skills, all three majors listed college/university education as the highest responsible entity. For Experiences, college/university education was reported as responsible for Agricultural Education while Agricultural Mechanics and Agricultural Business reported I am the most responsible. College/university education surfaced more as a responsible entity for Experiences compared to the other career readiness skills. It is encouraging to find post-secondary students accept responsibility for their career preparedness. Career Skills were one of the areas that received some of the highest MWDS scores and ranked as the highest need when analyzing the overall GMWDS. Interestingly all three majors indicated college/university education as the second highest responsible entity to teach Career Skills. If students believe colleges and universities are responsible for teaching these skills then the Agricultural Sciences department at Clemson University should consider how to use the areas of focus within Career Skills to better prepare students for a career. Reviewing existing curriculum leading to capstone courses may be a priority for review of career preparedness.

We recommend use of this survey instrument at other colleges and universities to better determine areas students need assistance with career preparedness. Curricular decisions, and faculty professional development opportunities surrounding the topic of career preparedness can be offered to increase technical knowledge and assist faculty in better preparing students to be equipped for the workforce. Other recommendations include administering the survey to South Carolina post-secondary students at technical schools and secondary students to determine career readiness differences between post-secondary and secondary students. A modified survey could be administered to South Carolina post-secondary faculty and/or secondary teachers in an effort to target areas where faculty and teachers need opportunities for professional development. We also recommend taking this research a step further on Clemson University’s campus using a pre/post design to survey freshmen and incoming transfer students during their first semester and again during their last semester prior to graduation to see how career readiness skills have developed through the student’s post-secondary experience. Findings from this study should be disseminated to Clemson University’s Agricultural Sciences department leadership and college administration in an effort to enhance curriculum to improve student’s career readiness. As recommended by the AAAE NRA and conceptualized by the Model of Student Readiness in the 21st century, which includes home, community, school and world environments (DiBenedetto & Myers, 2016), the findings of this research sought to help close the gap between what employers are looking for in potential employees and the skill set college graduates are equipped with upon graduation. Utilizing a survey with standard career ready constructs served to help eliminate disagreement and confusion between the employer, university, and employee with regards to career readiness skills. An increased knowledge of the skills students are lacking within the identified areas of career readiness may assist the Agricultural Sciences department at Clemson University in providing adequate and available opportunities for students to excel. By addressing these shortcomings or victories, we hoped our findings would assist with future preparedness of students to successfully and confidently join the workforce.

References

Ary, D., Jacobs, L. C., & Sorensen, C. (2010). *Introduction to research in education.* (8th ed.) Belmont, CA: Wadsworth, Cengage Learning.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bronfenbrenner, U. (Ed.). (2005). *Making human beings human: Bioecological perspectives on human development.* Thousand Oaks, CA: Sage.

Carnevale, A. P. (2013). *21st Century Competencies: For College and Career Readiness*. National Career Development Association. Retrieved from https://repository.library.georgetown.edu/handle/10822/559289

Carnevale, A. P., Smith, N., & Melton, M. (2011). *STEM*. Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from http://cew.georgetown.edu/stem

Cronbach, L. J. (1971). *Test validation. Educational measurement* (2nd ed.). Washington, DC: American Council on Education.

DiBenedetto, C. A. (2015). *Teachers' perceptions of their proficiency and responsibility to teach the knowledge, skills, and dispositions required of high school students to be career ready in the 21st century* (Doctoral dissertation, University of Florida).

DiBenedetto, C. A., & Myers, B. E. (2016). A Conceptual model for the study of student readiness in the 21st century. *North American Colleges and Teachers of Agriculture Journal*, *60(1a)*, 28-35.

Dillman, D. A. (2000). *Mail and internet surveys: The total design method.* New York: Wiley.

Garton, B. L., & Robinson, J. S. (2006). Career paths, job satisfaction, and employability skills of agricultural education graduates. *North American Colleges and Teachers of Agriculture Journal*, *4*, 31-36.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Robinson, J. S., Garton, B. L., & Vaughn, P. R. (2007). Becoming employable: A look at graduates' and supervisors' perceptions of the skills needed for employability. *North American Colleges and Teachers of Agriculture Journal, 51*(2), 19-26.

Schmidt, A. H., Robbins, A. S., Combs, J. K., Freeburg, A., Jesperson, R. G., Rogers, H. S., & Wheat, E. (2012). A new model for training graduate students to conduct interdisciplinary, interorganizational, and international research. *BioScience, 62*(3), 296-304.

Stone, J. R. III, & Lewis, M. V. (2012*). College and career ready in the 21st century: Making high school matter.* New York, NY: Teachers College, Columbia University.

Wardlow, G.W., & Osborne, E.W. (2010). Philosophical underpinnings in agricultural education. In R. M. Torres, T. Kitchel, & A.L. Ball (Eds.), *Preparing and advancing teachers in agricultural education* (pp. 17-29). Columbus, OH: Curriculum Materials Service, the Ohio State University.

Clemson University Agricultural Sciences Students' Perceptions of Career Readiness Skills

Matt R. Raven
Discussant Remarks

This paper addresses an important and timely topic focused on career readiness skills of students in higher education. The researchers did an excellent job of developing the need for the study and clearly tied it to the National Research Agenda of AAAE. This research was specifically applicable to research priorities questions three and six.

There is a great deal of literature regarding the skills that employers are seeking for potential employees. This research is an interesting take by looking at the same subject but from the perspective of college students rather than their potential employers. Furthermore, this research builds upon previous work done by DiBenedetto using the same instrument within a high school population. A perpetual weakness in Agricultural Education research is for us to skip around from topic to topic without focusing on one area for an extended period of time. This discussant is also guilty of the very same thing. Consequently, it is encouraging to see a researcher build upon previous research using a different population and following up some of the recommendations from that earlier research.

The researchers used an appropriate theoretical framework based on the stated purpose and research objectives. The use of Borich needs assessment was especially appropriate for this study. Even though the instrument had been used before the researchers did conduct a pilot study with an appropriate population and demonstrated that it had sufficient internal consistency. Given that the researchers were using a Borich needs assessment and analyzing individual items was a test-rest also done in order to determine the reliability and stability of the individual items? If not this would be a suggestion to further establish the reliability of the instrument. Also has any type of factor analysis been done on this instrument in previous studies to confirm that the items are within the proper constructs. Perhaps this might be a way to trim this instrument down into a form that takes less time to complete.

The researchers acknowledge some of the limitations of the study and limited their conclusions and recommendations to the respondents which was appropriate. Was there an attempt for follow-up with non-respondents? Given the population the researchers probably did have access to some known population characteristics that could have been analyzed to see if the respondents did differ from the population. An easy one to compare would be the gender ration of the population with that of the respondents. Based on the results of the research it appears that the majors in the Department are dominated by white males. Is that truly the case?

This paper presented a great deal of extremely interesting data. It was encouraging that the respondents largely accepted responsibility for their career preparedness as well as other constructs. Given that result how do we as educators make sure that this happens? The recommendation of a capstone course was a good one and perhaps this could be where that happens. This research how ties in extremely well with the current focus on assessment within Colleges of Agriculture across the country. This discussant feels that other Colleges of Agriculture would be interested in this instrument and an article on just the instrument would make for a good NACTA Journal article. As stated before, there is a great deal of data presented in this article. The researchers should consider the use of different visuals, perhaps a radial pie chart, to better help the reader interpret the data. One further suggestion would be for the researchers to consider adding systems thinking to the learning construct. This an emerging skill that graduates need.

Discussant – Don Johnson; Timekeeper – Lauren Cline

Extension Programming
Barriers to Adopting the Produce Safety Rule of the Food Safety Modernization Act in the Southern Region *Lendel K. Narine, Amy Harder, Michelle Danyluk*
Lessons for Extension Strategic Planning: A Case Study of Virginia Cooperative Extension *Jeremy Elliott-Engel, Chelsea Corkins, Dr. Donna Westfall-Rudd*
Educating Farmers on the Financial Incentives Associated with Increased Engagement in Best Management Practices *Dr. Shelli D. Rampold, Brandon H. McKee, Dr. Alexa J. Lamm*
Eco-Leadership Among County 4-H Organizations: Relationship to Programmatic Success and Best Practices for Eco-Leaders *Dr. D. Adam Cletzer, Dr. Eric K. Kaufman*

Barriers to Adopting the Produce Safety Rule of the Food Safety Modernization Act in the Southern Region

Lendel K. Narine, Agricultural Education and Communication, University of Florida
Amy Harder, Agricultural Education and Communication, University of Florida
Michelle Danyluk, Food Science and Human Nutrition, University of Florida

Abstract

The Food Safety and Modernization Act (FSMA) introduces a comprehensive set of regulatory standards to the food industry to reduce foodborne illnesses. Stakeholders affected must comply with a stringent list of operational practices. Regional Centers have been created by the National Institute of Food and Agriculture to provide stakeholders with training and education to facilitate the adoption of the FSMA. This study sought to describe the major barriers to FSMA adoption by participants of the FSMA training programs in the Southern region. This causal-comparative study surveyed a sample of 795 particpants in the Southern region via a structured questionnaire. Guided by the Diffusion of Innovations theory, results indicated relative advantage and complexity were the most important factors of FSMA adoption. Perceived cost of compliance, and participants' current knowledge were major barriers to adoption. Extension educators are well positioned to design supplemental training programs for stakeholders on managing cost in FSMA compliance. Given the high perceived complexity of the FSMA, educators should facilitate discussions with stakeholders on any misconceptions about the importance and need for FSMA. It is recommended Extension educators work with stakeholders to reduce the barriers identified, which would speed the process of FSMA adoption.

Acknowledgement: Funding for this research was provided by the USDA-NIFA, 2015-70020-24397.

Introduction

According to Scallan, Griffin, Angulo, Tauxe, and Hoetstra (2011), there are an estimated 46 million foodborne infections yearly, along with 250,000 hospitalizations and 3,000 deaths in the United States. Scharff (2012) stated the annual cost of foodborne illnesses in the U.S. was estimated at $77.7 billion, a cost likely to increase in coming years. The Food Safety Modernization Act (FSMA) is a major legislative effort to prevent microbial contamination and reduce foodborne illnesses associated with fresh produce (Produce Safety Alliance [PSA], 2015). The FSMA is the most significant reform to national agriculture and food safety policy in more than 70 years (U.S. Food and Drug Administration [FDA], 2015).

The FSMA will affect all stakeholders across the agricultural industry in the U.S. In particular, primary agricultural growers (i.e., farmers), those who pack fresh produce on their farms, and those who sell fresh produce at roadside stalls and farmers' markets are affected by the Produce Safety Rule (PSR) (FDA, 2015). The PSR includes a comprehensive set of science-based standards for safe growing, harvesting, packing, and holding of raw fruits and vegetables grown for human consumption (FDA, 2015). Producers subject to the PSR must comply with a stringent list of on-farm measures with respect to agricultural water usage, soil amendments, domesticated and wild animals, worker training, health and hygiene, equipment, tools, and buildings. Thus, growers, packers, wholesalers, and retailers must make many changes to their current farming operations to ensure their business complies with the PSR of FSMA.

This study will have implications for Extension programming and training, and extension educators. Given the second research priority area of the American Association for Agricultural Education National Research Agenda, Extension programs should be designed to facilitate adoption of new technologies and practices (Linder, Rodriguez, Strong, Jones, & Layfield, 2016). Results will provide information on the most critical barriers to FSMA compliance, and this can be used by program planners and educators to design educational curricula that meet specific needs of Southern agricultural producers. The identification of adoption barriers will allow justifiable predictions to be made about producers' future educational needs with respect to FSMA adoption and compliance. Therefore, results of this study are expected to provide information needed to support stakeholders' adoption of food safety practices outlined in the FSMA.

The Produce Safety Alliance and Southern Center

With respect to PSR education and training, the FDA has developed the FSMA Alliance Curricula that includes the Produce Safety Alliance (PSA). The PSA formed as a partnership between Cornell University, USDA, and FDA in 2010. These institutions were responsible for developing a standardized education curriculum, Train-the-Trainer (TTT) courses, and a network of trainers to support the produce industry. Furthermore, a cooperation between the PSA and the National Association of State Departments of Agriculture leads the implementation of the PSR. To disseminate training activities, the FDA in conjunction with the National Institute of Food and Agriculture (NIFA) established the National Food Safety Training, Education, Extension, Outreach, and Technical Assistance Program to fund and oversee the implementation of a National Coordination Center and four Regional Centers throughout the U.S., which includes a Southern Center (FDA, 2015). Training courses hosted by the Regional Centers are delivered by Extension specialists.

The Southern Center for FSMA Training, Extension, and Outreach to Enhance Produce Safety (SC), established in 2015, aims to develop a cadre of Produce Safety Alliance-certified trainers and producers in the southeastern United States and Puerto Rico. Training programs seek to increase stakeholders' awareness, knowledge, and skills needed to implement the PSR. The target audience includes primary agricultural growers, those who pack fresh produce on their farms, those who sell fresh produce at roadside stalls, and educators (consultants, Extension agents, and specialists). Extension specialists within the Southern Center host PSA trainings for the target audience. Due to a one-year delay in the Federal approval of the standardized PSA curricula, the Southern Center began PSA training in October of 2016.

Barriers to Compliance

Johnson and Endres (2012) noted complicated federal food regulations create barriers that drive up compliance costs and result in uncertainties in business operations. According to Paggi et al. (2010), producers faced many barriers to adopting Good Agricultural Practices (GAP), Good

Handling Practices (GHP), and Good Management Practices (GMP), chief of which was regulatory compliance cost. While producers have a choice in adopting GAP and GHP practices, they are legally required to comply with the PSR and therefore must overcome all barriers to adoption.

The role of awareness, access to information, training programs, and tailored technical assistance are evident in the literature as factors affecting adoption. Nowak (1992) stated new practices require producers to have working knowledge of the biological resources of their farm and understand how different practices affect soil and water resource issues. Producers may be unwilling to adopt new practices if they lack the management skills needed to implement and maintain them. Fazio, Rodriguez, and Molnar (2008) indicated a lack of technical assistance and information may be a significant barrier to adoption. Hence, the use of effective training and educational programs can be essential to overcoming information barriers and improving the rate of adoption. The effective delivery of such programs is expected to play an important role in PSR adoption. Also of importance is farmers' awareness of the policy change.

According to Fazio et al. (2008), the Southern Sustainable Agriculture Research and Extension Program (SARE) indicated economic barriers as the main factors influencing adoption of sustainable agricultural practices. Economic barriers included transitional costs incurred when adopting new practices, financial uncertainty in the ability to recover costs, and the burden of additional investment costs. With respect to PSR adoption, a significant barrier may be transitional costs. Nowak (1992) showed farmers could be unwilling to adopt practices incompatible with their current production systems, since this leads to increased labor and time requirements, the need for new equipment, and price disincentives. Knowler and Bradshaw (2007) noted potential long-run farm profitability had an impact on adoption practices.

Bartel and Barclay (2011) noted there was a regulatory failure in compliance with an Environmental Law in Australian agriculture. They stated little information was available on farmers' attitudes towards compliance prior to the study. Notably, implementation of the Environmental Law in Australian excluded input from affected stakeholders. Several studies have found attitudes and perception were closely aligned with perceived barriers to adoption (Alonge & Martin, 1995; Antle & Diagana, 2003; Hooks et al., 1983). The assessment of an agriculture conservation policy in Iowa showed farmers with generally positive views of the policy were more likely to be compliant, compared to farmers with opposing views (Arbuckle, Morton, & Hobbs, 2013).

Theoretical Framework

This study was guided by the Diffusion of Innovation (DOI) theory (Rogers, 2003). Rogers (2003) described diffusions as the process of which an innovation is communicated across certain channels over time. Since an innovation is any practice or technology perceived to be new by the individual, unpredictability exists about the desired outcomes of adoption. Further, this uncertainty is often accompanied by a general lack of structure of information. Given the complexity of innovation and adoption behavior, the DOI provides an explanation of the factors affecting adoption of an innovation. Rogers defined four components of the DOI as: the attributes of an innovation, communication channels used to relay information about the innovation, rate of adoption of the innovation with consideration to the innovation-decision process and adopter categories, and structure of the social system of which members reside (Rogers, 2003). While all four components play a role in explaining adoption behavior, this study focused on the attributes of an innovation.

Rogers (2003) indicated five innovation attributes affected adoption behavior, defined as relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is the degree to which an innovation is perceived to be better than its existing substitutes, compatibility is the extent to which the innovation is aligned to existing values and social norms, and complexity is the perceived level of difficulty involved in using the innovation (Rogers, 2003; Rogers & Shoemaker, 1971). These three attributes were considered the most important in explaining innovation adoption (Rogers, 2003). Trialability (the extent to which an innovation can be tested or experiment with by the individual) and observability (the ability to see the results of others' adoption of the innovation) were considered to have less predictive power compared to other attributes.

Tornatzky and Klein (1982) indicated both relative advantage and compatibility were highly subjective attributes as they depended on contextual factors. Therefore, the predictive power of innovation attributes may vary in different social systems. As such, factors such as the communication channels (mass media or interpersonal) used at different stages of the innovation-decision process, the social structure (informal or formal), and the communication structure (communication between heterphilious and homophilous groups) interacts with the attributes of an innovation to explain adoption behavior. Notwithstanding these factors, Rogers (2003) noted an innovation is easier adopted when the innovation has high relative advantage, is compatible with system values and social norms, has a low degree of complexity, and has high trialability and observability.

Given that the FSMA is a recent legislative step taken by the FDA, many compliance measures outlined in the PSR are new to producers, wholesalers, and retailers. However, the operational standards outlined in the PSR are somewhat consistent with GAP, and as a result, producers with GAP compliance are expected to be better prepared than others (PSA, 2015). Yet, the FSMA is an innovation cluster that must be adopted in a relatively short period of time period of one to two years. Since the time period is fixed, this study focused on the attributes affecting FSMA adoption. Guided by the DOI, this study operationalized innovation attributes associated with FSMA compliance with emphasis on relative advantage, compatibility, and complexity. These items were described as costs of compliance, current knowledge, participation in training, amount of training needed, perception and attitudes, Extension's ability to provide training, and availability of information. In this respect, results are geared towards understanding the most important barriers to adoption. This will provide agricultural and extension educators with the information needed to plan programs aimed at reducing such barriers, thereby easing the adoption process of producers, wholesalers, and retailers.

Purpose(s)/Objective(s)

The purpose of this study was to describe and rank PSA-trained participants' perceptions of the barriers to FSMA compliance according to its perceived level of importance. Further, the study provides a descriptive analysis of the barriers to FSMA adoption based on producers' type of operation, scale of production, and familiarity with past FSMA trainings. Results of this study will provide extension specialists with information needed to tailor their programs to address barriers of FSMA compliance. It adds to the extension and innovation adoption literature by discussing the adoption of regulatory standards for food safety.

Methods/Procedures

The target population of this study was all participants in the PSA trainings provided by the Southern Center (SC). Individuals of the target population met three conditions: (a) they were growers, packers, wholesalers or retailers; (b) they completed PSA training conducted by the SC, and; (c) they resided within Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, or Virginia. The Southern Center database of participants served as the sampling frame. The database was created in January of 2016, and serves as a centralized record of all participants to FSMA training at the SC. The sampling frame was compiled in September of 2017. Hence, it included participants who completed FSMA training at the SC during January of 2016 to September of 2017. Having met the three conditions of the target population, a total of 795 participants were included in the sample (N = 795). While the sampling frame was provided by the SC, there were limitations to the data. An unknown number of trainings were not recorded in the database due to incomplete participation records by trainers in some states. Further, there were missing values in the dataset, since participants were allowed to skip questions that they were unwilling to answer. Therefore, while the database provided a good record on attendance, it was not exhaustive and is a limitation of the study. Caution is recommended when generalizing the results to all participants of FSMA training at the SC.

The study utilized a causal-comparative design and cross-sectional data was collected via a structured self-administered questionnaire. SC trainers implemented the survey and questionnaires were distributed to attendees at the start of each training. Construct validity and measurement error was considered in designing the questionnaire. First, the basics of crafting good questions and constructing closed-ended questions were used to design the questionnaire (Dillman, Smith, & Christian, 2015). Particularly, the questionnaire was reviewed to ensure there were no double-barrelled questions and leading questions. Also, an exhaustive list of alternative options was provided for each question, while keeping the questionnaire short. Then, an expert panel consisting of food safety specialists and extension educators reviewed the questionnaire. Based on feedback from the panel, several questions were restated for readability, additional instructions for completing the questionnaire were included, and questions were reorganized to improve the general flow of items.

Variables examined were perception of barriers to FSMA compliance, existing practices, size of business, and experience in food safety trainings. Seven barriers to FSMA compliance were assessed: (a) costs of compliance, (b) current knowledge of FSMA, (c) participation in FSMA training, (d) the amount of training needed, (e) perception and attitudes of FSMA, (f) Extension's ability to provide FSMA training, and (g) availability of information on FSMA. Respondents were asked to indicate if they thought each item would be major challenge to compliance with FSMA via a checkbox (Yes = 1, No = 0). A construct to represent the frequency of barriers was calculated for each respondent by summing their responses to the seven barriers. The construct had acceptable internal consistency (Cronbach's alpha = .77). The frequency of barriers ranged from 1 (one barrier to compliance) to 7 (seven barriers to compliance). Mean values reported in the results represents the average number of barriers faced by producers. With respect to existing practices, respondents were asked to indicate if they had organic and/or GAP certification. In addition, participants were asked to estimate their average annual value of produce sales, and size of business was categorized as small ($25,000 – 250,000), medium ($250,001 – 500,000), and large (More than $500,000). Lastly, respondents were asked to indicate if they completed any FSMA training in the past. Results were presented as frequencies and crosstabs.

Findings

Table 1 provides an overview of participants' perceptions towards the barriers of FSMA compliance. Results indicated cost of compliance was the highest ranked barrier to compliance, with 60% of respondents stating this was a major challenge. Further, more than half the sample (52%) indicated producers' current knowledge of FSMA rules was also a major barrier to FSMA compliance. In contrast, most respondents did not perceive Extension's ability to provide FSMA training or the availability of information on FSMA as barriers to FSMA compliance.

Table 1
Perceived Challenges to FSMA Compliance

Rank	Barrier	Yes (%)	No (%)
1	Costs of compliance for producers (changes in operating costs, profits)	60	40
2	Producers' current knowledge of the FSMA	52	48
3	Producers' perception and attitudes of the FSMA	42	58
4	The amount of training that will be needed by producers	40	60
5	Producers' participation in training the FSMA	33	67
6	Availability of information on the FSMA	29	71
7	Extension's ability to provide training on the FSMA	23	77

Perceived barriers to FSMA compliance were described based on producers' type of operation in Table 2. Findings indicate those with GAP compliance perceived more barriers existed to FSMA compliance (M = 2.90, SD = 2.18), compared to those practicing organic farming (M = 2.69, SD = 2.11) and those with both organic and GAP certification (M = 2.68, SD = 2.14). Irrespective of operation type, cost of compliance was the highest ranked barrier to PSR compliance. Likewise, current knowledge was the second highest barrier of compliance for producers in each operation type. Fewer participants from each type of operation felt the availability of information and Extension's ability to provide training was a major challenge to FSMA compliance. Hence, there was some agreement on the barriers facing producers across different operation types.

Table 2
Compliance challenges by operation type

Barrier identified as a challenge	Operation type		
	Organic (%)	*GAP (%)*	*Organic and Gap*

			(%)
Costs of compliance	63	64	64
Current knowledge	50	54	50
Participation in training	34	34	36
Amount of training needed	39	41	37
Perception and attitudes	36	43	35
Extension's ability to provide training	25	25	25
Availability of information	22	30	22
Frequency of barriers, Mean (SD)	2.69 (2.11)	2.90 (2.18)	2.68 (2.14)

Table 3 provides a comparison of perceived barriers between respondents that completed at least one training about the rules of the FSMA and those who had never participated in FSMA training. Results indicated those who attended FSMA training in the past actually perceived more barriers to FSMA adoption (M = 3.11, SD = 2.18) than those with no experience in FSMA training (M = 2.62, SD = 2.11). Similar to other results, cost of compliance was the highest ranked barrier to FSMA compliance and current knowledge was ranked second. Also, Extension's ability to provide training and the availability of information on FSMA was the lowest ranked barriers to compliance. There was general agreement in the most and least important barriers based on participants' experience with FSMA training. However, many of those with experience in FSMA training indicated perceptions and attitudes and amount of training needed were greater barriers to FSMA compliance compared to those who did not attend FSMA training in the past.

Table 3
Compliance challenges by past attendance at FSMA training

Barrier identified as a challenge	Past FSMA Training	
	Yes (%)	*No (%)*
Costs of compliance	63	59
Current knowledge	56	51
Participation in training	38	30
Amount of training needed	47	36
Perception and attitudes	51	37
Extension's ability to provide training	25	22
Availability of information	31	27
Frequency of barriers, Mean (SD)	3.11 (2.18)	2.62 (2.11)

Table 4 provides a comparison of barriers between participants with small, medium, and large-scale agricultural operations. Those with small-scale operations indicated fewer overall barriers (M = 2.69, SD = 2.16), while those with large-scale production perceived more barriers to FSMA adoption (M = 3.12, SD = 2.16). Consistent with other results, cost of compliance and current knowledge was the highest ranked barriers to FSMA compliance across small, medium, and large scale operations. Likewise, Extension's ability to provide FSMA training and the availability of information on FSMA was not perceived as a major barrier for most involved in small, medium, and large-scale operations.

Table 4
Differences in barriers faced based on size of operation

Barrier identified as a challenge	Operation size (%)		
	$25,000 – 250,000	*$250,000 – 500,000*	*More than $500,000*
Costs of compliance	61	62	65
Current knowledge	51	53	57
Participation in training	27	38	35
Amount of training needed	38	42	47
Perception and attitudes	40	49	47
Extension's ability to provide training	23	24	28
Availability of information	28	27	32
Frequency of barriers, Mean (SD)	2.69 (2.16)	2.96 (2.31)	3.12 (2.16)

Conclusions/Recommendations/Implications

Results of this study indicated a general consistency in respondents' perceptions towards the barriers facing FSMA compliance. Cost of compliance and current knowledge of FSMA were the most important barriers to FSMA compliance whether respondents already had organic certification and/or GAP certification; participated in FSMA training in the past; or had a small, medium, or large-scale operation. These finding are consistent Paggi et al. (2010), and highlighted the importance of compliance cost on adoption of regulatory standards. With respect to knowledge as a barrier, Nowak (1992) pointed to the complexity of adopting new agricultural practices and the need for producers to have a good understanding of their farms' biological resources.

According to Rogers (2003), the most important attribute of an innovation is relative advantage. Participants' perceived cost of compliance was the most important barrier to FSMA adoption. This indicated participants believed the FSMA had a relatively low degree of relative advantage. Further, Rogers (2003) noted complexity has a negative effect on innovation adoption. Even though all participants completed the FSMA training, they noted a major barrier to adoption was current knowledge. This showed participants believed they did not have enough knowledge about the FSMA due to its complexity. Based on the attributes of an innovation, participants perceived the FSMA had a low degree of relative advantage and a high degree of complexity. These factors may have a negative impact on the adoption rate of the FSMA regulatory standards.

Results also indicated participants with experience on similar standards such as GAP exhibited high barriers to compliance. While PSA (2015) indicated those with GAP certification should be better prepared than others to comply with PSR standards, GAP producers perceived the greatest frequency of barriers to compliance in comparison to others. This indicates some level of misconception surrounding FSMA regulatory standards, and is consistent with the perceived high degree of complexity of FSMA.

Based on results of this study, it is recommended SC trainers incorporate a training module on cost management in FSMA training. Currently, the SC uses a standardized curriculum provided by the Produce Safety Alliance to train stakeholders. In addition, food specialists and extension educators are encouraged to contribute add-on material for supplemental training programs. While food specialists are actively engaged in designing crop-specific add-ons to FSMA training, Extension specialists with financial expertise are well positioned to design supplemental training programs aimed at providing stakeholders with education on managing cost in FSMA compliance. In addition, educators should facilitate discussions with participants to address any misconceptions about the importance and need for FSMA. Since the FSMA is designed to reduce foodborne illnesses in the US, there is a need to reduce stakeholders' barriers to compliance and speed the adoption process. Hence, extension educators should work with stakeholders to reduce these barriers, which would facilitate FSMA adoption and compliance.

References

Alonge, A. J., & Martin, R. A. (1995). Assessment of the adoption of sustainable agriculture practices: implications for agricultural education. *Journal of Agricultural Education, 36*(3), 34-42. doi: 10.5032/jae.1995.03034

Antle, J. M., & Diagana, B. (2003). Creating incentives for the adoption of sustainable agriculture practices: the role of carbon sequestration. *American Journal of Agricultural Economics, 85*(5), 1178-1184. doi: 10.1111/j.0092-5853.2003.00526.x

Arbuckle, J. G., Morton, L. W., & Hobbs, J. (2013). Farmer beliefs and concerns about climate change and attitudes toward adaptation and mitigation: Evidence from Iowa. *Climatic Change, 118*(3), 551-563. doi:10.1007/s10584-013-0700-0

Bartel, R., & Barclay, E. (2011). Motivational postures and compliance with environmental law in Australian agriculture. *Journal of Rural Studies*, *27*(2), 153-170. doi:10.1016/j.jrurstud.2010.12.004

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014*). Internet, phone, mail and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley & Sons.

Fazio, R., Rodriguez, J. M., & Molnar, J. (2008). *Barriers to the adoption of sustainable agricultural practices: working farmer and change agent perspectives* (Final Report). Southern Region Sustainable Agriculture Research and Education Program. Alabama Agricultural Experiment Station, Auburn University. Retrieved from http://mysare.sare.org/mySARE/ProjectReport.aspx?do=viewProj&pn=LS03-183

Hooks, G. M., Napier, T. L. & Carter, M. V. (1983). Correlates of adoption behaviors: The case of farm technologies. *Rural Sociology*, *48*(2), 308-323. Retrieved from http://search.proquest.com/docview/1290932511?accountid=10920

Johnson, N. R., & Endres, A. B. (2012). Small producers, big hurdles: Barriers facing producers of 'local foods.' *Hamline Journal of Public Law and Policy*, *33*(2011-2012), 49-122. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2225440

Knowler, D., & Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. *Food Policy, 32*(1), 25-48. doi: 10.1016/j.foodpol.2006.01.003

Linder, J. R., Rodriguez, M. T., Strong, R., Jones, D., & Layfield, D. (2016). Research priority area 2: New technologies, practices, and products adoption decisions. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 19-27). Gainesville, FL: Department of Agricultural Education and Communication.

Nowak, P. (1992). Why farmers adopt production technology. *Journal of Soil and Water Conservation, 47*(1), 14-16. Retrieved from http://www.jswconline.org/content/47/1/14.extract

Paggi, M., Yamazaki, F., Ribera, L., Knutson, R. D., Anciso, J., Palma, M., & Noel, J. (2010, September). *Comparative producer costs of GAP and GHP standards: Can the playing field be made level?* Paper presented at the First EAAE/ AAEA Seminar: The Economics of Food, Food Choice, and Health, Freising, Germany.

Produce Safety Alliance. (2015). *The Food Safety Modernization Act*. Retrieved from http://producesafetyalliance.cornell.edu/food-safety-modernization-act

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Rogers, E. M., & Shoemaker, F. F. (1971). *Communication of innovations*: *A cross-cultural approach.* New York: Free Press.

Scallan, E., Griffin, P. M., Angulo, F. J., Tauxe, R. V., & Hoekstra, R. M. (2011). Foodborne illness acquired in the United States - unspecified agents. *Emerging Infectious Diseases, 17*(1), 16-22. doi: 10.3201/eid1701.P11101

Scharff, R. (2012). Economic burden from health losses due to foodborne illness in the United States. *Journal of Food Protection, 75*(1), 123-31. doi: 10.4315/0362-028X.JFP-11-058

Tornatzky, L. G., & Klein, K. J. (1982). Innovation characteristics and innovation adoption implementation: A meta-analysis of findings. *IEEE Transactions on Engineering Management 29*(1), 28- 43.

U.S. Food and Drug Administration. (2015). *Standards for the growing, harvesting, packing, and holding of produce for human.* (Document Number: 2015-28159). Washington, DC: U.S.

Barriers to Adopting the Produce Safety Rule of the Food Safety Modernization Act in the Southern Region

Discussant Comments
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The authors used survey methodology to determine and rank-order the perceptions of produce industry personnel concerning barriers to adoption of the mandatory Produce Safety Rule (PSR) of the Food Safety Modernization Act (FSMA). The authors have produced a well-written manuscript that is easy to read and understand. Well done!

The introductory sections of the paper provide both excellent background information concerning the importance of the research and sufficient legislative background to understand the context for the research. Simply learning that 46 million foodborne illnesses, 250,000 hospitalizations, and 3000 deaths occur annually in the U. S. does tend to focus the mind on the importance of the topic! The theoretical framework draws on Rogers' (2003) well-known Diffusion of Innovation Theory. Specifically, the authors make the case that characteristics of the PSR such as relative advantage, compatibility, and complexity will influence adoption of the federally mandated PSR. If you are into splitting hairs, you could easily argue the federal mandate will influence (compel) adoption and the specific relative advantage gained will be the opportunity to remain involved in the produce industry. Conversely, if you are not into splitting hairs, you could easily intuit the authors' unstated intent is determine how best to assist industry personnel in adopting the mandate.

The study generally followed appropriate research practices. I especially appreciated the more-detailed-than-is-common description of the procedures used to validate the instrument. Rather than simply indicating that the instrument was "reviewed by a panel of experts" (or similar "magic words" concerning instrument validity), the authors actually described the make-up of the panel and what they were asked to do as they reviewed the instrument. Although the authors report that 795 individuals were included in the target population, the actual number of respondents was not reported. Further, because results were presented as percentages (as opposed to frequencies), interested readers lack the necessary data to independently determine either the number of respondents or the response rate. While I am not overly concerned about non-response bias in this study, specifying the response rate is a basic expectation when reporting survey research.

The results were presented in an easy-to-understand and meaningful fashion. Regardless of classification, respondents consistently perceived a low relative advantage and a high degree of complexity as the major barriers to adopting the PSR mandate. The finding that participants with previous Good Agricultural Practices (GAP) training perceived more barriers to PSR compliance was likely a function of sensitization by previous exposure to the expense and complexity of compliance.

The authors make reasonable recommendations for changes in training based on their results. Most significantly, the authors clearly understand the necessity of shifting training participants from a 'grudging compliance' to a 'this is good for all of us' mentality. Well done!

Lessons for Extension Strategic Planning: A Case Study of Virginia Cooperative Extension

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Cooperative Extension (Extension) must adjust to the evolving needs of stakeholders. One way to be responsive to stakeholders is through thorough and robust information gathering. To address this need, a statewide steering committee comprised of multiple internal stakeholders developed and implemented a strategic planning process that incorporated intensive stakeholder feedback. The planning process was concurrently and summatively investigated using a qualitative case study approach to provide insight on the steps taken by the steering committee, strategies utilized, and pitfalls encountered to inform future Extension strategic planning processes. Themes include the importance of steering committee knowledge and capacity, barriers such as timeline and motivation impact the process, and levels of commitment to diverse voices including non-users and historic stakeholders. Based on these findings, future Extension strategic planning processes should capitalize on stakeholder diversity while balancing the power dynamics potentially present via historic stakeholders and their motivations.

Strategic planning is a recognized organizational planning approach and has been implemented widely by corporations, public institutions, and not-for profits to help them assess their current situations and future plans (Poster & Streib, 2005). By utilizing diverse and active engagement, strategic planning has the ability to shape the nature and direction of an organization's future to navigate changing financial, cultural and political climates (Andersen, 2000). State-level Cooperative Extension systems (Extension) have adopted strategic planning as their preferred organizational planning approach (Boleman & Cummings, 2005; Graf, 1993; Martin & Rewerts, 1989; Smith & Torppa, 2010). Virginia Cooperative Extension (VCE) in the absence of having an organizational plan, opted to develop their first strategic plan in 2009.

VCE is a network of 107 unit offices spread across the Commonwealth of Virginia. These offices are staffed by 240-plus local agents and supported by nearly 90 specialists. In 2008 as the United States was experiencing the Great Recession, VCE was realizing a 4.7 million dollar budget cut. VCE also had an interim Director. In 2009 the state leadership team determined that a statewide strategic planning process would help the entire extension network to envision its future and develop the necessary procedures and operations to achieve that future. This process resulted in a five-year strategic plan for 2011-2016 that utilized research-based methodology to inform future programming through consideration of current local and state perspectives and needs. This was done to position the organization to be flexible and able to respond to dynamic future concerns (Communications and Marketing, Virginia Tech 2010). The resulting strategic plan was framed as a proactive, responsive, and innovative plan to ensure commitment to Virginia communities (Communications and Marketing, Virginia Tech 2010). Other Extension Programs like North Carolina (North Carolina Cooperative Extension, 2016), South Carolina (Clemson Cooperative Extension, 2015), Minnesota (University of Minnesota Extension, 2011), Missouri (University of Missouri Extension, 2017) are also claiming to utilize strategic planning to improve access to services, target strengths, and refine core support areas. To the best of the authors' knowledge, as of the time of the submission of this paper, no published efforts have been made to critically assess the context of strategic planning for statewide Extension. The *Journal of Extension* had published only a limited number of studies relevant to strategic planning or organizational change initiatives (Boleman &

Cummings, 2005; Bull, Cote, Warner, & McKinnie, 2004; Conone, 1991; Fetsch and Bolen, 1989; Johnsrud & Rauschkolb, 1989; King & Boehlje, 2000; McDowell, 2004; Schmitt & Bartholomay, 2009) which has created a lack of basic resources on Extension strategic planning.

This dearth of information frustrated the VCE strategic plan steering committee. Of the publications, many are outdated - having been published in the 80s or 90s - and no longer aligned with the adaptive goals of Extension. Furthermore, none of these articles reported directly how state-level Extension systems initiated and completed the strategic planning process in their entirety. It is unclear if the suggested frameworks or the process of strategic planning serves as an effective strategy for organizational stability or growth for Extension. For a public-serving organization like Extension, it is also uncertain who is influencing data collection design, data analysis, and decision-making processes involved in strategic planning. This lack of quality information jeopardizes the ability for effective strategic planning that supports cohesive program growth throughout the national extension system.

This study informs future planning processes for other state extension systems. An effective and relevant Extension system is one of the goals of the American Association for Agricultural Education's National Research Agenda, Research Priority 6. Vibrant, Resilient Communities (Graham, Arnold, & Jayartne, 2016). VCE invested considerable time and effort in conducting a statewide process to engage internal and external stakeholders and non-users in a feedback process. The findings of the strategic steering committee - the group observed and analyzed through this research - is valuable for other Extension systems as they strive to use strategic planning in order to remain relevant and responsive.

Literature Review

Strategic planning is not "magic answers or quick fixes" (Fetsch & Bolen, 1989), rather it is the disciplined effort to shape the nature of the organization for the future (Olsen & Eadie, 1982). Strategic planning was developed in the corporate sector as an alternative to more traditional long-range comprehensive or master planning (Bryson & Roering, 1987). Strategic planning places the emphasis on 1) action, 2) consideration of a broad and diverse set of stakeholders, 3) attention to external opportunities, threats, and internal strengths and weaknesses, and 4) attention to actual or potential competitors (Bryson & Roering, 1987).

Nutt & Backoff (1987) and Bryson & Roering (1987) developed strategic planning. Both authors posited strategic planning processes, and they were used to inform the strategic plan development process reported in this study. Nutt & Backoff (1987) outlined the strategic planning process as a six-stage process, with three steps within each stage. The stages are: Stage 1, identify the historical context; Stage 2, assess the situation; Stage 3, identify issues that have significant influence on the way the organization functions; Stage 4, identify strategies for addressing the issues; Stage 5, assess the feasibility of strategy implementation, with an exhaustive consideration of who will be affected by the new strategy; and, Stage 6, implement the plan, and identify what monitoring should be implemented. Nutt and Backoff (1987) require *search*, *synthesis* and *selection* at all six stages of the process. The *search* step requires the strategic planners to search out the required information for the step to be effectively implemented. This may take advantage of strategies like brainstorming communication in interactive groups, or silent reflective techniques like surveys or Strengths, Weaknesses, Opportunities, and Threat (SWOT) analysis - a study to identify an organization's internal strengths and weaknesses, in addition to its external opportunities and threats (Bryson &

Roering, 1987; Pickton & Wright, 1998). The *synthesis* step requires the strategic planners to look for patterns and themes from data generated from the preceding step. The *selection* step requires the strategic planners to winnow down ideas generated out of the *synthesis* step; often requires time for reflection before generating priorities, solutions and action steps.

Whereas, Nutt & Backhoff (1987) outlined prescriptive steps for strategic planning, Bryson & Roering (1987) developed a complex, multi-variable, model that incorporates the forces that organizations have to consider while implementing the strategic planning process. Nutt & Backhoff (1987) take a more linear process based approach, outlining six procedural steps. Bryson and Roering (1987) have built SWOT analysis, one of the steps in the Nutt and Backhoff plan, into their process as well, however it is an essential part of the entire process verses a stage of the process. The Bryson & Roaring (1987) plan does encourage the organization to picture itself in the future, which is not emphasized in the Nutt and Backhoff (1987) planning strategy. Both strategic planning approaches are similar. They both require the selection of an implementation leadership team, the identification of, and agreement on, the organization mission and mandates; and an analysis of from *who* the legitimacy of the organization's mission is received. While differences remain in theory, in practice the two versions of strategic planning are in agreement that organizations need to focus on organizational strategies, integrate a plan of action, and conduct informed SWOT analysis to recognize what the organization faces now and into the future.

Extension Strategic Planning

Fetsch and Bolen (1989) introduced for-profit strategic planning to Extension. Their seven points were: 1) Extension strategic planning is different than corporate strategic planning, and the organization 2) must provide support, 3) identify a facilitator, 4) involve all organizational sectors, 5) broaden ownership of the process, 6) negotiate the strategic plan wording, and, 7) "write the plan in pencil" as the process is ongoing (Fetsch & Bolen, 1989). Conone (1991) continued the recommendations, highlighting that Extension exists in the context of its stakeholders and that those long-term clients can have an outsized influence on the organization's future. In some cases, those historic stakeholders may prevent the organization from adapting to the current and future contexts. With that in mind Conone recommended that Extension should include people that do not have a vested interest in the current administrative structure or programming efforts (Conone, 1991), i.e., nonusers should be encouraged to participate in the process.

Extension does have a unique strategic planning context. Extension education resides in the public sector as an integral part of the Land Grant University system, funded by Federal, State and County governments (Franz & Townson, 2008). Increasingly it also functions as a not-for-profit organization, surviving off of grants, contracts and fees as opposed to public funding solely (Franz & Townson, 2008). Public-sector and not-for-profit organizations have critical needs to articulate, evaluate and manage their planning strategies, and those considerations are often overlooked (Nutt & Backoff, 1987).

Martin and Rewerts (1988) emphasized that hearing from Extension customers must be incorporated into planning processes. If Extension does not develop strategies to successfully listen to customers than the organization will not stay relevant (Boleman & Cummings, 2005). For example, Conone (1991) encouraged Extension to seek input from beyond an "agrarian focus" and to respond to the needs of the diversity of the people in the state.

Conceptual Framework

Planning is a "social activity whereby people construct educational programs by negotiating personal, organizational, and social interest in contexts marked by socially structured relations of power" (Cervero & Wilson, 2006, p. 24). It is "practically and ethically essential to ask who benefits and in what ways" (Cervero & Wilson, 2006, p. 26). Planners need to have an understanding of who participates in the planning process. Cervero and Wilson also maintained that these planning practices occur at "multiple physical and metaphorical planning tables" (2006, p. 18). Extension's diffuse nature of clientele and stakeholders, as well as the funding design - a combination of Federal, State and local funding - requires extra attention to organizational and social interests.

Methodology

The purpose of this study is to document and analyze the planning process used to produce a new strategic plan for VCE. The researchers asked the following questions: a) What is the strategic plan that is initiated and implemented in this state-wide strategic planning initiative? b) How does the steering committee influence the planning process? and c) What was learned by the steering committee to better implement a strategic planning process?

Data Collection

This case study used multiple means for data collection, including: 1) observation of the steering committee meetings and 47 community meetings conducted by the steering committee, 2) qualitative document analysis of steering committee member e-mails and planning documents (Yin, 2003) and, 3) formal in-depth interviews with the state extension director, the three state program directors, participants in the steering committee, and participants in the district and county planning meetings.

Participants. The participants of this study are the state extension director, the three state program leaders, and 25 individuals identified as a part of the state steering committee (N=29). The steering committee members were selected by the state extension director, the three program leaders, as well as regional administrators in order to ensure a diverse and representative population of VCE employees on the steering committee. The selected steering committee was comprised of on-campus state specialists, county agents, and State Agriculture Experiment Stations (SAES) employees. Additionally, the steering committee was comprised of equal representation from the VCE's regions and program areas, and had equity in representation across each organizational level.

Collection. Data were collected throughout the strategic plan steering committee process in 2009. This study received IRB approval prior to the first meeting of the steering committee. Steering committee meetings and interviews were audio recorded and transcribed verbatim. Observational data and all transcription of recorded data were collected by a team of faculty and graduate students.

Observations. Formal observations (Yin, 2003) were conducted during each of the steering committee meetings and a planning retreat. The researcher was included in all email exchanges that took place between the formal group meetings. Throughout the study the researchers maintained a role of participant observer (Spradley, 1980), allowing the planning group members to know that they are being observed. Observations were planned, focused (Spradley, 1980), and guided by observation protocols (Yin, 2003).

Documents. The research team collected documents and archived records related to the activities of the strategic planning work throughout the process. Materials were collected from the VCE website, archived staff records from earlier planning meetings for previous conferences, VCE annual reports, and steering committee e-mail communication. Lofland et al. (2006) suggests, these archival records "significantly enrich field studies, although they have considerable potential for error and bias" (p. 89) and therefore cannot be "accepted as literal recordings of events that have taken place" (Yin, 2003, p. 87). These documents serve the case study by corroborating information from other sources and providing additional inferences that may be pursued during the meeting observations and interviews. Since these documents are not written specifically for this study they were critically reviewed to determine their original purpose (Yin, 2003) and application to the case study.

Interviews. Another primary source for data in this descriptive case study were a series of interviews with select participants of the steering committee, district meetings, and county meetings. The interviews were designed to illuminate deep, authentic experiences, and to provide respondents the space to offer their opinions and reflective insights (Gubrium & Holstein, 2001) into strategic planning work. Eight [n=8] study participants completed the voluntary semi-structured interview.

Transcription. Per the IRB approval process in order to provide anonymity to participants the only participant identification allowed was gender, therefore all transcripts are blinded with male or female, for all participants. Transcription was conducted throughout the planning process as recordings became available, by a team of graduate students who were non-participant observers. The lead researcher reviewed transcripts for meeting meaning accuracy as a participant-observer.

Data Analysis

Data analysis commenced in 2017. One research team member, who had not previously been involved in the 2009 data collection, read through all of the materials twice in order to gain awareness of the data (Corbin & Strauss, 2008). Multiple sources of data supports triangulation (Creswell, 2014).

Observation. Throughout the strategic planning process, both development and implementation, the steering committee was observed. The steps in the strategic plan development process were documented. These steps were recorded. The researchers reflected on the process that was implemented.

Coding. Once familiar with the data, the researcher open-coded all of the materials: meeting transcripts, interviews, and documents (Corbin & Strauss, 2008). Open codes are used to illuminate the data and identify what is saturated and what is new (Charmaz, 2014). Focus-codes were developed to target incomplete understandings from the data (Charmaz, 2014).

Themes. The researcher who conducted the coding sorted all codes into significant categories. These categories were then organized into themes. The lead-researcher who had been involved in this study since its inception participated in analysis conversations and reviewed the codes, audit trail, and themes in order to give insight on the process. The lead researchers' role of participant observer informed the final theme development (Spradley, 1980).

Reflexivity

This study was coordinated by the lead researcher and two teams of graduate students. All researchers were from a department that is familiar with the purpose and mission of Extension. The researchers had varying levels of direct experience with VCE and other states' Extension programs.

Limitations

This study did not include outside stakeholders. Non-steering committee members' voices in the reflection process would have been valuable to illuminate stakeholder perspectives on the process implementation. Additionally, while all steering committee members are included in the study because they were a part of the committee, only eight participants volunteered to be interviewed. The participants also skewed towards campus administration, giving an outsized voice to VCE campus based administration.

This study was conducted across a decade. The lead researcher was the only person who remained the same between the team that collected the data and the team that analyzed the data. While the project was divided between data collection and data analysis, this meant that the researcher doing the data analysis was limited in their ability to utilize observations in the analysis process. Thus, the researcher who conducted the data analysis relied on being sensitized to the strategic planning literature and used the literature as a lens to develop open codes (Charmaz, 2014).

Results

The VCE Strategic Planning Process

The VCE Strategic Plan steering committee's first task, once convened, was to design a plan for strategic plan development. The researchers documented the strategic planning process. The step-by-step process that was conducted by the steering committee is delineated in Table 1. Steps in the Virginia Cooperative Extension Strategic Planning Process.

Table 1

Steps in the Virginia Cooperative Extension Strategic Planning Process

Stage in Process	Actions Taken
A) Initial Strategic Plan Steering Committee Meeting	1. Review purpose, mission, and core values of Extension 2. Build rapport and create a sense of team
B) Second Strategic Plan Steering Committee Meeting	1. Use SWOT analysis to conduct statewide environmental scan and develop appropriate planning strategies 2. Formulate the planning process
C) Collect Feedback from Across the State	1. Established a series of open meetings. Considerations were: group facilitators, observers to check participation o External- State, Regional, and local government, and brainstormed potential audiences o Internal- on campus/research status faculty, off campus agents, employees

	2. Open meetings were subject to IRB. All meetings were recorded, transcribed, by a team of researchers
D) Data Analysis	1. A team of researcher's line-by-line coded all open meeting transcripts 2. Steering committee were split into four teams to conduct further analysis on 12,000 individual open codes. The initial coding team organized like codes together. Keeping internal and external responses separate 3. Steering committee analyzed categories and codes into themes within internal and external categories 4. Merged themes from the four teams and from both internal and external stakeholders into one set of themes 5. Compile reports into tree diagram (Jones, Stanton, & Harrison, 2001) of strengths, weaknesses, opportunities, threats, issues/concerns by state, district, and county and by program area
E) Strategic Plan Preparation	1. Finalize vision statement 2. Update mission statement 3. Present core values 4. Report results of statewide environmental scan and appropriate strategies 5. Identify Priority Areas to be addressed over next five years 6. Each Extension unit developed long-range objectives based on results of their respecting strategic planning sessions: target audience, change, subject of change 7. Long-range objectives presented and discussed at regional listening sessions
F) Strategic Plan Review	1. Strategic Plan Steering Committee formulate statewide long-range objectives based on discussions at regional listening sessions 2. Interdisciplinary teams work with county faculty to develop educational materials in support of statewide long-range goals
G) Strategic Plan Steering Committee finalizes strategic plan	1. Strategic Plan is published 2. Strategic Plan is utilized 3. [An outside academic Unit] served as resource to teams in developing evaluation and accountability indicators to measure progress in addressing long-range objectives 4. County-based, center-based and campus-based faculty develop annual goals and implement programs in support of long-range objectives

Steering Committee was then brought together to establish the purpose, mission, and core values of VCE and Extension. Participants were asked to further develop the core values of the group in order to assess if the participant definition of Extension aligned with previously established organizational efforts. Groundwork definitions and statements were reviewed. The committee utilized a SWOT analysis to conduct a statewide environmental scan of VCE (Pickton & Wright, 1998). This was done to support accurate development of appropriate strategies.

The committee delineated a procedure and plan for how they would develop a final strategic plan for VCE. The Strategic Planning Steering committee's work resulted in 93 members of the Extension community hosting and facilitating 26 dialogue sessions with external state-level and local stakeholders and 21 sessions with internal stakeholders, Extension agents, staff, campus and center-based faculty and staff. These sessions yielded approximately 12,000 responses from 1,120 individuals ([Author], 2010). The data was coded, analyzed into themes, and then used by the committee to inform the writing of the strategic plan. Rich, thick description has been shared through the use of quotes from the participants in-order to give an open and honest narrative of the process challenges and strengths (Creswell, 2014; Yin, 2003).

Theme Results: Reflections on the Strategic Planning Process

Steering team influences on the strategic planning results. The state steering committee provided the leadership and guidance to the process from inception to publication. The development of the strategic planning process was enhanced by the capabilities of the steering committee. The team's ability to work together, as well as the knowledge and awareness that the individuals on the team were able to offer, enhanced the implementation of the process.

Effectiveness of team-enhanced results. Steering committee members identified that the implementation process was effective. They identified that the steering committee had an opportunity to form into a team at a two-day retreat. A steering committee member relayed:

> Female: I think the overall steering committee really meshed by having that extended meeting. We became a team because we spent enough time together and we fought a little bit and we struggled to get through the process. We became a team. I thought it was very open and people really felt free to share their voices.

The team development efforts resulted in honesty between team members, a safe environment for sharing ideas, and support between team members that allowed for the work to be effectively conducted. The team was influenced by constantly reflecting on how the process was going to be received and perceived throughout the organization.

Steering committee knowledge matters. Institutional knowledge and knowledge of organizational social dynamics ensured participation and effective feedback by the participants. The individuals at the planning table negotiated and influenced the planning process (Cervero & Wilson, 2006). More importantly in this process the steering committee relayed their valuable knowledge about the system derived from their insider status as well as employee perspectives of the process. For example, a steering committee member in a planning meeting stated

> we have been bouncing around the idea of inviting… State specialist to the district meetings, we realize that they will probably choose [because of proximity to the Virginia Tech campus], if they have that option, to choose to go to Southwest, and how is that going to affect your Fall District Meeting, when you have a whole group of Specialist [sic], possibly coming to Fall District Meeting that's scheduled?

The team member recognized that there was going to be heavy attendance at one specific meeting because of the proximity to the main campus and that it was going to affect the facilitation of other parts of the meeting. The steering committee recognized the stakeholder behavior, which allowed for the team to prepare for the dynamics that behavior generated.

The steering committee used insider knowledge when they were designing focus groups. The team was concerned with creating an environment that would make attendees comfortable enough to share their perspectives and input. A steering committee member said at a planning meeting, "I think we need to pre-select [the] groups because we know if you are an agent, they feel comfortable, you know I feel comfortable talking to those sitting beside me, but I may not." The steering committee, in response to this expected behavior, planned to pre-organize groups in order to facilitate having a diverse number of voices from specific categories of people. The groups were sometimes based on program area of interests or on type of stakeholder position. This was a strategy to allow for the free flow of conversation based off of previous institutional knowledge.

Barriers. Even with the best strategic planning there still will be barriers to participation. The object of the steering committee was to try and address challenges in order to enhance the overall process. The steering committee identified that because of the concurrent budget cut, it caused uncertainty among all stakeholders and put a tight timeline on all participants. Additionally, the team recognized that stakeholder motivation, particularly that of internal employees, was low or driven by concerns around the the financial instability.

Purpose. The timing of the strategic planning process was a challenge. The organization was conducting the strategic plan partly in response to the budget cuts. Stakeholders inside and outside of the organization were aware of the existential nature of the budget cut, causing a need for the committee to make clear that the process was a planning and strategy exercise rather than a reorganization process. A steering committee member said it clearly

> no one in Extension decided we wanted to take a 4.7 million dollar cut, but people are hurt by that and they're scared by that, including us, including me, including everyone that I work with.

One steering committee member during reflection on the process relayed

> [we had to] continually help them understand that it's not a restructuring process, but a program planning process

Because the strategic planning process was occurring at the same time the organization was facing a budget cut, stakeholders came to the process with fear and apprehension. This concern resulted in agendas being displayed by focus-group participants.

Timeline. The steering committee used their insider organizational knowledge to address some of the regular planning challenges. They navigated the other organizational commitments that internal stakeholders had along with the strategic planning process. One exchange of the steering team was

> Male: We have a 10-month timeline, and we're going to have to do this right away. This needs to be apart of the district meetings…
>
> Female: SPLs (State Program Leaders) want time with the agents too. We may have to rearrange some things.

In order to address the competing time commitments, the team tried to situate the strategic planning process along with the program planning efforts of the staff, or internal stakeholders. The steering committee, discussed

> Male: You'd want to do the local stuff… September.
>
> Female; Yeah, because that would fall in sync with the program planning cycle because that's the planning time and then they roll into developing their plan of work.

Ensuring the strategic planning process aligned with the organization's staff's annual planning process supported agents integrating the conversations they had about strategic planning into their annual planning around programming.

Motivation. Throughout the process the steering committee was aware of the reticence of internal stakeholders about participating. In a planning meeting a steering committee member said

> now there's always going to be moaning and groaning now. That's why I said somebody going to have to step in and say, "you have to be at this meeting"

As indicated in this quote, one of the strategies the team relied on was for high-level leadership, such as the Director of Extension or the Regional Directors, to emphasize the importance of participation. It was never done as a punitive approach; instead the support of administration for the strategic planning process was made clear and the message was often directed through leadership.

Commitment to diverse voices. The steering team expressed a commitment to involve diverse traditional internal stakeholders. The steering committee worked to include Department heads, agents, state specialists, staff at the Agricultural Research and Extension Centers, and Virginia Tech's 1890 partner institution, Virginia State University in the process.

Navigating non-user voice inclusion. The team was committed to "[get] as many voices involved as possible." The team spent considerable time discussing how to invite participation, and on who should be invited. The team was concerned with getting wide ranging representative organizations. Steering committee members discussed " ...do we have bankers on their, financial side of business…", "immigrant serving services", "organic", and "pet breeders" for example. An exchange between two steering committee members shows the recurring question of the team: why would these outside groups want to participate if they had no previous relationship with VCE?

> Female A: If we're little known by some of these groups. why would they come?
> Female B: We are trying to reach non-users
> Female A: But it's going to take a personal phone call, a personal invitation, because otherwise they aren't going to come.

The team settled on sending personalized letters to over 370 groups and following up with phone calls to stakeholders when possible. A team member reflected on the process, stating

> we worked really hard to make sure our list of invitees was comprehensive and we talked to a lot of people to make sure we had the right groups listed and we were reaching out to groups that we didn't work with, not just people we work with now, but non-users.

The focus was on inviting wide-ranging user and non-user participants. Even with that one team member relayed

> one place, the executive director came [from a new audience statewide agency]. I casually observed him and he was very quiet at the table where he was. I saw him two weekends ago at the National Conference, and he just felt totally overwhelmed according to him, totally out of place, didn't have any idea what he was talking, what he was being asked quite frankly. He also made the statement that when he would want to answer, the conversation was dominated by people who appeared to have an agenda.

This occurred even with the team's commitment to facilitation strategy. The team painstakingly reflected on how groups would be designed. The team had made an intentional choice to co-mingle different populations, interests and perspectives to help the cross-pollination of ideas. However, because of that mixing of groups there was not an opportunity to frame the conversation for non-users, which could contribute to the non-users' confusion about VCE. Many other steering committee members relayed that there had been good representation of many voices from within and outside of the organization and that their voices were well represented in the data.

Navigating historic user voice. Extension has long-term organizational stakeholders who hold political and social clout (Conone, 1991). These long-term relationships come with entrenched expectations of services, educational opportunities, and audiences to serve. The steering committee discovered that a membership-based organization was sending a representative to external stakeholder meetings in order to ensure key points were included in each meeting's transcripts in order to have an outsized influence on the analysis process. The committee recognized the value provided by the input and positive relationship this membership-based organization provides. VCE and the steering committee realized that if they were to successfully recognize their SWOT, they needed valid and fair data to analyze. Once it was discovered that the organization was trying to alter the outcomes of the study, that "manipulation" was taken into consideration during the theme development. The steering committee handicapped the data so that this organization was not able to have outsized influence on the results.

Strategic planning process limitations. Throughout the process there was not a specific assessment of actual or potential competitors (Bryson & Roering, 1987). This was the result of an organizational assumption that Extension was essential and relevant to Virginia communities. While none of the authors are arguing otherwise, it is important to challenge base assumptions during the strategic planning process to ensure the organization is responding to the environmental reality.

Upon reflection, the steering committee members identified that the use of verbal focus groups as the primary method of collecting data created an uneven playing field for some individuals to have their voices represented in the strategic planning process. The use of different input modes such as surveys, blogs, or interviews would have reduced the over-representation of certain passionate stakeholders within specific focus groups.

Discussion & Conclusions

The process developed and conducted by the steering committee mimicked the recommended strategic planning processes initially created by Bryson & Roering (1987) and Nutt & Backoff (1987). This finding suggests that state extension systems claiming to use strategic planning may indeed be utilizing appropriate processes. However, more states need to publish and reflect on their processes in order for this to be confirmed. This study supports that an internal state steering committees can implement a strategic plan without previous experience. A gap in the process was that the steering committee did not look for competitors (Bryson & Roering, 1987). This may be in response to the internal leadership's assumption that Extension is a unique organization. Additionally, the strategic planning team did not bring in outsider voices to the planning process which could have contributed to limiting how stakeholders did or did not participate. Assumptions need to be challenged throughout the process and the use of outside leadership may be a strategy to challenge assumptions.

Proper planning determines the ultimate success of the information garnered from he strategic plan (Corbin & Strauss, 2008). As the process was conducted, VCE included agents, staff, specialists, administrators, government officials, administrators, families, communities, and potential stakeholders. The steering committee considered the inherent weight of influence historic stakeholders have. In some instances, historic stakeholders should have a higher level of influence due to their continued importance for the future growth of organizations. In other instances, historic stakeholders may need to have their voices equalized with other stakeholders.

This inequity in power between historic stakeholders and newer stakeholders can result in conflict. Care should be taken by steering committees to balance historic stakeholder support in order to ensure the appropriate adaptation sought by the organization in the strategic planning process.

The strategic planning literature has not emphasized the implementation process. The steering committee took time to build a team in order to be more effective in their plan implementation. The steering committee navigated both expected and unexpected barriers in program planning (Cervero & Wilson, 2006) and because the planning team had built rapport was able to navigate these challenges.

The steering committee sought to be responsive to changing demographics as a strategy to remain relevant for the future (Bull et al., 2004). The process delineated in this paper sought to engage large numbers of user and non-user community stakeholders from across the state to ensure the organization is responsive to not only current but potential stakeholders. Engaging with non-users directly helped develop a strategic plan responsive to their needs and created an opportunity to educate non-users about what Extension provides. It was not enough to invite non-users to the table because they first needed to know what Extension is, and what Extension could do for them. Without that knowledge, non-users may not have attended or when they did participate, they were not able to articulate what it is that they needed from Extension.

This study found that historic stakeholders had a disproportionate level of influence compared to those new to the extension system. In fact, observations from this study showed that historic stakeholders were willing to "manipulate" the established process by sending representatives that did not meet the county geographic requirements, but that would ensure a loud, confident, reoccurring voice during the development process. This observation, also discussed in Conone (1991), reinforces the power challenges inherent to a historic organization when attempting to adapt to a changing environment.

Recommendations

Since 2009, only one article has been published in the *Journal of Extension* addressing the strategic planning process, and it solely targeted the development of an Urban Extension strategic plan and relayed the project outcomes, rather than reflecting on the process itself (Warner, Vavrina, Campbell, Elliott, Northrop, & Place, 2017). This study provides a baseline strategy for a statewide Extension strategic planning process study. More research needs to be conducted on how to effectively receive feedback from current and potential statewide stakeholders.

The process conducted by VCE was expansive and produced enormous amounts of qualitative data. The volume of data collected and the process of analyzing it were a significant burden, suggesting that the steering committee needs to be prepared to have a plan for data management and analysis. These qualitative data provided richness to the process, but could have been elicited through multiple methods. The volume of data generated should be considered in future strategic planning processes. Steering committees need to balance personnel and time requirements with qualitative richness. Narrowing research questions or using specific prompts may streamline feedback.

Outside stakeholders, particularly non-users, needed to have their consciousness raised about the possibilities of Extension before they are asked to engage with the conversation. For

Extension to be able to realize the potential of those new audiences, their voice needs to be heard as loud or louder than the current clientele. If those individuals/organizations are uncertain about their role within the organization, let alone in the strategic planning process, then they will not be forceful in sharing a vision of future Extension partnership or use. Future Extension strategic planning processes should be aware of this barrier and consciously attempt to support interactions between new stakeholders and the strategic planning process.

References

Andersen, T. J. (2000). Strategic planning, autonomous actions and corporate performance. *Long range planning*, *33*(2), 184-200. doi: 10.1016/S0024-6301(00)00028-5

Barnes, J., & Haynes, S. (2006). Building Trust in Local Community Organizations: Where Do We Start and How Can We Make a Difference? *Journal of Extension, 44*(4), Article 4TOT6. Available at http://www.joe.org/joe/2006august/tt6p.shtml.

Boleman, C. T., & Cummings, S. R. (2005). Listening to the people: A strategic planning model for cooperative extension. *Journal of Extension*, *43*(3), Article 3TOT3. Available at http://www.joe.org/joe/200 5june/tt3p.shtml.

Bryson, J. M., & Roering, W. D. (1987). Applying private-sector strategic planning in the public sector. *Journal of the American Planning Association*, *53*(1), 9-22. DOI: 10.1080/01944368708976631

Bull, N. H., Cote, L. S., Warner, P. D., & McKinnie, M. R. (2004). Is extension relevant for the 21st century? *Journal of Extension*, *42*(6), Article 6COM2. Available at https://www.joe.org/joe/2004december/comm2.php.

Cervero, R. M., & Wilson, A. L. (2006). *Working the planning table: Negotiating democratically for adult, continuing, and workplace education*. San Francisco: Jossey-Bass.

Charmaz, K. (2014). *Constructing grounded theory*. Thousand Oaks, CA: Sage

Clemson Cooperative Extension (2015). *Clemson Cooperative Extension: Strategic Plan 2015-2020*. Clemson, SC: Clemson University. Retrieved from https://www.clemson.edu/extension/strategicplan/files/clemson_extension_strategic_plan.pdf

Communications and Marketing (2010). *Virginia's Strategic Plan for Virginia Cooperative Extension*. Blacksburg: Virginia Tech. Retrieved from https://ext.vt.edu/content/dam/ext_vt_edu/strategic-planning/goals-objectives.pdf.

Conone, R. M. (1991). People listening to people... or are we really. *Journal of Extension*, *29*(3), Article 3FRM1. Available at http://www.joe.org/joe/1991fall/f1.php.

Corbin, J., & Strauss, A. L. (2008). *Basics of qualitative research* (Third ed.). Thousand Oaks: Sage.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks: Sage publications.

Fetsch, R. J., & Bolen, K. R. (1989). Successful strategic planning. *Journal of Extension*, *27*(4), Article 4FEA2. Available at http://www.joe.org/joe/1989winter/a2.php.

Franz, N. K., & Townson, L. (2008). The nature of complex organizations: The case of Cooperative Extension. *New Directions for Evaluation*, *2008*(120), 5-14. doi: 10.1002/ev.272.

Glaser, B. G., & Strauss, A. L. (1967/1995). *The discovery of grounded theory: Strategies for qualitative research*. New Brunswick: Aldine Transaction.

Graf, K. W. (1993). Will Cooperative Extension Survive the '90s? *Journal of Extension*, *31*(4), Article 4F2. Available at http://www.joe.org/joe/1993winter/f2.php.

Graham, D., Arnold, S., & Jayaratne, K. S. U. (2016) Research Priority 6: Vibrant, Resilient Communities. T. G. Roberts, A. Harder, & M. T. Brashears (Eds). (pp. 49-56). *American Association for Agricultural Education national research agenda: 2016-2020.* Gainesville, FL: Department of Agricultural Education and Communication.

Gubrium, J. F., & Holstein, J. A. (2001). From the individual interview to the interview society. In *Handbook of interview research: Context and method* (pp. 141 - 159). Thousand Oaks, CA: Sage.

Johnsrud, M. D., & Rauschkolb, R. S. (1989). Extension in Transition: Review and Renewal. *Journal of Extension*, *27*(1), Article 1TP1. Available at https://www.joe.org/joe/1989spring/tp1.php.

Jones, E., Stanton, N. A., & Harrison, D. (2001). Applying structured methods to Eco-innovation. An evaluation of the Product Ideas Tree diagram. *Design Studies*, *22*(6), 519-542. doi:10.1.1.426.95871.

King, D., & Boehlje, M. (2000). Extension: On the brink of extinction or distinction? *Journal of Extension*, *38*(5), Article 5COM1. Available at https://www.joe.org/joe/2000october/comm1.php.

Lofland, J., Snow, D., Anderson, L., & Lofland, L. H. (2006). *Analyzing social settings: A guide to qualitative observation and analysis* (fourth ed.). Toronto: Thomson Learning, Wadsworth.

Martin, D. H., & Rewerts, M. A. (1988). Knowing our customers. *Journal of Extension*, *26*(3), Article 3FEA8. Available at http://www.joe.org/joe/1988fall/a8.php.

McDowell, G. (2004). Is Extension an idea whose time has come and gone? *Journal of Extension*, *2*(6), Article 6COM1. Available at https://www.joe.org/joe/2004december/comm1.php.

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass.

North Carolina Cooperative Extension (2016). *N.C. Cooperative Extension Service, A Summary of Our Strategic Vision for Serving North Carolina*. Raleigh, NC: North Carolina State University. Retrieved from https://www.ces.ncsu.edu/vision-initiative/strategic-plan.

Nutt, P. C., & Backoff, R. W. (1987). A strategic management process for public and third-sector organizations. *Journal of the American Planning Association*, *53*(1), 44-57. doi: 10.1080/01944368708976634.

Olsen, J. B., & Eadie, D. C. (1982). *The game plan: Governance with foresight* (Vol. 1). Natl Governors Assn. Available at: https://trove.nla.gov.au/version/31243503.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (third ed.). Thousand Oaks: Sage Publications.

Pickton, D. W., & Wright, S. (1998). What's swot in strategic analysis?. *Strategic change*, *7*(2), 101-109. doi:10.1002/(SICI)1099-1697.

Poster, T. H., & Streib, G. (2005). Elements of strategic planning and management in municipal government: Status after two decades. *Public administration review*, *65*(1), 45-56. doi: 10.1111/j.1540-6210.2005.00429.

Schmitt, M. A., & Bartholomay, T. (2009). Organizational Restructuring and Its Effect on Agricultural Extension Educator Satisfaction and Effectiveness. *Journal of Extension, 47*(2), Article 2RIB1. Available at https://www.joe.org/joe/2009april/rb1.php.

Smith, K. L., & Torppa, C. B. (2010). Creating the capacity for organizational change: personnel participation and receptivity to change. *Journal of Extension*, *48*(4), Article 4FEA1. Available at http://www.joe.org/joe/2010august/pdf/JOE_v48_4a1.pdf.

Spradley, J. P. (1980). *Participant observation*. New York: Holt, Rinehart, & Winston.
Sobrero, P. M. (2004). Futuring: The implementation of anticipatory excellence. *Journal of Extension*, *42*(2), Article 2COM1. Available at http://www.joe.org/joe/2004april/comm1.php.

University of Minnesota Extension (2011). *Extension Strategic Plan: Guidelines for Decision-Making*. Minneapolis: University of Minnesota Extension. Available at http://www.extension.umn.edu/about/facts/extension-strategic-plan-2011.pdf

University of Missouri Extension (2017). *Mission. Vision. Values*. Columbia, MO: University of Missouri Extension. Available at http://extension.missouri.edu/about/strategic-plan.aspx.

Warner, L. A., Vavrina, C. S., Campbell, M. L., Elliott, M. L., Place, R. J., & Place, N. T. (2017). A Strategic Plan for Introducing, Implementing, Managing, and Monitoring an Urban Extension Platform. *Journal of Extension*, *55*(3), Article 3FEA1. Available at https://www.joe.org/joe/2017june/pdf/JOE_v55_3a1.pdf.

Yin, R. K. (2003). *Case study research: Design and methods* (third ed. Vol. 5). Thousand Oaks: Sage.

Lessons for Extension Strategic Planning: A Case Study of Virginia Cooperative Extension

Discussant Comments
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The authors chose to examine the strategic planning process conducted by the Virginia Cooperative Extension Service beginning in 2009. The context for this planning process was an approximately $4.7 million reduction in the Extension budget in response to the economic downturn of the Great Recession. The authors have produced a well-written, even interesting, manuscript that both describes and holds up a critical lens to this process, detailing its strengths, weaknesses, successes, and limitations.

The literature review clearly establishes the importance of the topic. Strategic planning is a common and widespread process in organizations ranging from Fortune 500 companies to our own departments, colleges, and universities. Yet, as the authors correctly note, little if any literature exists that describes and examines the strategic planning process as it is conducted in real-world situations. The authors should be commended for both recognizing this gap in the knowledge base and in conducting relevant research to help fill the gap.

While I have tremendous respect for the rigor and results of qualitative research, I claim no particular expertise in evaluating its methodology. I readily admit it is my own personal failing that reading a document that does not make familiar and even comforting references to populations, samples, *p*-values, effect sizes, and the ever-present, if often incorrectly used, coefficient alpha is an uncomfortable reminder of the constantly and geometrically increasing universe of important things that I don't know. However, the researchers do provide clear descriptions of and authorative documentation for the correctness of their methods and procedures and, given both the overall excellent quality of the paper and the reputations of its authors, I have full confidence in the rigor of the study.

The results were clearly stated and easy to follow. As is typical with qualitative research, the authors provided a wealth of verbatim transcript data that allow readers to understand, at least in part, how the strategic planning process looked and felt to the participants. Given the context of a concurrent $4.7 million budget reduction, it is easy to understand why steering committee members "came to the process with fear and apprehension" and why existing stakeholders sought to maintain their customary share of a diminished pie.

The stakeholder group was exclusively composed of Extension employees. Quite likely, these employees had a stake in maintaining the status quo in Extension programming. The authors correctly recognized this as being a limitation of the strategic planning process. I would be interested in hearing the authors' thoughts on why this was done and how the strategic planning process might have been different if outside stakeholders, especially non-users of Extension, had been included.

My compliments to the authors on a well-written, interesting, and informative manuscript. From my perspective, any group of authors who can describe strategic planning in such a manner is more than worth their weight in gold! Well done!

Educating Farmers on the Financial Incentives Associated with Increased Engagement in Best Management Practices

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Abstract

The benefits to the environment associated with farmer adoption of Best Management Practices (BMPs) is well documented yet the agricultural industry has resisted widespread acceptance and implementation. Network support, level of education/knowledge, and financial concerns have all been found as contributing factors impacting adoption. Extension agents can increase knowledge levels through direct education with farmers; however, network support in the form of public support and willingness to pay for engagement in BMPs may be the best way to combine the network and financial support farmers need to increase engagement. Unfortunately, little is known about public interest in supporting BMP engagement. This study sought to determine public willingness to pay for BMP engagement and identify the characteristics of those willing to pay more for food produced using BMPs so extension efforts could be targeted at the consumer as well as the producer. Findings indicated there is public support for BMP adoption and that most would support a 10 percent increase in food prices to buy food produced using BMPs. Recommendations for marketing strategies and how extension agents can identify and utilize BMP opinion leaders to assist in educating a broad base of consumers in the cost of BMP engagement are offered.

Introduction

Agricultural best management practices (BMPs) are practical approaches for agricultural producers to cost effectively conserve and preserve natural resources (Florida Department of Agriculture and Consumer Services, n.d.). BMPs have been developed by scientists to prevent farmers from overusing natural resources and to reduce the amount of pollutants entering the environment. Water scarcity, land erosion, and biodiversity loss is increasing worldwide (Water consumed this year, n.d.; Soil Erosion and Degradation, n.d.) and is impacting farming practices across the globe. The agricultural industry has been proactive in remediating natural resource exploitation while still maintaining sufficient production; however, there is still more that can be done and many farmers are not engaging in BMPs at the level they can and should because the alteration of practices can be costly. Financial barriers are often the reason why new innovations, such as BMPs, are not adopted (Lamm, Warner, Martin, White, & Fisher, 2017a; Lamm et al., 2017b; Rogers, 2003). Agricultural BMPs are proven effective measures with known environmental benefits but are also financially beneficial for farmers (Bhopal, 2016). Therefore, the implementation of BMPs for producers can protect the environment and be an advantageous business decision.

Despite the environmental and potential financial incentives for using BMPs, farmers' acceptance and implementation of such practices has varied (Prokopy, Floress, Klotthor-Weinkauf, and Baumgart-Getz, 2008). Prokopy et al. (2008) reviewed 25 years of BMP literature and identified several factors that influenced farmers' adoption of BMPs. These factors included (a) the utilization of social networks, (b) access to information, (c) positive environmental attitudes, and (d) increased environmental awareness in producers (Prokopy et al., 2008). However, the researchers also found that to improve environmental attitudes and to increase environmental awareness it was important for outreach groups from the community, such as extension agents, be present to encourage farmers. As such, Prokopy et al. (2008) suggested public encouragement of BMPs, through education conducted by agencies and groups such as extension, is crucial to farmers changing their practices.

Similarly, Baumgart-Getz, Prokopy, and Floress (2012) examined 46 research studies on producers' adoption of BMPs between the years of 1982 and 2007. The studies evaluated were synthesized to create a list of key independent variables in the categories of (a) capacity, (b) attitude, and (c) environmental awareness. Variables that were prevalent included descriptive evaluations of farms (e.g. farm size, age of the farmer), availability of BMP adoption payments, and the previously mentioned factors involving producers' networking and farmers' perceptions of the environment (Baumgart-Getz et al., 2012). The researchers concluded that networking and acquisition of knowledge, such as that offered by extension educators, was a significant factor contributing to their awareness of BMPs and their eventual adoption (Baumgart-Getz et al., 2012). Further, support from BMP adoption payments was not a significant contributor to farmers' adoption of BMP practices. Based on these findings, Baumgart-Getz et al. (2012) asserted that adoption of BMPs was primarily contingent upon social factors rather than financial support or incentive. Therefore, future encouragement of agricultural BMPs adoption may be best actualized through producer networking with the public, rather than through financial incentives.

Public interest and attitude toward sustainable agricultural products, such as products produced using BMPs, has increased steadily in recent years. However, there has also been increased concern regarding the dissonance in consumers' attitudes and intentions of products developed using BMPs (Vermeir & Verbeke, 2006). In a study conducted to examine young consumers' attitudes and intentions toward sustainably produced food, Vermeir and Verbeke (2006) found consumers who were given informational text about the importance of sustainable consumption had higher intentions of buying sustainable foods than respondents who received other messages. Disbursing informative messages on agricultural BMPs may prove to have similar advantages.

This study was intended to determine the factors that influence consumers' willingness to pay for food produced using BMPs. Determining the dissonance between consumers' who are willing to pay more for products produced using BMPs and consumers who are not can provide a clear perspective on those groups that should be targeted by extension efforts and informed of the potential benefits of BMPs. Since public encouragement is an active part of farmers' adoption of BMPs (Prokopy et al., 2008), it is important to be able to gauge consumers' approval of BMPs versus the costs that are associated with these practices. While BMPs can be advantageous for agribusinesses, they are often associated with start-up costs and change that can be uncomfortable for farmers. However, public opinion of and willingness to buy BMP products may be influential on the farmers adoption of such practices (Miller, 2014). This study was conducted to better aid Extension educators in marketing BMP products and, ultimately, increasing farmer adoption of such products. Further, this study addresses the American

Association for Agricultural Education national research priority two: New technologies, practices and products adoption decisions (Lindner, Rodriguez, Strong, Jones, Layfield, 2016).

Theoretical Framework

Social marketing and audience segmentation has been used frequently in agricultural and Extension as a means of highlighting specific subgroups to gain insight into possible strategies for addressing complex issues (Huang, Lamm, & Dukes, 2016; Warner, Chaudhary, Rumble, Lamm, & Momol, 2017). Moreover, audience segmentation is utilized to help ensure the maximum impact is made with an initiative (Andreasen, 2006). Whenever decision makers apply segmentation to their desired audience, resources can be more efficiently allocated by taking into consideration benefits versus costs (Andreasen, 2006). Audience segmentation can be conducted with factors such as gender, ethnicity, and location to determine the most appropriate approach (Andreasen, 2006; Warner et al., 2017). While other approaches to marketing may focus heavily on the primary audience, the strategic approach of audience segmentation considers secondary audiences who can play key roles and influence the primary audience (Atkin & Freimuth, 2001). The role of the public in natural resource conservation as it relates to agriculture closely aligns with the idealism of secondary audiences influencing the primary audience (Prokopy et al., 2008). Therefore, this influence must be evaluated to encourage further expansion of BMPs.

Numerous studies have been conducted regarding consumers' willingness to pay for agriculture products, and socio-demographic information has been utilized often to create profiles on consumer groups (Verain, Bartels, Dagevos, Sijtsema, Onwezen, & Antonides, 2012). Variables that have been considered most frequently include age, gender, education, household size, income, and race (Batte, Hooker, Haab, & Beaverson, 2007; De Groote, Kimenju, & Morawetz, 2011; Loureiro & Umberger, 2003;). Market segmentation studies have also been conducted on consumers' willingness to pay, including evaluations of consumers' perceptions of green electricity, organic products, and environmentally friendly products (Gil, Gracia, & Sanchez, 2000; Laroche, Bergeron, & Barbaro-Forleo, 2001; Zhang & Wu, 2012). Examining the dissonance between a consumers' willingness to pay can help decision makers make informed choices on policies and strategies that promote agricultural BMPs to consumers.

This study will explore the differences in consumers' willingness to pay using segmentation from these variables. By identifying any dissonance between groups, opportunities to encourage BMPs can be more effectively focused upon by extension agents. As secondary groups can be significant influencers on primary groups' adoption of a practice, this method of targeting consumer groups can be an effective approach for encouraging BMPs (Atkin & Freimuth, 2001). Since producer's likelihood of BMPs adoption is contingent upon incentives (Miller, 2014) using the effective approach of networking, mentioned by Baungart-Getz et al. (2012), is another strategy that should be explored by extension agents to encourage producers' adoption of BMPs. Finding disparities in consumers' willingness to pay for BMPs is the next step in increasing BMP adoption throughout the United States.

Purpose & Objectives

The purpose of this study was to examine Florida residents' willingness to pay more for food produced using best management practices (BMPs). The following research objectives guided this study:

1. Determine Florida residents' likelihood of buying and willingness to pay more for food produced using BMPs.

2. Describe the demographic characteristics of Florida residents by the amount they are willing to pay more for food produced using BMPs.

Methodology

An online survey research design was utilized to address the research objectives of this study. The population of interest was residents in Florida. Responses were obtained using a public opinion survey research company, Qualtrics. Non-probability sampling is a commonly used data collection method in public opinion research (Baker et al., 2013) and was employed in this study to best reach the targeted population.

Instrumentation

An online questionnaire was used as the instrument in this study. Face validity was established by an expert panel of faculty and staff with collective proficiencies in agricultural management practices and instrument development. The questionnaire was evaluated for readability, layout and style, and clarity of wording. The panel deemed the instrument acceptable. Finally, the questionnaire was pilot tested with 50 Florida residents before further distributing the questionnaire.

The research presented here was part of a larger study to gain an understanding of public perceptions of BMPs. Two sections of the questionnaire were germane to the objectives of this study. The first section was designed to assess respondents' willingness to pay for food grown using BMPs. Respondents were first asked to indicate whether they would pay more for a product grown or raised by a farmer using BMPs (1 = yes; 0 = no). Respondents who indicated they would be willing to pay more were then asked to indicate the percentage increase they were willing to pay for produce grown using BMPs when compared to produce not produced using BMPs (1 = *10% or $2.75 instead of $2.50 for a small container,* 2 = *25% or $3.13 instead of $2.50 for a small container,* 3 = *50% or $3.75 instead of $2.50 for a small container,* 4 = *75% or $4.38 instead of $2.50 for a small container*). The second section was demographic in nature with eight items used. They included (a) gender, (b) race, (c) area of residence, (d) annual household income, (e) educational attainment, (f) political beliefs, (g) political affiliation, and (h) involvement with agriculture.

Data Collection

The online link to the questionnaire was distributed by Qualtrics to Florida residents, and responses were collected gradually until set quotas were met. As nonprobability sampling procedures are intended to represent the population of interest, participation rates were used rather than response rates (Baker et al., 2013). A total of 526 completed responses were collected from 1,265 invited residents, resulting in a 42% participation rate. Due to the use of nonprobability opt-in sampling procedures, limitations of this study include nonparticipation biases, selection, and potential exclusion. Thus, the ability to generalize results beyond the scope of this study is limited (Baker et al., 203). Weighting techniques based on the 2010 census data were employed prior to data analysis in order to minimize these risks and ensure the sample was reflective of the population of interest (Baker et al., 2013)

Population

The population of interest was Florida residents. Respondents were split between males (51.7%) and females (48.3%), and the majority (77.6%) were White (see Table 1). Residents' ages ranged from 18 to 80 plus years, with more residents in the age categories 40 to 49 years (17.9%) and 50 to 59 years (17.2%) than any other category. The most respondents (40.6%) lived in an urban or suburban area outside of city limits, and the fewest number of respondents (1.6%) lived on a farm in a rural area. The highest level of education completed by the largest number of respondents was a four-year college degree (25.5%), followed by some college with no degree (24.6%), and the largest number of respondents (29.7%) earned less than $30,000 as their combined annual household income. Regarding political affiliation and values, respondents were split fairly evenly between Democrats (33.5%) and Republicans (31.0%), and more respondents (43.5%) held moderate beliefs than any other political belief. Lastly, the majority of respondents (64.6%) had never been involved in agriculture, nor did they have anyone in their immediate family who had ever been involved in agriculture (see Table 1).

Table 1

Weighted Demographic Characteristics of Respondents (N = 526)

Variable	*f*	%
Race		
White	408	77.6
Black	76	14.4
Asian or Pacific Islander	13	2.5
Multiracial	10	1.9
American Indian or Alaska Native	2	.4
Age Category		
40-49	94	17.9
50-59	90	17.2
20-29	86	16.3
30-39	81	15.5
60-69	75	14.2
70-79	49	9.4
80+	33	6.2
18-19	18	3.5
Area of Residence		
Urban or suburban area outside of city limits	214	40.6
Subdivision in a town or city	191	36.3
Rural area, not a farm	65	12.3
Downtown area in a city or town	48	9.2
A farm in a rural area	8	1.6

Educational Attainment		
4-year college	134	25.5
Some college no degree	129	24.6
High school graduate	118	22.5
2-year college degree	72	13.7
Graduate or Professional degree	63	12.0
Less than 12th grade (did not graduate high school)	9	1.8
Combined Annual Household Income		
Less than $30,000	156	29.7
$30,000-$39,000	76	14.4
More than $100,000	58	10.9
$40,000 - $49,999	57	10.8
$50,000 - $59,999	51	9.6
$70,000 - $79,999	47	8.9
$60,000 - $69,999	36	6.8
$80,000 - $89,999	27	5.2
$90,000 - $99,999	19	3.7
Political Beliefs		
Moderate	229	43.5
Conservative	122	23.1
Liberal	90	17.1
Very Liberal	47	8.9
Very Conservative	39	7.5
Political Affiliation		
Democrat	176	33.5
Republican	163	31.0
Independent	114	21.8
Non-affiliated	66	12.5
Other	6	1.2
Involvement in Agriculture		
I have never been involved in agriculture and no one in immediate family has ever been involved in agriculture	340	64.6
I have been involved in agriculture in the past	73	13.8
I am currently involved in agriculture as a hobby	60	11.4
I am not involved in agriculture but someone in my immediate family is	36	6.8
I am currently involved in agriculture for a living	18	3.5

Data Analysis

Respondents were organized within groups based on the percentage increase they were willing to pay for food produced using BMPs. Descriptive statistics (e.g. frequencies and percentages) were then used to describe the demographic characteristics of respondents in each segment. Data were analyzed using SPSS24.

Results

Willingness to Pay more for Food Produced Using BMPs

Objective one sought to determine Florida residents' likeliness to purchase and willingness to pay more for food produced using BMPs. The majority of residents (92%) indicated they would be more likely to buy products from a farmer that uses BMPs. Regarding willingness to pay, 64.6% of respondents reported they would pay more for a product that was grown or raised by a farmer using BMPs, and only 8.0% reported that they would not. Of the 340 residents willing to pay more, almost 60% were willing to pay 10% or $2.75 instead of $2.50 for a small container of fruit grown using BMPs when compared to fruit not produced using BMPs. Just over 30% of respondents were willing to pay 25% or $3.13 instead of $2.50 for a small container, and 7.1% were willing to pay 50% or $3.75 instead of $2.50 for a small container. Very few respondents (2.7%) were willing to pay 75% or $4.38 instead of $2.50 for a small container.

Demographic Classifications Based on Amount Willing to Pay for Food

The second research objective sought to describe Florida residents within each willingness to pay (WTP) group. The demographics of respondents in each willingness to pay group are depicted in Table 2. Respondents in the not willing to pay more for BMP products group were White (76.4%), predominantly male (58.0%), living in an urban areas (82.9%), and ranging between the ages of 20 and 79 years (97.1%). Few respondents in this group were ages 19 or younger (2.9%) and 70 or older (18.9%). The largest number of respondents in this group had obtained less than a college degree (55.4%) and earned less than $30,000 a year in their household (40.8%). The political values most represented by this group included being affiliated with the Republican party (31.6%) and having moderate political beliefs (42.8%). Lastly, the majority of respondents in this group (73.8%) had never been involved in agriculture, nor had anyone in their family been involved in agriculture.

Table 2

Demographic Characteristics of Residents Grouped by Percent Willing to Pay (WTP) More

Variable	Not WTP more n = 42 %	WTP 10% more n = 203 %	WTP 25% more n = 104 %	WTP 50% more n = 24 %	WTP 75% more n = 9 %
Sex					
Female	42.0	57.2	47.4	28.7	43.8
Male	58.0	42.8	52.6	71.3	56.2
Race					
White	76.4	85.6	71.5	51.2	64.7
Black	11.6	8.9	22.2	40.4	35.3
Asian or Pacific Islander	4.2	2.6	0	0	0
American Indian or Alaska Native	.9	.2	0	0	0
Multiracial	2.5	2.7	0	0	0
Other	4.4	0	0	8.4	0
Age Category					
18-19	2.9	3.4	4.5	5.5	0
20-29	16.2	13.3	21.0	13.6	37.7
30-39	14.8	13.4	17.5	30.9	12.1
40-49	13.5	17.5	18.8	38.4	50.1

50-59	15.2	18.7	20.5	11.6	0
60-69	18.5	12.1	15.0	0	0
70-79	8.9	14.8	2.7	0	0
80+	10.0	6.9	0	0	0
Area of Residence					
A farm in a rural area	1.4	1.6	1.3	0	11.0
Rural area, not a farm	15.7	8.8	14.7	10.5	0
Urban or suburban area outside of city limits	41.5	37.9	42.0	44.6	56.0
Subdivision in a town or city	35.5	42.5	30.7	22.3	19.7
Downtown area in a city or town	5.9	9.2	11.4	22.5	13.2
Educational Attainment					
Less than 12th grade (did not graduate high school)	2.5	1.6	.60	0	7.9
High school graduate	29.4	18.2	18.2	17.2	42.8
Some college no degree	23.5	27.4	25.6	9.9	9.4
2-year college degree	11.6	15.1	15.4	10.0	17.1
4-year college	23.0	25.5	27.7	35.4	22.7
Graduate or Professional degree	10.1	12.2	12.4	27.5	0
Combined Annual Household Income					
Less than $30,000	40.8	24.9	23.2	14.1	24.4
$30,000-$39,000	10.0	16.4	22.3	3.6	0
$40,000 - $49,999	9.7	12.7	5.8	13.1	40.7
$50,000 - $59,999	10.5	9.6	8.6	5.2	15.6
$60,000 - $69,999	7.7	8.8	3.4	0	0
$70,000 - $79,999	3.2	9.4	14.2	23.8	13.2
$80,000 - $89,999	5.3	3.3	8.6	5.0	6.1
$90,000 - $99,999	3.9	3.6	2.0	11.0	0
More than $100,000	9.0	11.2	11.8	24.4	0
Political Beliefs					
Very Liberal	9.2	6.4	11.0	19.0	6.1
Liberal	20.9	16.4	13.9	5.8	19.7
Moderate	42.8	44.2	42.4	50.4	33.4
Conservative	22.9	24.0	24.2	6.3	40.7
Very Conservative	4.2	9.0	8.5	18.5	0
Political Affiliation					
Republican	31.6	32.9	29.2	16.8	30.5
Democrat	29.7	30.2	40.4	52.0	58.5
Independent	19.7	28.3	17.5	9.2	0
Non-affiliated	15.8	8.3	12.8	22.1	11.0
Other	3.1	.3	0		
Involvement in Agriculture					
I am currently involved in agriculture for a living	1.2	3.7	5.0	8.7	13.2

I am currently involved in agriculture as a hobby	9.2	8.7	16.3	22.6	27.6
I have been involved in agriculture in the past	9.5	17.1	15.5	10.7	16.1
I am not involved in agriculture but someone in my immediate family is	6.2	5.2	9.6	10.7	11.0
I have never been involved in agriculture and no one in immediate family has ever been involved in agriculture	73.8	65.3	53.5	47.4	32.1

In the group willing to pay 10% more for BMP products, the largest number of respondents were White (85.6%), female (57.2%), living in subdivision in a town or city (42.5%), and ranging between the ages of 20 to 79 years old (89.8%). Few respondents in this group were in the age categories of 18 to 19 (3.4%) and 80 or older (6.9%). A larger number of respondents in this group had acquired some college, no degree (27.4%) or a four-year college degree (25.5%) and earned less than $30,000 a year in their household (24.9%). These respondents held moderate political beliefs (44.2%) and were affiliated with the Republican (32.9%) and Democratic (30.2%) parties. The majority of respondents in this group (65.3%) had never been involved in agriculture, nor had a family member involved in agriculture.

The group willing to pay 25% more for BMP products were primarily male (52%), Democrats (40.4%), and within the age range of 20 to 69 years old (92.8%). Few respondents in this group were within the age categories of 18 to 19 (4.5%) or 70 to 79 years old (2.7%), and no respondents in this group were 80 years old or older. Finally, 53% of respondents in this group had never been involved in agriculture nor had a family member involved in agriculture.

Respondents in the group willing to pay 50% more for BMP products were primarily White (51.2%) or Black (40.4%), male (71.3%), living in an urban or suburban area outside city limits (44.6%), and between the ages of 30 and 49 years old (69.3%). Few respondents were 19 years old or younger (5.5%), and no respondents were 60 or older. A larger number of respondents in this group had acquired a four-year college degree (35.4%) or a graduate/professional degree (27.5%), and 24.4% earned more than $100,000 a year in their household. These respondents held moderate political beliefs (50.4%) and were affiliated with the Democratic (52%) party. The majority of respondents in this group (52.7%) had some degree of involvement in agriculture or had a family member involved in agriculture.

Few respondents were willing to pay 75% more for BMP products (n = 9). These respondents were White, (64.7%), male (56.2%), and lived in an urban or suburban area outside of city limits (56.0%). Respondents in this group ranged from 20 to 49 years old, with the majority in the age range of 40 to 49 (50.1%). No respondents in this group were 19 or younger or 50 or older. A larger number of respondents (42.8%) had acquired a high school diploma as their highest level of education and earned $40,000 to $49,999 a year in their household (40.7%). The majority of respondents in this group were affiliated with the Democratic party (58.5%). Finally, the majority (67.9%) had some degree of involvement in agriculture or had a family member involved in agriculture.

Conclusions, Implications and Recommendations

The environmental benefits associated with farmer engagement in BMPs is widely documented yet acceptance and implementations of BMPs is still limited (Lamm et al., 2017a; Lamm et al., 2017b). Many factors contribute to farmer adoption including network support, level of education/knowledge, and financial concerns (Prokopy et al., 2008). Public support and willingness to pay for engagement in BM`Ps would offer the network and financial support farmers need to increase engagement yet little is known about public interest in supporting BMP engagement with their pocketbook.

The results of this study revealed the overwhelming majority of Florida residents would be more likely to buy products from a farmer who uses BMPs. However, fewer were willing to purchase food grown using BMPs if they had to pay more for it. This finding implies there is a need for extension education that informs the public of the costs associated with BMP production of goods. Further, it may be beneficial to employ marketing strategies that highlight the importance of BMPs to mitigate consumer hesitation when faced with increased prices of BMP products.

Despite the observed dissonance between likelihood of buying BMP products and willingness to pay more, the findings indicated consumers were willing to pay some amount more for food grown using BMPs. However, there were differences in the characteristics of consumers willing to pay more for food grown using BMPs. Segmenting the audience based on percent willing to pay can help extension agents assist their clientele in targeting consumer audiences based on the specific price of their products. First, the findings can assist in developing a pricing scheme. Of the residents willing to pay more for BMP products, most were willing to pay 10 or 25 percent more. Fewer residents were willing to pay 50 percent more, and only a very few were willing to pay 75 percent more. As such, it may be in the best interest of Florida producers to adopt BMPs that do not result in the cost of the product exceeding a 25 percent increase compared to products not produced using BMPs.

The characteristics of residents willing to pay 10 percent more was split fairly evenly across all demographic characteristics with the exception of race. However, the majority of White residents in the 10 percent group were consistent with the demographics of the Florida population. This implies there is a wider market for selling BMP products at a 10 percent increased cost to consumers rather than a need to tailor marketing to a specific sub population. If the additional costs of BMP engagement can keep farmers from increasing more than 10 percent consumers will hardly be impacted and be supportive of BMP engagement.

The number of respondents who had some degree of involvement in agriculture or had a family member involved in agriculture increased as amount willing to pay increased. This finding indicated that consumers who have or have had some connection to agriculture are more likely to purchase food grown using BMPs at an increased price. Perhaps these individuals could be used as opinion leaders within their communities (Rogers, 2003) and accessed by extension agents to tell their story to their neighbors and friends. Since they are already willing to pay more for products produced using BMPs they could be targeted and further educated as BMP activists. An extension educational booth could be set up at a local farmers market or CSA pick up spot to discuss the benefits of BMP adoption. At this location, the extension agent could strive to identify some of these opinion leaders and collect their contact information so they could be accessed for targeted events or even social media communication campaigns in the future.

While examining socio-demographic characteristics can provide useful insight when marketing BMP products (Andreasen, 2006), future research is needed to examine consumers' overall perceptions of BMPs. According to Verain et al., (2012), socio-demographic variables alone may not give sufficient information for segmenting consumers' preference. As a disparity was observed between Florida residents' likelihood of buying BMP products and their willingness to pay more for those products, future BMP research should be conducted to include consumer attitudes and beliefs in addition to socio-demographic factors. In addition, research should be conducted outside of the state of Florida to determine if consumer willingness is different in another state that may focus on different crops or have a different growing season.

References

Andreasen, A. R. (2006). *Social marketing in the 21st century*. Thousand Oaks, CA: Sage. doi:10.4135/9781483329192

Atkin, C. K., & Freimuth, V. S. (2001). Formative evaluation research in campaign design. *Public communication campaigns*, *3*, 125—145. doi:10.4135/9781452233260.n7

Baker, R., Brick, J. M., Bates, N. A., Battaglia, M., Couper, M. P., Dever, J. A.,… & Tourangeau, R. (2013). Report of the AAPOR task force on non-probability sampling. American Association for Public Opinion Research. Retrieved from http://www.aapor.org/AM/Template.cfm?Section=Reports1&Template=/CM/ContentDisplay.cfm&ContentID=5963

Batte, M. T., Hooker, N. H., Haab, T. C., & Beaverson, J. (2007). Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products. *Food policy*, *32*(2), 145–159. doi:10.1016/j.foodpol.2006.05.003

Baumgart-Getz, A., Prokopy, L. S., & Floress, K. (2012). Why farmers adopt best management practice in the United States: A meta-analysis of the adoption literature. *Journal of environmental management*, *96*(1), 17–25. doi:10.1016/j.jenvman.2011.10.006

Bhopal, S. T. (2016, June 05). Save water, earn money: Dewas farmers script a success story. Retrieved December 15, 2017, from http://www.hindustantimes.com/bhopal/save-water-earn-money-dewas-farmers-script-a-success-story/story-K38JEYMgE46urNQtWkN4aL.html

De Groote, H., Kimenju, S. C., & Morawetz, U. B. (2011). Estimating consumer willingness to pay for food quality with experimental auctions: the case of yellow versus fortified maize meal in Kenya. *Agricultural Economics*, *42*(1), 1–16. doi:10.1111/j.1574-0862.2010.00466.x

Florida Department of Agriculture and Consumer Services. (n.d.). Retrieved December 15, 2017, from http://www.freshfromflorida.com/Business-Services/Water/Agricultural-Best-Management-Practices

Gil, J. M., Gracia, A., & Sanchez, M. (2000). Market segmentation and willingness to pay for organic products in Spain. *The International Food and Agribusiness Management Review, 3*(2), 207–226. doi:10.1016/s1096-7508(01)00040-4

Huang, P., Lamm, A. J., & Dukes, M. (2016). Informing extension program development through audience segmentation: Targeting high water users. *Journal of Agricultural Education, 57*(2), 75–89. doi:10.5032/jae.2016.02075

Lamm, A. J., Warner, L. A., Martin, E. T., White, S. A., & Fisher, P. (2017a). Enhancing extension programs by discussing water conservation technology adoption with growers. *Journal of Agricultural Education, 58*(1), 251–266. doi:10.5032/jae.2017.01251

Lamm, A. J., Warner, L. A., Taylor, M. R., Martin, E. T., White, S. A., & Fisher, P. (2017b). Diffusing water conservation and treatment technologies to nursery and greenhouse growers. *Journal of International Agricultural and Extension Education, 24*(1), 105–119. doi:10.5191/jiaee.2017.24110

Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, *18*(6), 503–520. doi:10.1108/eum0000000006115

Lindner, J. R., Rodriguez, M. T., Strong, R., Jones, D., & Layfield, D. Research priority 2: New technologies, practices, and products adoption decisions. In T. G. Roberts, A. Harder, & M. T. Brashears (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020* (pp. 19–25). Gainesville, FL: Department of Agricultural Education and Communication

Loureiro, M. L., & Umberger, W. J. (2003). Estimating consumer willingness to pay for country-of-origin labeling. *Journal of Agricultural and Resource Economics*, 287–301.doi:10.1017/s1074070800007094

Miller, J. (2014). *Farmer adoption of best management practices using incentivized conservation programs* (Doctoral dissertation, The University of Vermont and State Agricultural College).

Prokopy, L. S., Floress, K., Klotthor-Weinkauf, D., & Baumgart-Getz, A. (2008). Determinants of agricultural best management practice adoption: Evidence from the literature. *Journal of Soil and Water Conservation, 63*(5), 300–311. doi:10.2489/63.5.300

Rogers, E. M. (2003). *Diffusion of Innovations.* New York, NY: Free Press.

Shiferaw, B. A., Okello, J., & Reddy, R. V. (2009). Adoption and adaptation of natural resource management innovations in smallholder agriculture: Reflections on key lessons and best practices. *Environment, development and sustainability*, *11*(3), 601–619. doi:10.1007/s10668-007-9132-1

Soil Erosion and Degradation. (n.d.). Retrieved December 15, 2017, from https://www.worldwildlife.org/threats/soil-erosion-and-degradation

Verain, M. C., Bartels, J., Dagevos, H., Sijtsema, S. J., Onwezen, M. C., & Antonides, G. (2012). Segments of sustainable food consumers: a literature review. *International Journal of Consumer Studies*, *36*(2), 123–132. doi:10.1111/j.1470-6431.2011.01082.x

Vermeir, I., & Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer “attitude–behavioral intention” gap. *Journal of Agricultural and Environmental Ethics*, *19*(2), 169–194. doi:10.1007/s10806-005-5485-3

Warner, L. A., Chaudhary, A. K., Rumble, J. N., Lamm, A. J., & Momol, E. (2017). Using audience segmentation to tailor residential irrigation water conservation programs. *Journal of Agricultural Education, 58*(1), 313–333. doi:10.5032/jae.2017.01313

Water consumed this year (millions of liters). (n.d.). Retrieved December 15, 2017, from http://www.worldometers.info/water/

Zhang, L., & Wu, Y. (2012). Market segmentation and willingness to pay for green electricity among urban residents in China: The case of Jiangsu Province. *Energy Policy*, *51*, 514–523. doi:10.1016/j.enpol.2012.08.053

Educating Farmers on the Financial Incentives Associated with Increased Engagement in Best Management Practices

Discussant Comments
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The authors used a public survey research company (Qualtrics) to survey a nonprobability sample of Florida residents to determine their likelihood of purchasing food grown using best management practices (BMPs) and the extent to which they would pay extra for such food. The introduction was well written and clearly established the need for the study. One small suggestion would be to include a couple of representative BMPs so readers have additional context for understanding the study. The theoretical (conceptual?) framework was based on social marketing, audience segmentation, and willingness-to-pay. While these phrases are somewhat self-explanatory, a brief operational definition of each would be helpful to readers.

The research methods were clearly described and generally followed accepted procedures. If only for my own professional development, I wish the authors had provided additional information on how the non-probability sampling strategy was implemented. I am confident it was done correctly, but I would like to learn the details. My only methodological concern with the manuscript has to do with reliability. By my reading, the variables “willingness to pay” and “percent extra willing to pay” (my term) were operationalized as single items. Given that respondents were answering two questions they likely had not previously considered, evidence for the reliability (stability) of their responses would be appropriate.

The finding that 92% of respondents would be more likely to purchase food produced using BMPs, but that only 64.6% would pay extra for such food is striking and may indicate a lack of knowledge among this subset of respondents about food production. It would be interesting to see a comparative demographic profile of these respondents. Additionally, it was interesting to see how little premium respondents were willing to pay for BMP-produced foods, with a majority only willing to pay a 10% (or less) extra for such food. Given a recent USDA estimate that farmers receive only 11.6 cents out of every dollar spent on food, there appears to be little financial incentive for farmers to adopt BMPs.

Table 2 contained a wealth of interesting data; however, I found myself constantly referring back to Table 1 to compare cell percentages with the weighted demographic characteristics. It would be helpful if the authors reported whether or not the percentages in Table 2 differed significantly from the weighted percentages in Table 1. For example, is the percentage of female respondents “Not WTP” (42%) significantly different from the percent of females in the weighted sample (48.3%)?

The conclusions, implications, and recommendations are appropriate and based on the results. However, given the potential for non-response error (as noted by the authors) I would caution against conflating the respondents (specific) with residents (general). The recommendation to examine consumers’ overall perceptions of BMPs is warranted and constitutes a logical next step in this line of inquiry.

Eco-Leadership Among County 4-H Organizations: Relationship to Programmatic Success and Best Practices for Eco-Leaders

Our understanding of leaders and the role they play in organizations and society is changing. At the turn of the century, society began to move from more mechanistic understanding of leadership to a more ecological one. The latter, ecological approach to leadership is characterized by collective decision-making, collaboration, shared leadership, and grassroots organization. This study uses an explanatory sequential mixed methods design to explore the nature of the relationship between: (a) county 4-H association members' levels of hierarchical and systemic thinking; (b) how 4-H associations engage in leadership and organizational learning; and (c) programmatic success. While no direct relationship between association members' levels of hierarchical and systemic thinking and programmatic success was found, mixed methods results revealed several distinctions between high and low scoring programs' approaches to leadership that support an ecological approach to leadership.

Introduction

Our society's understanding of what leadership is, and what a leader should be, has undergone a significant shift in the early part of the 21st century. Traditional definitions of leadership dating to the 1900s might describe the phenomenon as "a process whereby an individual influences a group of individuals to achieve a common goal" (Northouse, 2013, p. 3). This understanding of leadership is rooted in what Allen, Stelzner, and Wielkiewicz (1998) call an industrial, or mechanistic, paradigm, which focuses on the preeminence of individual positional leaders and the machine-like qualities of organizations. While such a conceptualization of leadership was appropriate — and effective — during the Industrial Revolution, as the Western world entered the 21st century knowledge-driven economy, the industrial paradigm's reliance on individual leaders to provide 'the leadership' for organizations was revealed to be untenable in this increasingly complex, interdependent, and interconnected world. Leadership evolved to meet those challenges.

At the turn of the century, Allen, Stelzner, and Wielkiewicz (1998) and others identified an emerging ecological paradigm in leadership studies. The ecological paradigm of leadership focuses on the systemic nature of leadership. Leadership is no longer understood as the actions or properties of an individual leader holding a position of authority, but, rather, a collective process that involves both leaders and followers co-creating leadership. Under this paradigm, there is, of course, still individual positional leaders, but their new role is to "assist in the emergence of leadership, rather than creating change through executive orders and decision" (Wielkiewicz & Stelzner, 2005, p. 331). This approach enables organizations to harness the talent, creativity, and energy of all employees and stakeholders, rather than relying on an individual, or select few, leaders to provide leadership (Wielkiewicz & Stelzner, 2010; Western, 2013).

Four Factors of the Ecological Paradigm of Leadership

Wielkiewicz and Stelzner (2010) put forward four factors to consider when structuring organizations to nurture the creation of leadership under an ecological model: (a) interdependence; (b) open systems and feedback loops; (c) cycling of resources; and (d) adaptation. These four principles are "critical to understanding leadership and organizations" from an ecological viewpoint (Wielkiewicz & Stelzner, 2010, p. 18). First, the principle of

Interdependence holds that any attempt to understand or direct an organization by focusing on its positional leader is incomplete and bound to fail. Leadership must be understood in the complex context of the organization and its environment (Wielkiewicz & Stelzner, 2010). Second, Open Systems and Feedback Loops holds that no organization is a closed system. Each organization is dependent on inflows of information and other resources. Each organization is itself part of a larger, more complex open system (e.g., economic, political, social). Organizations that squelch feedback loops place the organization at risk by lessening its ability to adapt to the environment (Wielkiewicz & Stelzner, 2010). Third, Cycling of Resources maintains that like biological systems must utilize resources in the environment in an efficient and sustainable way, leadership processes within organizations must also efficiently leverage the talent and capacity of the whole system by developing an ongoing, long-term process for cultivating leaders. Fourth, Adaptation holds that like biological systems adapt through evolution, similarly, organizations must have in place structures that facilitate ongoing organizational learning in order to adapt to changing environments. The greater the adaptive learning, the greater the ability to respond to external threats (Wielkiewicz & Stelzner, 2010).

Research of Ecological Forms of Leadership

Traditionally, the study of leadership has also been rooted in a mechanistic understanding of the world, usually focusing on the behaviors of the individual leader and his or her linear influence on followers (Wielkiewicz, 2002). However, new research has begun to focus instead on “the systems context in which leadership and organizational adaptation takes place” (Wielkiewicz, 2002, p. 108). These new leadership theories are based in ecology and systems theory, rather than more traditional psychology and sociology (e.g., Capra, 1996; Colarelli, 1998; Katz & Kahn, 1978; Kelly, Ryan, Altmann, & Stelzner, 2000). This ecological perspective on leadership put forward by Wielkiewicz (2002) contends that:

> No single individual is capable of leading an organization in the sense that the word has traditionally been used because the amount of information that must be processed and the complexity of challenges from the outside the organization are too enormous. Instead, a successful organization must function like a complex adaptive system. (p. 108)

This implication is that instead of fixating on individual positional leaders who function in a top-down, hierarchical manner, organizations would be more successful in adapting to environmental changes if they were to “draw on ecological principles to match the complexity of the environment in which organizations function” (Wielkiewicz, 2000, pp. 108-109). These new constructs of an ecological perspective of leadership — diversity, feedback loops, increased organizational learning, and systemic thinking — necessitate new measures to help researchers and practitioners study and influence the development of beliefs and skills related to leadership (Wielkiewicz, 2000).

Measuring Ecological Approaches to Leadership

According to the ecological theory of leadership, as described by Allen, Stelzner, and Wielkiewicz (1998), the various characteristics of eco-leadership described above can be plotted in their degree on two orthogonal continua: (a) hierarchical thinking, and (b) systemic thinking. Hierarchical thinking refers to the degree to which a person believes an organization should be arranged in a hierarchical fashion, with both power and control concentrated in the hands of an upper echelon of leaders or a single leader. A highly hierarchical viewpoint stresses rules, procedures, goals, and a general dependence on the leader (Wielkiewicz, 2000). Moreover, adherents to a highly hierarchical view of leadership attribute the responsibility for the success or failure of an organization to positional leaders, as well as charges them with the responsibility for ensuring the safety and security of an organization's members (Wielkiewicz, 2000). This description of a highly hierarchical view of leadership is consistent with a more mechanistic/industrial view of leadership, while a low hierarchical view of leadership is consistent with an ecological view of leadership (Rost, 1997).

Systemic thinking refers to the degree to which an individual has the "ability to relate a variety of ideas and concepts to organizational success, such as ethics, the need for cooperation of all individuals to help the organization accomplish goals, the need for long-term thinking, and the need for organization learning" (Wielkiewicz, 2000, p. 341). Individuals with a higher degree of systemic thinking would be "least likely to see themselves or positional leaders in the organization as having the capability of single-handedly making all of the key organizational decisions" (Wielkiewicz, 2000, p. 345). According to Allen, Stelzner, and Wielkiewicz (1999), organizations with a high number of systemic thinkers should be most successful and adaptive. A high degree of systemic thinking indicates a more ecological view of leadership, while a lower degree of systemic thinking indicates a more mechanistic viewpoint (Rost, 1997).

Leadership Development in Organizations

Despite this paradigm shift in leadership, a majority of organizational leadership development programs continue to focus on individual positional leaders who function in a top-down, hierarchical manner. Wielkiewicz (2000) argues that organizations would be more successful in adapting to environmental changes (and thus be better, lasting programs) if they were to "draw on ecological principles to match the complexity of the environment in which organizations function" when enacting organizational leadership (pp. 108-109). This disconnect between the above-mentioned best practices and current leadership development practices is particularly evident in organizations whose very structure lends themselves to ecological forms of leadership.

One quintessential example is Cooperative Extension's county 4-H programs. 4-H represents the interconnected, nested ecosystems described by Allen, Stelzner, and Wielkiewicz (1998), which, in addition to existing at the federal, state, and local levels, also consists of innumerable connections with local communities, organizations, non-profits, businesses, schools, and families — including a collective leadership structure known in [state] as the county 4-H association, which engages volunteers in the leadership of the program. However, leadership development efforts in [state] are still largely invested in the individual Extension 4-H agent — a position which suffers considerable turnover and, therefore, negatively impacts programmatic success (Strong & Harder, 2009). However, it is possible that county 4-H programs adopting a more ecological approach to leadership would distribute leadership capacity and responsibility throughout the organization to a greater degree, such that the turnover of an individual positional leader (i.e., agent) would be less disruptive and, therefore, lead to greater programmatic success in the long term.

Purpose and Research Questions

This study explored the relationship between an ecological approach to leadership among county 4-H association members and organizational success in county 4-H programs in an effort empirically examine the efficacy of ecological approaches to leadership. An explanatory sequential mixed methods design was used, involving the collection of quantitative data first and then explaining the quantitative results with in-depth qualitative data. This study had three research questions:

1. What is the nature of the relationship between levels of hierarchical and systemic thinking among county 4-H association members and programmatic success
2. To what extent do county 4-H association volunteers perceive their leadership approach as affecting county 4-H programmatic success.
3. How do county 4-H association volunteers' perceptions of leadership help us better understand the variables associated with programmatic success?

Theoretical Framework

Ecological leadership is rooted in complexity science, which is often used to explain emergent, adaptive, and self-organizing systems (Davis, 2004). Frequently defined by the objects of study rather than the methods of investigation, complexity science has been used to explain: the fall of the Soviet Union, trends in the stock market, the emergence of life on Earth, and even the movements of flocking birds (Davis, 2004). The fundamental unit of analysis in complexity science is the complex adaptive system (CAS). These CAS's are characterized by two general qualities. First, they are adaptive; they can alter their own structures in response to pressures both internal and external. In this way, they cannot be described in terms of physics — where laws govern action and reaction — but, rather, are better described in evolutionary terms. Second, the system is emergent; meaning, it is "composed of and arises in the co-implicated activities of individual agents" (Davis, 2004, p. 151). In this way, the phenomenon is not merely the sum of its parts (i.e., a mechanistic understanding), but rather the emergent product of both its parts and their interaction with one another (i.e., an ecological understanding) (Davis, 2004).

Methods

An explanatory sequential mixed methods design was used to conduct this study. In this design, we first conducted a quantitative strand of research and then followed up with a second, qualitative strand (Creswell & Plano Clark, 2011). The qualitative strand offers the opportunity to investigate in greater depth and explain initial findings.

The first, quantitative strand used three instruments to collect data. The first instrument was a researcher-created index designed to evaluate performance and rank county 4-H programs based on mandatorily reported federal ES237 enrollment data, in combination with United States Census Bureau data. The index measured per capita enrollment trends for the five most common program areas during the previous four program years. This strand was a census; all [state] county 4-H programs (n=67) were included in this index. Data was analyzed by converting county index scores to z scores, sorting, and assigning county 4-H programs into quartiles. Based on these results, six county 4-H programs were selected to participate in the second, qualitative strand — three of the highest scoring counties (top quartile), and three of the lowest scoring counties (bottom quartile).

The second instrument was the Leadership Attitudes and Beliefs Scale III (Wielkiewicz, 2002). The LABS-III was originally designed to measure the impact of leadership program interventions on college students' attitudes and beliefs about leadership "in a manner consistent with Allen et al.'s (1998) [ecological] leadership theory" (Wielkiewicz, 2002, p. 109). The LABS-III consists of 28 Likert-type questions on an ordinal, five-point scale ranging from strongly agree to strongly disagree. The instrument is comprised of two subscales: hierarchical thinking and systemic thinking. Both convergent and discriminative validity of the systemic and hierarchical thinking scales have previously been established (Fischer et al., 2014). This strand was a census; all county 4-H association members (volunteers) were surveyed. It is unknown how many county 4-H association members exist in [state]. However, 187 association members, representing 60.6% of county 4-H programs (n=39) responded. Data was first analyzed using simple descriptive statistics (i.e., mean, standard deviation, and range). Pearson's product-moment correlation coefficient was then used to determine the strength and direction of the relationship between scores on the LABS-III questionnaire and the county index score (Ary et al., 2010). Cohen's (1998) classification of effect size was used. Finally, multiple linear regression modeling was used to explain the variance in the relationship between LABS-III scores and county index score.

The third quantitative instrument was a researcher-created demographic questionnaire distributed with the LABS-III to county 4-H association members. The questionnaire collected data on association members' age, gender, race, education level, county, years as an association member, and primary role in the county 4-H program. Simple descriptive statistics were used to characterize the association members. Pearson's product-moment correlation coefficient was then used to determine the strength and direction of the relationship between demographic variables, LABS-III questionnaire scores, and county index scores.

The second, qualitative strand utilized semi-structured, open-ended focus group sessions with county 4-H association volunteer members and their respective 4-H agents in each of the six counties selected based on county index scores (three from the highest scoring, three from the lowest scoring). Questions were guided by a researcher-developed protocol. *A priori* propositions guided the researchers to interpret quantitative results in light of supporting literature, which led to specific questions being developed. The protocol focused the conversation on encouraging participants to share in their own words their experience with leadership in their county 4-H program. It was comprised of three primary questions: (a) What factors do you feel have contributed to the success of this group?; (b)How does this group approach decision-making?; (c) How does this group ensure continued improvement? Each of these three questions had several follow-up questions that allowed the researcher to probe for better understanding and detail. During the focus group sessions, the researcher acted as facilitator and a digital audio recording device was used to capture the conversation verbatim. Following the focus groups (n =6), which included 33 individual participants, we completed whole-text analysis of verbatim transcripts, employing the constant comparative analytic procedures developed by Corbin and Strauss (2008). We used Atlas.ti to excerpt text and code data using a systematic approach (Ary et al., 2010). We grouped codes into preliminary categories and used the categories to identify broad themes in the data, as they related to the research questions. The results of this qualitative analysis are reported in the form of themes, which are each supported by participant quotes.

Results

Research Question 1: What is the nature of the relationship between levels of hierarchical and systemic thinking among 4-H association members and program success?

The LABS-III was used to measure levels of hierarchical and systemic thinking among the 187 respondents representing 60.6% (*n*=39) county 4-H associations in [state]. The study population for this question were the county 4-H associations as complex adaptive systems; scores among members were averaged to render an association unit score. Association members scored a moderate 2.70 (SD=.587) on hierarchical thinking (where 1 indicates the highest level of hierarchical thinking, and 5 the lowest), indicating a medium preference for positional authority and responsibility. Members scored 1.71 (SD=.388) on systemic thinking (where 1 indicates the highest level of systemic thinking, and 5 the highest), indicating a capacity to attribute success or failure to multiple sources and ability to see complex connections. Based on correlation and multiple linear regression analysis, there appears to be no relationship between hierarchical or systemic thinking and the county index score.

However, there was a moderate correlation between county index score and one demographic variable among this population: a moderate negative correlation ($r=-.435$, $p<.01$) was found between the mean number of years served by associations' memberships and their county index scores. Meaning, the longer a group has served together, the more likely that county program to have a lower county index score. A stepwise regression yielded a significant regression equation ($F(1,39) = 8.370$, $p<.05$), with an R^2 of .181.

Research Question 2: To what extent do county 4-H association volunteers perceive their leadership approach as affecting county 4-H programmatic success.

From more than five hours of audio recordings and 125 pages of transcripts emerged six themes. Often, these themes appear to be internally conflictual, but differences among participants are to be expected with extreme case selection. In research question three, a mixed methods analysis is provided assessing the quantitative differences between high and low scoring counties on the qualitative themes described below.

Theme 1: Associations Vary on Phenomena to which The Attribute Success or Failure. Participants identified a variety of factors affecting their county 4-H program's success or failure. Several were quick to praise the county 4-H agent: "We've had other agents who didn't take the program to the level that Rhonda has. Rhonda has made the leadership quality, since she's been here…" Others attributed success to 4-H club leaders, another positional leader within the program. "We really have strong leaders, and that's where you're going to get your strong clubs...," one participant said. There were other, external factors too, such as meeting community needs, support from local county commissioners, and parental and family involvement. One participant described the level of involvement: "It's not just parents. Whenever we have things like county events, grandparents are showing up, too."

Theme 2: Agents Play a Central Role in Decision Making. Agents were almost universally cited as providing primary direction for the association, as well as being the primary conduit for information flowing between the association and the county 4-H program, stakeholders, and other organizations. Nearly every association described a scenario in which the membership was a largely reactive body. Most associations conveyed that they believed agents appreciated and utilized their advice; they also cited a tendency to seek consensus when offering advice. They also asserted that they were largely an advisory body and final decisions were best left to the agents. One said, “We all have individual ideas and we throw them out there and then Courtney makes the final decision I would think on what to...I think she weighs everyone’s opinion.”

Theme 3: Associations’ Connections to Community and 4-H Vary. The primary way in which participants reported being connected to the community was based on 4-H projects. For example, a 4-H shooting sports club may have a connection with a local gun club, or a 4-H dog club may have a connection to a local dog park. Groups such as Farm Bureau and Cattlemen’s Associations were also cited by a wide range of participating associations. One participant described her association’s connections: “We have local organizations that help support scholarships for local youth, like our Cattlemen’s … some things like that that really tie into what 4-H is all about.” While entity-to-entity connections were common and easy for members to recall, participants frequently had difficulty describing connections between individual members and the community. Most associations offered vague reports — “4-H is connected to *so many* groups” — and were unable to give details when pressed.

Theme 4: Associations Vary of Decision-Making Processes and Topics. Association members reiterated that their role was not a decision-making body, such as a board of directors, but rather an advisory body. What they offered advice on, however, varied. Overwhelmingly, they described weighing in on mundane procedural matters unrelated to the larger mission of the association in county 4-H programming: budget, behavioral issues, registration deadlines, awards criteria, banquet fees, scholarships, etc. One secretary described the association’s role: “I just went through a year’s worth of meeting minutes and there’s really not a whole lot in there other than what we’ve discussed as far as policies and procedures.” Rarely, though, the association was employed in the vetting of programmatic concerns. One agent described using her association as a sounding board when weighing a new school programs. “So, if I come to them and say, ‘I want to start a new program in the schools,’ they say, ‘Yeah that's a good idea,’ or ‘No we don't think so.’”

Theme 5: Associations Are Often Not Structured for Success. Emerging during the discussions of decision making, communication, and organizational learning was the theme that associations were incorrectly structured — not used in the way intended by 4-H. Association members are supposed to come from the community. Instead, nearly all participants cited both coming up through the program — “My name is Linda…I've been involved with 4-H probably since my kids were cloverbuds” — and having other current roles within the program, such as a sub-advisory committee spokesperson. One woman typified this situation saying, “I just feel I’m [here] to give my dog report, but I enjoy being part of the discussion and giving my opinion, as well. I’m not really sure what my role is…”

Theme 6: Association Members’ Opportunities for Development Not for Association Role. Participants reported having opportunities to continue to learn and grow, the most common being a one-on-one mentoring relationship with the agent. However, all participants reported that these development opportunities were in support of other roles in the county 4-H program in which they were serving, such as club leader, rather than for their role as association member. No association member reported receiving training for their association role.

Research Question 3: How do county 4-H association volunteers' perceptions of leadership help us better understand the variables associated with programmatic success?
Data from the quantitative and qualitative strands were combined in two ways to address this research question. First, the quantitative county 4-H index score was used to evaluate county 4-H programs and separate them into quartiles, with six focus groups from the highest and lowest quartiles then participating in the qualitative strand. Second, themes and categories from the qualitative strand of the study were first organized according to Wielkiewicz and Stelzner's (2005) four factors of ecological leadership. Then, themes' codes were selected based on appearance in at least two of three high or low scoring focus groups' transcripts, and organized in a mixing table to quantitatively show similarities and differences in codes between high and low scoring counties, all organized according to the four factors of ecological leadership. This mixing table is not shown because it is seven pages long. However, I will summarize the key differences and similarities through meta-analysis using the four factors of eco-leadership.

Interdependence. While there were commonalities among high and low scoring counties, they diverged on to what they attributed success. Low scoring counties only attributed success to strong volunteer club leader support for the 4-H program or the county 4-H agents — positional leaders. In contrast, while high scoring counties still paid tribute to agents and leaders, they offered six or more factors, including tight knit communities, local government support, and parental involvement.

Open Systems and Feedback Loops. Low scoring counties reported a number of practices that indicate an inwardly looking and isolated association membership (restricted systems and feedback loops). For instance, participants reported feeling as though they served on the association for the purpose of representing their 4-H club or sub advisory group, rather than carrying out the association's mission of connecting with the community. High scoring counties, in contrast, tended to have fewer members currently serving in other roles in the 4-H program and focused more on gathering advice from outside of the organization.

Cycling of Resources. There was considerable overlap in responses from high and low scoring counties. Both cited that county 4-H agents provided primary direction for the association, often setting the agenda, chairing the meetings, and distributing information.

Adaptation. High scoring counties tended to cite a one-on-one mentoring relationship with the county 4-H agent as the primary means of improvement, while low scoring counties were more apt to attend trainings at the local, state, and regional levels. This may seem counterintuitive, but, remember low scoring counties tended to use their association as opportunities to gather internal constituencies — primarily 4-H club leaders — and so the opportunities reported by participants were those aimed at improving 4-H club leaders, rather than improving in their role as association members.

Discussion

Research Question 1: What is the nature of the relationship between levels of hierarchical and systemic thinking among 4-H association members and program success?
Correlational and multiple linear regression analyses found no relationship between either subscale and county index scores. There, of course, may be no relationship. However, with the

low number of county 4-H programs participating (*n*=39), there may not be enough variance in the data set. A larger sample size might be more discerning and potentially able to uncover a relationship.

A moderate negative correlation (r=-.435, p<.01) was found between mean number of years served on the county 4-H association and county index score. Meaning, the longer a group has served together, the more likely that county program to have a lower county index score. A stepwise regression also yielded a significant regression equation (F(1,39) = 8.370, p<.05), with an R^2 of .181. This is consistent with the ecological principles of both cycling of resources and open systems and feedback loops. In order for a complex adaptive system to continually adapt, it must have access to new resources and information. In practical terms, this means having in place a plan for developing leadership on an ongoing basis for the purpose of being responsive to the changes in community needs. When an association's membership stagnates and the same group is permitted to endure, is stops the cycle of developing new talent and constricts feedback loops, thereby lessening the organization's ability adapt to new challenges in the community.

Research Question 2: To what extent do county 4-H association volunteers perceive their leadership approach as affecting county 4-H programmatic success?
Participants identified six broad themes when describing their leadership approach in county 4-H programs: (a) Associations vary on phenomena to which they attribute success or failure; (b) Agents play a central role in decisions making; (c) Associations' connections to community and 4-H vary: (d) Associations vary on decision-making processes and topics; (e) Associations are often not structured for success; and (f) Members' opportunities for development not for association role. These six themes provide insight into the leadership approach of agents and their volunteers across both high and low scoring programs.

Associations Vary on Phenomena to Which They Attribute Success or Failure. County 4-H programs varied on what factors to which they attributed success or failure. Some counties were quick to assign responsibility to leaders: "We really have strong leaders, and that's where you're going to get your strong clubs...." This is consistent with more mechanistic paradigms of leadership to focus on positional leaders as the source of success. This is generally thought to be the product of human cognitive and evolutionary biases, which cause us to perceive these leaders as directing and controlling an organization; and, consequently, we overestimate their effect on organizational events (Wielkiewicz & Stelzner, 2005). Other counties cited a greater number and variety of factors relating to their success. This is consistent with an ecological paradigm of leadership, which seeks to see the connections and interdependencies in complex systems (Wielkiewicz & Stelzner, 2005).

Agents Play a Central Role in Decisions Making. Agents were almost universally cited as providing primary direction for the association, as well as being the primary conduit for information flowing between the association and the county 4-H program, stakeholders, and other organizations. This may simply be due to the nature of the 4-H associations, which were created in 2011 by subsuming existing 4-H advisory committees (Diem & Cletzer, 2011). While volunteers have considerable sway in shaping the program, they may not see themselves as decision makers in the manner of a board of directors.

Associations' Connections to Community and 4-H Vary. Nearly all associations cited connections with other entities, such as Farm Bureau, as well as common interests, such as 4-H club projects. However, there is a distinction to be made between associations with organizational partnerships, like 4-H and Farm Bureau, and associations with members who represent genuine community segments: "the west side of town," "past the river," minority communities, or businesses groups. The latter represents a more robust example of an ecological organization seeking to maintain close relationships with constituency groups.

Associations Vary on Decision-Making Processes and Topics. While all associations stressed their advisory capacity in decision-making processes, they differed on topics discussed. A majority of time was spent on mundane, procedural matters. One association's secretary said, "I just went through a year's worth of meeting minutes and there's really not a whole lot in there other than what we've discussed as far as policies and procedures." Rarely, though, the association was employed in the vetting of programmatic concerns. One agent described using her association as a sounding board when weighing a new school programs. "So, if I come to them and say, 'I want to start a new program in the schools,' they say, 'Yeah that's a good idea,' or 'No we don't think so.'" While rare, this is the exact written purpose of the association, and also a best practice for an ecological organization.

Associations are Often Not Structured for Success. In an organization meant to connect 4-H to the community through strategic recruiting to the association, a majority of its members came instead from within the county 4-H program and currently serve in other roles within the county 4-H program, such as 4-H club leader (only 36.4%, *n*=67, report serving on the association as their primary role in 4-H). This is contrary to the express purpose of the association, but also contrary to the principles of ecological organizations. By promoting only from within, the organization limits new information and resources from entering the organization, and, therefore, making it less adaptable in the face of external change.

Members' Opportunities for Development Not for Association Role. While participants cited opportunity to learn and grow, those examples given were for growth in their other roles in the 4-H program, such as club leader. No association member reported receiving training for their association role. From an ecological perspective, organizations must continue to learn and adapt by either bringing in new members or educating existing members. Associations reported doing neither.

Research Question 3: How do county 4-H association volunteers' perceptions of leadership help us better understand the variables associated with programmatic success?
As this research questions sought to use quantified qualitative findings to provide distinctions between quantitatively differentiated high and low scoring counties, we focus on the two key distinctions uncovered.

Low Scoring County 4-H Associations Are More Inwardly Focused and Connected. Low scoring county 4-H programs' associations differentiated themselves, in part, by exhibiting a greater tendency to be inwardly focused and connected. The composition of low scoring counties' associations was almost entirely from within the program, such as a 4-H dog club leader representing her club on the association. Additionally, low scoring counties tended to spend time exclusively on inward focused procedural matters — scholarship deadlines, camp fees, etc. — rather than focusing outward on meeting new challenges and community needs. High scoring county programs, while also tackling procedural matters, were the only associations to cite vetting program issues, such as which programs to offer and how they may meet community needs. They also were more likely to cite their external connections in terms of actual community factions — “the west side of town,” “past the river,” minority communities, or businesses groups — rather than formalized, entity-to-entity connections with Farm Bureau or Cattlemen’s associations.

These findings are consistent with Wielkiewicz and Stelzner’s (2005) ecological leadership principle of open systems and feedback loops, which holds that an organization is dependent on inflows of information and other resources. Each organization is itself part of a larger, more complex open system (e.g., economic, political, social). Organizations that squelch feedback loops place the organization at risk by lessening its ability to adapt to the environment (Wielkiewicz & Stelzner, 2010). Low scoring associations that select members from within the 4-H program for the purpose of representing and connecting internal constituencies (e.g., dog advisory group, or individual 4-H clubs), therefore, have a more closed system with fewer feedback loops. This leaves the 4-H program with little inflows of new information, feedback on programming, and resources from the larger community, which may contribute to increasingly less effective county 4-H programming over time as the organization fails to adapt to external changes.

High Scoring County 4-H Programs Attribute Success to A Greater Number of Factors. High scoring counties’ associations differentiated themselves on the question of, To which factors do you attribute the success or failure of their county 4-H program? Where low scoring counties predominantly attributed success to only one factor, positional leaders, high scoring counties attributed success to a range of factors that did include positional leaders, such as the 4-H agent, but also six other factors, including a “tight-knit” community, parental involvement, and support from local county government.

This is consistent with Wielkiewicz and Stelzner’s (2005) ecological leadership principle of interdependence, which holds that any attempt to understand or direct an organization by focusing on its positional leaders is incomplete and bound to fail. Leadership must be understood in the complex context of the organization and its environment, and success can be attributed, in part, to a group’s ability to see the connectedness of social systems and the way they influence one another. Therefore, the specific factors to which high scoring counties attribute success are not important in and of themselves. Rather, it is the number and variety of factors contributing to success identified by high scoring counties that makes it illustrative of this concept. High scoring counties’ association members are more apt to see the myriad factors affecting their county 4-H program, rather than fixating on individual positional leaders.

Conclusions/Recommendations/Implications

This study sought to explore the relationship between ecological approaches to leadership and programmatic success in county 4-H programs. While no direct quantitative relationship between levels of hierarchical and systemic thinking and county index scores was found, several mixed methods findings support the relationship between ecological approaches to leadership and programmatic success. First, high scoring county 4-H programs tended to structure their organization to provide greater open systems and feedback loops by selecting association members external to the program with close ties to the community; they also placed greater focus on determining external trends that may impact the organization. Second, high scoring counties demonstrated a greater ability to see the interdependencies and connectedness of their communities by attributing their success to numerous and varied factors, rather than individual positional leaders.

One recommendation for practice is simply that term limits for county 4-H association members (and other advisory council members in general) should be established and followed. The findings of this study showed moderate negative correlation between mean number of years served by an association and county index score. By ensuring a steady cycling of individuals through term limits, the association would have a built-in mechanism for ensuring new talent with new connections for an adapting program are installed regularly.

A second recommendation for practice is county 4-H agents should enact a policy of recruiting association members not already serving in another capacity within the county 4-H program. In other words, agents should not structure their associations where they are comprised of internal groups. Instead, agents should focus on individuals with knowledge of, or experience in, 4-H, but who also have connections and experience beyond the 4-H program. By simply changing the role of the association member to one who represents a part of the community on the 4-H association, rather than a part of 4-H on the 4-H association, the association should become more outwardly connected and oriented — and, therefore, more adaptive to the environment in which it operates.

With regard to future research, the basic premises of this study could be replicated in a wide variety of contexts: business, rural community, agricultural organizations, civic groups, etc. Empirical validation for various leadership approaches' effects on organization, community, or program efficacy are rare. By using the structure provided in this study (e.g., complexity science as a theoretical framework and the mechanistic-ecological continuum as a variable of measure), replication would only then require the creation of an index of success in various complex adaptive systems under study (i.e., the context).

Finally, there should be developed a measure of actual ecological leadership practices occurring in an organization. The LABS-III provided a useful proxy for measuring leadership attitudes and beliefs. However, this does not assess the reality of leadership within the organization, as long-running institutional practices and structures may trump even the association members' individual attitudes and beliefs about leadership. This would be accomplished by reviewing the literature on leadership in mechanistic and ecological organizations, and then identifying indicators of where an organization may fall on a continuum between mechanistic and ecological in accordance with Wielkiewicz and Stelzner's (2005) four factors of ecological leadership.

References

Allen, K. E., Stelzner, S. P., & Wielkiewicz, R. M. (1998). The Ecology of Leadership: Adapting to the Challenges of a Changing World. *Journal of Leadership & Organizational Studies*, *5*(2), 62–82. doi:10.1177/107179199900500207

Ary, D., Jacobs, L., & Sorensen, C. (2010). Introduction to research in education. Wadsorth: Cengage Learning.

Capra, F. (1996). *The Web of Life.* New York: Doubleday.

Colarelli, S. M., (1998). Psychological interventions in organizations: An evolutionary perspective. *American Psychologist, 53,* 1044-1056.

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research* (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Cohen, J. (1998). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Creswell, J., & Plano Clark, V. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Davis, B. (2004). *Inventions of teaching*: *A genealogy*. Routledge.

Diem, K.G., & Cletzer, D.A. (2011). *Florida 4-H implementation guide to maintain tax exempt status for your county 4-H program.* Retrieved from University of Florida, Florida 4-H Youth Development Program website: http://florida4h.org/staff/taxexempt/.

Fischer, D., Wielkiewicz, R. M., Stelzner, S. P., Overland, & Meuwissen, A. S. (2015). Changes in Leadership Attitudes and Beliefs Associated with the College Experience: A Longitudinal Study.

Katz, D., & Kahn, R. S., (1978). *The social psychology of organizations (2nd ed.).* New York: Wiley.

Kelly, J. G., Ryan, A. M., Altman, B. E., & Stelzner, S. P. (2000). *Understanding and changing social systems: An ecological view.* In J. Rappaport, & E. Seidman (Eds.), Handbook of Community Psychology (pp. 133-159). New York: Plentum.

Lowhorn, G. L. (2011). A Confirmatory Factor Analysis of the Leadership Attitudes and Beliefs Scale-III. *International Journal of Arts and Sciences 4*(6), 284-296.

Northouse, P. G. (2013). *Leadership theory and practice* (6th ed.). Thousand Oaks, CA: Sage.

Rost, J. C. (1997). Moving from individual to relationship: A postindustrial paradigm of leadership. *Journal of Leadership & Organizational Studies*, *4*(4), 3–16.

Strong, R., & Harder, A. (2009, February). Implications of Maintenance and Motivation Factors on Extension Agent Turnover. *Journal of Extension* [On-line], 47(1). Available at: http://www.joe.org/joe/2009february/a2.php.

Wielkiewicz, R. M. (2000). The Leadership Attitudes and Beliefs Scale: An instrument for evaluating college students' thinking about leadership and organizations. *Journal of College Student Development*, *41*(3), 335–347.

Wielkiewicz, R. M. (2002). Validity of the leadership attitudes and beliefs scale: Relationships with personality, communal orientation, and social desirability. *Journal of College Student Development 43*(1), 108-118.

Wielkiewicz, R. M., & Stelzner, S. P. (2005). An ecological perspective on leadership theory, research, and practice. *Review of General Psychology, 9*(4), 326-341. doi: 10.1037/1089-2680.9.4.326

Wielkiewicz, R. M., & Stelzner, S. P. (2010). An ecological perspective on leadership theory, research, and practice. In B. W. Redekop (Ed.), *Leadership for environmental sustainability* (pp. 36-54). New York, NY: Routledge.
Western, S. (2013). *Leadership: A Critical Text*. Thousand Oaks, CA: Sage.

Eco-Leadership Among County 4-H Organizations: Relationship to Programmatic Success and Best Practices for Eco-Leaders

Discussant Comments
Donald M. Johnson
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The authors used a mixed-model approach to examine the relationship between county 4-H "success," adherence to the eco-leader paradigm, and selected demographic variables. The authors have produced a well-written manuscript that both educates the reader and explicates the phenomena under study. Well-done!

The literature provides a clear description of the evolution of leadership theory from the study of individual, top-down leadership to the current concept of ecological leadership, where leadership is less centralized, more democratic, and exists within constantly changing ecosystem. I enjoyed reading this section - my compliments to the authors on presenting this topic in a readily accessible manner. Readers looking for a model of clear writing about a complex topic should study this paper.

The qualitative and quantitative procedures were largely sound and logically implemented. On the quantitative piece, I would like to have seen *post-hoc* reliability estimates reported for the two subscales (hierarchical and systemic thinking) of the LAB-III instrument and some testing of the assumptions for linear regression. On a most positive note, I was gratified to see the authors include a statement concerning the convergent and discriminant validity of the LAB-III instrument. I commend the researchers for moving beyond the familiar statements concerning face and content validity and referencing more appropriate (for this study) forms of validity. The qualitative piece appeared to be appropriately done; I will leave it to others more expert in qualitative methodology to point out any shortcomings I may have missed.

The quantitative results were clearly presented and easy to follow. When submitting for journal publication, I encourage the authors to consider including a figure displaying locations of each low- and high-quartile program plotted on the two continua (hierarchical and systems thinking) of the ecological leadership paradigm. A figure such as this would provide excellent context for the remainder of the results. Perhaps, the authors can verbally sketch this figure for us as part of their response to these comments.

The qualitative results were interesting and, as the authors intended, provided excellent, if contradictory, insight into the qualitative results. As an example, the qualitative results found "no relationship between hierarchical or systemic thinking and the county index score." Yet, in the qualitative section, the authors found that "low scoring counties reported a number of practices that indicate an inwardly looking and isolated association membership." Given that feedback loops and systemic thinking are apparently integral components of the eco-leadership model, these two results are difficult to reconcile. Perhaps the researchers will address this in their comments.

My compliments to the authors on a well-conducted study on an important topic. I encourage the authors to continue their study of eco-leadership in this and other contexts. Well-done!

Discussant – Kate Shoulders; Timekeeper – Joenelle Futrell

Laboratory Management
Agricultural Mechanics Professional Development Needs of Novice, School-Based Texas Agricultural Science Teachers *P. Ryan Saucier, G. Curtis Langley, Emily A. Riggin*
Laboratory Management Needs of Iowa School-Based Agricultural Mechanics Teachers *Dr. A. Preston Byrd, Dr. P. Ryan Saucier, Dr. Ryan G. Anderson*
A Measure of Safety Climate Attitudes in the Agricultural Mechanics Laboratory *Steven Boot Chumbley, Mark S. Hainline, Trent Wells*
The Development of Preservice Agriculture Teachers' Pedagogical Content Knowledge through a Greenhouse for Teachers Course *Amanda M. Wooditch, Amber H. Rice, Jason B. Peake, Eric D. Rubenstein*

Agricultural Mechanics Professional Development Needs of Novice, School-Based Texas Agricultural Science Teachers

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Agricultural Mechanics Professional Development Needs of Novice, School-Based Texas Agricultural Science Teachers

Abstract

Agricultural mechanics courses at the secondary level continue to be one of the most popular course options for students in public agricultural education programs. However, agriculture teacher turnover in the U.S. is very high causing staffing issues in all states, especially for entry-level teachers. This problem is even more prevalent in the specialized area of agricultural mechanics where administrators are facing challenges finding qualified teachers. The study sought to identify the professional development needs of entry-level agriculture teachers in Texas regarding the specialized curriculum area of agricultural mechanics. Results from this study indicated that entry-level teachers had professional development needs across all three competences as identified in the Borich Needs Assessment Model (1980). Across the Knowledge, Performance, and Consequence competences, teachers indicated a need for professional development, especially metal fabrication and electrical skills. Based on this study, researchers recommend increased measures to expand agricultural mechanics skills taught in university undergraduate teacher preparation programs that include skills based laboratories and increased efforts to provide professional development workshops for existing agriculture teachers.

Introduction

Agricultural mechanics is one of the corner stones of school based agricultural education programs, and continues to be one of the highest enrolled in agricultural education course throughout the country (Burris, Robinson, & Terry, 2005; Chumbley, Gill, & Chesher, 2013; Hubert & Leising, 2000). With as much as 89.1% of agricultural educators teaching courses related to agricultural mechanics, it is no wonder scholars have endorsed the teaching and learning concepts brought forth in the agricultural mechanics laboratory (Roberts & Ball, 2009). More than just mere places for learning to occur, the agricultural mechanics laboratory provides a place for positive reinforcement of core concepts as well as ideas from other agricultural areas (Langley & Kitchel, 2013). Due to the popularity of the courses offered in this area and the major foundations of agricultural education being built on a "doing to learn" basis, agricultural mechanics teachers are in short supply (Roe & Saucier, 2015).

Agencies and researchers across the nation are reporting teaching positions in all aspects of academia are going unfilled (Fandel, 2007; Walker, Garton, Kitchel, 2004). For some time this seems to be one of the most prominent headlines regarding education. Perhaps this is the reason researchers, state and national agencies, and school districts focus a tremendous amount of resources focusing on teacher recruitment and retention (Ingersoll & Smith, 2003). Attrition not only impacts educational institutions from a financial aspect, but lower student achievement, program irregularity, overall school effectiveness, and school moral are also negatively impacted by high turnover rates (Hong, 2010). Specifically, agricultural education research often investigates the reasons why teachers choose to leave the profession (Blackburn, Bunch, & Haynes, 2017; Clark, Kelsey, & Brown, 2014; Moore & Camp, 1979; Sorenson, Lambert, & McKim, 2014; Thieman, Marx, & Kitchel, 2014). Many possible explanations for teacher attrition have surfaced in the last two decades: teacher burnout (Thieman et al., 2014), culture shock (Langley, Martin, & Kitchel, 2014), decreed self-efficacy (Guay, Vallerland, & Blanchard, 2000), and inadequate skills (Dicke et al., 2015).

Agricultural education at its roots has been focused on the development of specific skills within the profession (Roberts & Ball, 2009). Additionally these skills have been focused on the industries and skilled trades the secondary education student is prepared to enter upon graduation (Ramsey & Edwards, 2011). However, educational research across many disciplines has revealed a great deal of variation when it comes to content knowledge possessed by the teachers themselves. One reason content knowledge may be lacking in some areas is due to the large numbers of novice teachers in all disciplines. With more than 26% of the nation's teachers having less than five years of teaching experience, one could make the assertion that low content knowledge is due to less time within the profession. Additionally, when one looks at agricultural education teachers, the trend is much the same. Consider this, in Texas, the state agricultural teacher association (VATAT) reported 23% (f = 460) of the teaching population has less than five years' experience.

Yet others have proposed differing opinions regarding novice teachers and the content knowledge they possess. As early as 2002, Schumacher, Strickland, and King voiced concerns about pre-service teacher education programs holistically cutting hours and course required. Moreover, Forsythe (1983) noted almost 20 years prior that teachers were receiving minimal experiences and instruction to develop teacher competency in safety. Another study indicated the majority of agricultural education programs only required 12 or fewer credit hours in the field of mechanical agriculture (Burris et al., 2005). Likewise, (Hubert & Leising, 2000) exposed the mean average of hours enrolled in for agricultural mechanics as only being 6.7 hours. Compare these findings with the findings of Johnson, Schumacher, and Stewart, (1990), where Missouri agricultural educators had on average 17 hours of agricultural mechanics instruction. One could postulate the barrage of researchers emphatically and repeatedly calling for more focused and more frequent professional development related to agricultural mechanics is due to the lack of educational hours at pre-service institutions (Hubert, Ulrich, & Murphy, 2000; Johnson & Fletcher, 1990; Langley & Saucier, 2016; McKim & Saucier, 2011; Saucier, Terry, & Schumacher, 2009). Although the simplest answer to this phenomenon may be to require additional course work, practically this is not a viable solution. As such, teacher educators will need to provide varying strategies to provide both preservice and in-service agricultural teachers with technical training (Burris et al., 2005). One could conclude that teacher educators will need to tailor professional development to knowledge and skills teachers are deficient in, rather than providing broad-spectrum professional development of an entire content area.

Still others are calling for research investigating content specific knowledge for better integration of Science, Technology, Engineering, and Math (STEM) principles (Stubbs & Myers, 2016). Agricultural educators are uniquely suited to fit an ever-increasing need of workforce in the STEM industries. However, teachers have indicated difficulty integrating specific examples of content related STEM principles into agriculture classrooms (Stubbs & Myers). One of the most important responsibilities of an agricultural educator is to educate students regarding the skills employers desire (Garton, 2006). When dealing with agricultural mechanization principles, a vast number of skills can be taught and may be one-reason teachers have expressed a lack of confidence in teaching agricultural mechanics (Blackburn, et al., 2015). Although lacking confidence, teachers have continually expressed a perceived importance for agricultural mechanics across several decades (Burris et al., 2005; Dyer & Andreasen, 1999; Gliem & Miller, 1993; Johnson & Schumacher, 1989; Tummons, Langley, Reed, & Paul, 2016).

Although researchers have called for more professional development across broad spectrums of agricultural mechanics, limited congruency exist among technical skills. Technology based professional development such as GPS, computer-aided design, and the operation of computer numerically controlled equipment have been the areas of need for some groups (Kotrlik, Redmann, Harrison, & Handley, 2000; Langley & Saucier, 2016; Schultz, Anderson, Schultz, & Paulsen, 2014). Conversely, others identify professional development needs rooted in fundamental agricultural mechanics principles and skill sets (Blackburn, Robinson, & Field, 2015; Johnson et al., 1990; Saucier, Vincent, & Anderson, 2014). With a wide range of professional development needs across the country, one can draw the overarching conclusion that continued professional development is warranted. Additionally, it seems need assessments may require more focus to accurately identify the areas of most need among school-based educators.

Conceptual Framework

The rise in novice teachers could have impacts on the general knowledge and specific content knowledge teachers possess when they enter the classroom (Houck & Kitchel, 2010). Furthermore, one of the most critical knowledge bases a teacher must have is pedagogical content knowledge (PCK; Diakidoy & Iordanou, 2003). PCK has most recently been defined as the knowledge of, the rationale behind, planning for, and the act of teaching a piece of subject matter using specific methods for specific students to promote student learning (Carlson, Stokes, Helms, Gess-Newsome, & Gardner, 2015).

The notion of PCK was first brought forth by (Shulman, 1986) and has been researched by a wide variety of educational disciplines since. Math and science are the two fields of study leading the way in this research. Although agricultural education has extremely close ties with both math and science, very little research has been accomplished in the field. Although needs bases studies have been completed and characterization studies carried out for some time, studies investigating knowledge based on the principles of PCK are limited.

PCK in math, physics, chemistry, and general science have all indicated various deficiencies (Rice & Kitchel, 2015). One would assume PCK might look similar in these fields due to the similar nature of each, however PCK literature emphatically asserts that PCK is content and even topic specific (Lauermann & König, 2016). In general, PCK could be variable by lesson or unit taught by the same instructor. This is a very important concept to grasp when trying to operationalize PCK within agricultural education. Furthermore, due to the wide variety of content a school-based agricultural educator is expected to know, the demand for content knowledge could be higher than that of other disciplines (Houck & Kitchel, 2010). Moreover, these concerns were realized by (Rice & Kitchel, 2015) when preservice agricultural teachers were unable to apply content knowledge when teaching, and revealed content knowledge preparation was inadequate. Additionally, Rice and Kitchel (2015) asserted preservice students were unable to break down content knowledge, which lead to lack of student understanding.

Although in its infancy, Rice and Kitchel (2015) developed a model depicting how an agricultural educator's PCK might be influenced. This model can be seen in Figure 1.

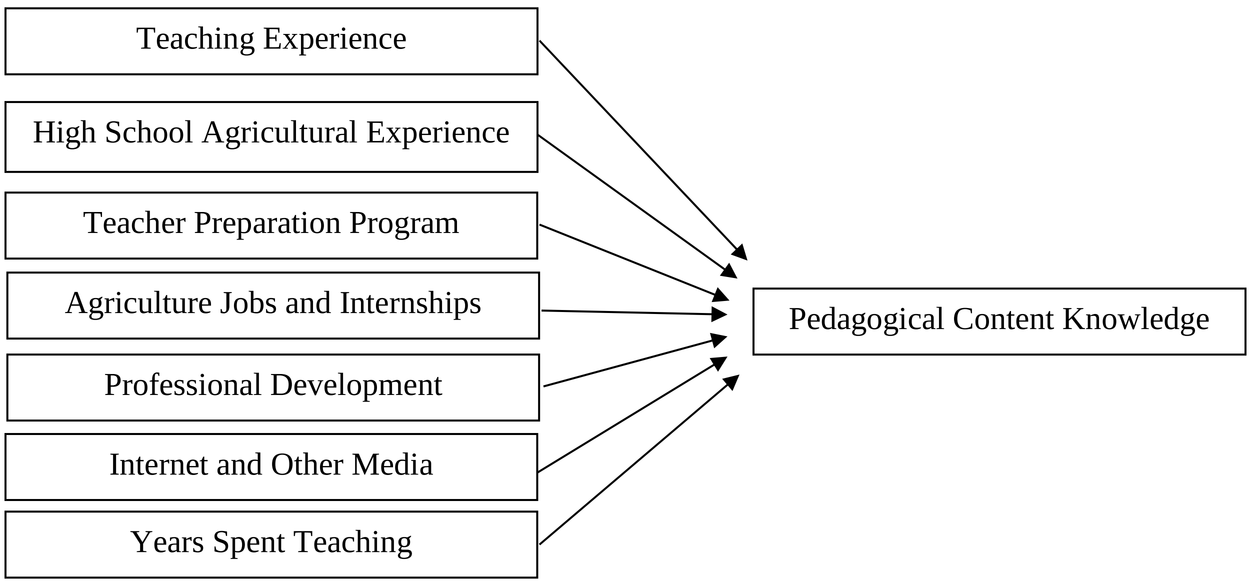

Figure 1. The Relationship between Sources of Content Knowledge and PCK (Rice & Kitchel, 2015)

As identified by Rice and Kitchel (2015), professional development is one of the sources influencing an agricultural educator's PCK. Additionally, researchers have asserted that preservice teachers may not be developmentally ready for PCK while at the teacher educator institution (Lauermann & König, 2016). Additionally, links to teacher burnout and being adequately prepared (professional knowledge) for the classroom exist. Specifically, teacher readiness can have impacts on the self-efficacy of a teacher (Dicke et al., 2015). Not only can PCK help a teacher generally feel better about the lesson or the way they move through their professional career, but may also indicate teachers set a higher standard of student performance (Dicke et al., 2015). Coincidentally, efforts that focus solely on the knowledge aspect of teacher preparation face the challenge of addressing the complete picture of how preservice teachers become practicing teachers (Abbitt, 2011).

To further guide this study, authors relied on the framework described in Bandura's self-efficacy theory. While much work has been completed regarding self-efficacy within agricultural education, the most promising empirical support for the use of this theory comes from outside disciplines. For instance, Ertmer and Ottenbreit (2010), regarding technology integration, asserted that no matter how knowledgeable a person was, if they were not comfortable with a given piece of technology, they were not likely to use it during classroom instruction. Further, evidence of support emerges from Abbitt (2011) who reported a positive change in one's knowledge could lead to increased self-efficacy. However, self-efficacy research is contained within the four walls of a traditional classroom. To a large degree, this does not accurately represent the foundational underpinnings of agricultural mechanics research.

Similar in nature, Gurvitch and Metzler (2009) reported increased self-efficacy when preservice teachers were engaged in both laboratory and practicum experiences within physical education instruction. This evidence provides further support for laboratory-based instruction such as those competencies taught within agricultural mechanics.

Self-efficacy is defined as the "beliefs in one's capabilities to organize and execute the course of action required to produce given attainments" (Bandura, 1997, p. 3). Furthermore, self-efficacy influences a person's choices, actions, the amount of effort they give, how long they persevere when faced with obstacles, their resilience, their thought patterns and emotional reactions, and the level of achievement they ultimately attain (Bandura, 1986). In the field of education, teacher self-efficacy is an important concept of understanding teacher motivation (Knobloch & Whittington, 2002). By understanding the way a teacher feels about completing an activity, or their self-efficacy level, professional development opportunities can be developed to address these inadequacies. See Figure 2 for an illustration of the theory of Self-Efficacy.

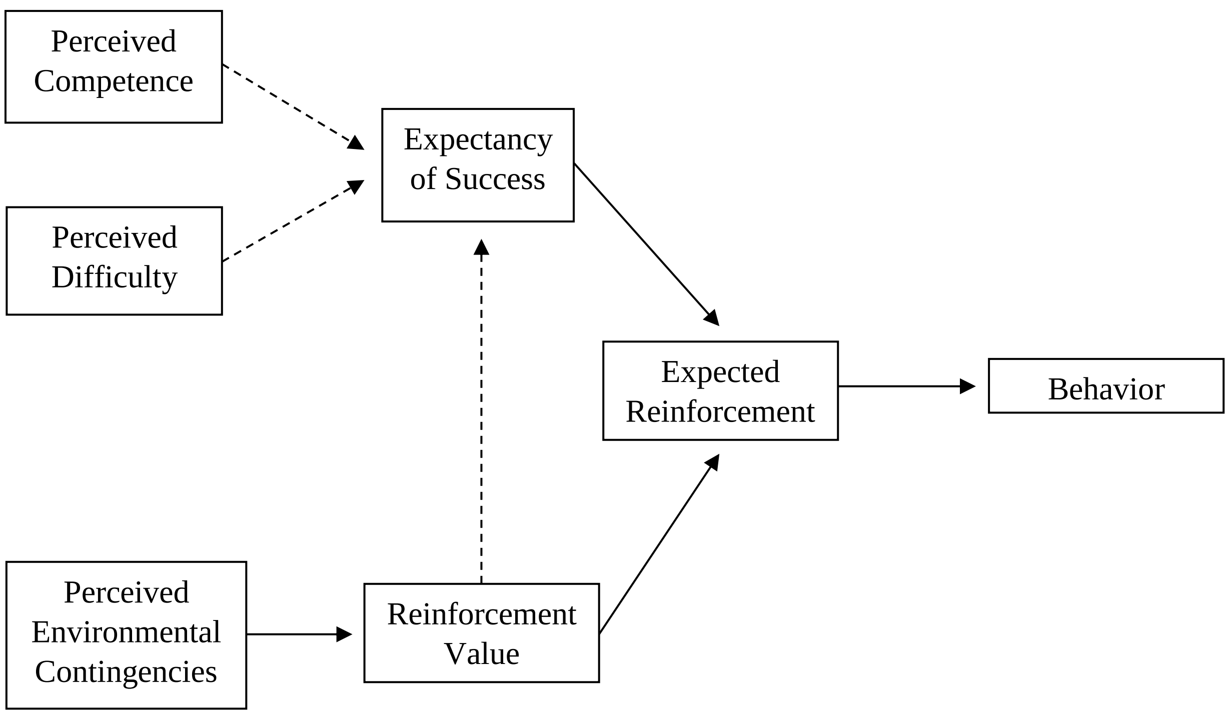

Figure 2. Theory of Self-Efficacy (Bandura, 1997).

Pedagogical Content Knowledge (PCK) is an important part of a teacher's readiness to teach from many aspects. From the teachers standpoint, PCK could impact the stress and professional well-being throughout their career. From the employing school district providing ways to bolster PCK, which could reduce recruitment cost, and from the preservice institution providing ways to further enhance a teaching candidates PCK, could make each entity more desirable. Moreover, PCK could influence self-efficacy, which may have long lasting and wide sweeping impact on the agricultural profession. However, at this point, these are merely notions, and further investigation regarding agricultural education and the current PCK held by those teaching agricultural mechanics is warranted.

Purpose

The purpose of this census was to determine the agricultural mechanics professional development needs of novice, school-based Texas agricultural science teachers and their personal, program, and professional demographics. The following research questions guided this study.

Research Questions

1. What are the personal (age, sex, & ethnicity), program (U.I.L. school size & location of school), and professional (highest degree earned, major program of study in college, minor program of study in college, university semester credit hours taken in agricultural mechanics, & prior agricultural mechanics experience) characteristics of novice, Texas school-based agricultural science teachers?

2. What are the agricultural mechanics in-service education needs of novice, Texas school-based agricultural science teachers, as measured by the knowledge, performance, and consequence competence?

Methods

The population for this quantitative census were all (N = 150) novice, Texas school-based agricultural science teachers who attended a first-year, new teacher orientation meeting at the summer 2016 Texas agricultural science professional development conference. Due to the population being unknown prior to the meeting, a purposeful sampling method was employed. Patton (2002) noted that in quantitative inquiry, the focus is typically on small samples, as small as an N = 1, where the researchers seek an understanding of phenomenon *in-depth*. Furthermore, the logic and power of purposeful sampling derive from the emphasis on in-depth understanding, which leads to selecting *information-rich* cases for study. He also noted that "*information-rich* cases are those from which one can learn a great deal about issues of central importance to the purpose of the research" (Patton, 2002, p. 46). Cresswell (2007) stated, "purposeful sampling is used for qualitative research" when the "inquirer selects individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon" of the study (p. 125). For this study, researchers sought to better understand and describe the phenomenon of agricultural mechanics professional development needs of novice, Texas school-based agricultural science teachers - a group that typically has a high career turnover rate during the first three years (Sorensen, McKim, & Velez, 2016; Tippens, Ricketts, Morgan, Navarro, & Flanders, 2013).

Instrument development for this study was guided by the foundational elements of the Borich Needs Assessment Model (Borich, 1980). This model enables "researchers/evaluators to purposefully prioritize teaching and/or research competencies so participants can receive training in the most needed area first, and in each successively less urgent area (competency), if time and funding permit the extension of a training and professional development session" (McKim, 2013, p. 1). Furthermore, the Borich Needs Assessment Model can be used to determine the "gaps," based on "*what is*" versus "*what should be*," in educators' and/or researchers' competencies in the teaching or research processes" (McKim, p. 1). Borich (1980) identified three dimensions within the needs assessment model that would allow a better understanding of the needs of teachers that included: *Knowledge Competence, Performance Competence, and Consequence Competence*. Furthermore, a comparison of scaled measures: importance, knowledge, ability to perform, and ability to teach others to perform, can be compared to create a Mean Weighted Discrepancy Score (MWDS), which allows insight into these dimensions. The MWDS also allows researchers the ability to prioritize training for teachers based upon these dimension areas.

Using the Borich Needs Assessment model as a guide, an instrument was developed based upon a review of literature that focused on the state mandated curriculum, or Texas Essential Knowledge and Skills (TEKS), taught in Texas agricultural mechanics courses (Texas Education Agency, 2015), and a previous study by Saucier, McKim, and Tummons (2012) and Geiken and Saucier (2014). In the study by Saucier et al. (2012), researchers used the Delphi method to identify 23 agricultural mechanics skill areas that novice Missouri agriculture teachers should know prior to teaching. Furthermore, Geiken and Saucier conducted a national Delphi study that identified 22 agricultural mechanics skill areas that all U.S., novice, agriculture teachers should know prior to teaching. Based upon these works and the state mandated TEKS curriculum (TEA), researchers designed a two-part instrument. Based upon recommendations by Spector (1992), the first section offered respondents an opportunity to respond to 21 agricultural mechanics skill areas, four times, using a five-point Likert type scale that utilized the following scales and anchors: *Importance to teach* (1 = No importance, 2 = Little importance, 3 = Some importance, 4 = Moderate importance, 5 = Excellent importance), *Knowledge* (1 = No knowledge, 2 = Little knowledge, 3 = Some knowledge, 4 = Moderate knowledge, 5 = Excellent knowledge), *Ability to Perform* (1= No ability, 2 = Little ability, 3 = Some ability, 4 = Moderate ability, 5 = Excellent ability), and *Ability to Teach others to Perform* (1 = No ability, 2 = Little ability, 3 = Some ability, 4 = Moderate ability, 5 = Excellent ability). The second section of the instrument sought to identify key personal (age, sex, & ethnicity), program (University Interscholastic League (UIL) school size & location of school), and professional (highest degree earned, major program of study in college, minor program of study in college, university semester credit hours taken in agricultural mechanics, & prior agricultural mechanics experience) characteristics of novice, Texas school-based agricultural science teachers. In this section, respondents were asked to determine if they completed enough agricultural mechanics courses at their respective universities to teach a school-based agricultural mechanics course. Respondents were also offered a section to describe why they felt unprepared to teach a school-based agricultural mechanics course.

To ensure the validity of the instrument prior to data collection, a panel of experts ($N = 5$) was used to determine face and content validity. A panel of experts have been found useful in minimizing the face and content validity errors through a systematic review of the purpose of the study and instrument, thus determining if the instrument purports to the purpose of the study (Morse, 1991). The panel members consisted of two professors with experience teaching both school-based and collegiate agricultural mechanics courses, one professor with experience teaching both school-based and collegiate level agricultural education courses, and two graduate students with school-based agricultural education experience. Based upon the panel’s recommendations, changes were implemented to the instrument, thus deeming the instrument valid.

Due to the fact that this population was not easily identifiable prior to the meeting of first year teachers at the annual teachers' professional development conference and the need to control for measurement error (Trochim, 2006), a *post hoc* reliability analysis was conducted. Researchers utilized Cronbach's alpha coefficient to determine if the scales of measurement were consistent in regards to respondents answer choices (Ary, Jacobs, & Sorensen, 2010; Field, 2009). These *post hoc* reliability estimates ranged from .946 to .975 (Scales of measurement: Importance to Teach = .946, Knowledge = .961, Ability to Perform = .970, Ability to Teach Others to Perform = .975). According to Ary, Jacobs, and Sorensen (2010), Field (2009), and Spector (1992), these reliability estimates for scales of measurement were acceptable.

For data collection, a paper questionnaire was developed and issued to all respondents who attended the first year teachers meeting at the summer 2016 Texas agricultural science professional development conference. Prior to the meeting, no frame was available. Concluding a single round of data collection, a census was conducted that resulted in a 93.33% response rate or 134 usable responses. Due to a census being conducted and a high response rate, "control of non-response error are not necessary when a response rate of 85% is achieved" (Lindner, Murphy, & Briers, 2001, pg. 51). Additionally, according to Guideline 1.3.4 of the Standards and Guidelines for Statistical Surveys (Office of Management and Budget, 2006), researchers should "plan for a nonresponse bias analysis if the expected unit response rate is below 80 percent" (p. 8).

In determining the appropriate analysis of the data, the primary guidance was scales of measurement as outlined by Ary, Jacobs, Razavieh, and Sorensen (2006). For research question one, data were analyzed using SPSS® version 22.0 for Windows™ based computers to determine frequency, percentage, measures of central tendency (mean, median, mode), and variability (range & standard deviation). To analyze data associated with research question two, the Borich (1980) Needs Assessment Model, and a Microsoft Excel based Mean Weighted Discrepancy Calculator (McKim & Saucier, 2011). To determine the professional development needs of the respondents, the Borich (1980) needs assessment model was utilized to determine the discrepancy for each competency. In accordance with this model, a Mean Weighted Discrepancy Score (MWDS) was calculated for each competency using the following formula:

$$\text{MWDS} = \frac{[(\text{Importance Rating} - \text{Ability Rating}) \times (M \text{ Importance Rating})]}{\text{Number of Observations}}$$

A large mean MWDS represents greater in-service needs, while smaller scores represent lesser in-service needs (Borich, 1980).

Findings

Research question one sought to describe the personal program, and professional characteristics of novice, Texas school-based agricultural science teachers. Research determined that more than half (59.0%) of respondents were women, white (93.3%), possessed a bachelor's degree (75.4%), and were an average age of 27 years (M = 27.17 ; SD = 7.51). On average, teachers indicated that they were enrolled in about 8 semester credit hours of agricultural mechanics courses while earning their degree at a university (M = 8.04; SD = 7.30). Most of these teachers will teach at a 3A (UIL) school (24.6%) in a rural area (51.5%). Furthermore, the majority of teachers (*f* = 71; 61.7%) indicated that they had agricultural mechanics related work experience prior to teaching and only 54.5% (*f* = 73) of teachers felt that they had enough agricultural mechanics courses to successfully teach an agricultural mechanics course at the high school level.

Research question two sought to determine the agricultural mechanics in-service education needs of novice, Texas school-based agricultural science teachers, as measured by the knowledge, performance, and consequence competences. Within the Knowledge Competence, the top three competencies with the greatest need for professional development were: metallurgy (MWDS = 7 .32), metal fabrication (MWDS = 6.37), and Gas Tungsten Arc Welding (MWDS = 5.68). The competencies with the lowest need for professional development were power tools (MWDS = 2.03), oxygen-fuel cutting and welding (MWDS = 0.20) and hand tools (MWDS = 0.16). Please see Table 1 for a more information.

The top professional development needs within the Performance Competence were welding testing (MWDS = 5.23), Gas Metal Arc Welding (MWDS = 4.70), and electricity (MWDS = 4.69). The lowest competencies with the lowest need for professional development were soldering (MWDS = 3.00), concrete (MWDS = 2.77), and painting and preservation (MWDS = 1.94). For further information, please see Table 2.

When evaluating the Consequence Competence, the top three competencies that had the greatest need for professional development were metallurgy (MWDS = 8.12), welding testing (MWDS = 5.24), and Gas Metal Arc Welding (MWDS = 4.74). The three competencies with the lowest need for professional development in this competence were soldering (MWDS = 3.06), concrete (MWDS = 2.62), and painting and preservation (MWDS = 2.09). See Table 3 for more information.

Table 1
Mean Weighted Discrepancy Scores (MWDS) for Competencies Related to the Knowledge Competence (*n* = 134) – as ranked by MWDS

Rank	Competency	MWDS	Importance			Knowledge		
			M	*SD*	Mo	M	*SD*	Mo
1	Metallurgy	7.32	4.35	0.83	5.00	2.66	1.16	3.00
2	Metal Fabrication	6.37	4.67	0.68	5.00	3.32	1.12	4.00
3	Gas Tungsten Arc Welding	5.68	4.37	0.83	5.00	3.08	1.10	4.00
4	Power and Machinery	5.26	4.52	0.77	5.00	3.37	1.10	4.00
5	Welding Test	5.10	4.19	0.87	5.00	2.98	1.11	3.00
6	Plumbing	4.80	4.27	0.84	5.00	3.15	1.12	3.00
7	Gas Metal Arc Welding	4.30	4.44	0.80	5.00	3.47	1.08	4.00
8	Electricity	4.28	4.15	0.91	5.00	3.12	1.03	3.00
9	Shielded Metal Arc Welding	4.15	4.25	0.85	5.00	3.28	1.14	4.00
10	Environmental and Structures	3.82	3.98	0.91	4.00	3.02	1.04	3.00
11	Soil and Water Conservation	3.50	4.17	0.97	5.00	3.33	1.12	3.00
12	Precision Measurement Tools	3.35	4.36	0.83	5.00	3.60	1.13	4.00
13	Planning and Estimation	3.28	4.19	0.95	5.00	3.40	1.10	4.00

(continues)

Table 1 (continued)
Mean Weighted Discrepancy Scores (MWDS) for Competencies Related to the Knowledge Competence (*n* = 134) – as ranked by MWDS

Rank	Competency	MWDS	Importance			Knowledge		
			M	*SD*	Mo	M	*SD*	Mo
14	Plasma Cutting	3.04	4.01	1.00	4.00	3.25	1.10	4.00
15	Soldering	2.90	3.65	0.95	4.00	2.84	1.10	3.00
16	Concrete	2.83	3.57	0.96	4.00	2.78	1.07	3.00
17	Safety/Laboratory Management	2.60	4.70	0.66	5.00	4.15	1.01	5.00
18	Painting and Preservation	2.04	3.87	0.96	4.00	3.35	1.06	3.00
19	Power Tools	2.03	4.36	0.83	5.00	3.90	1.00	4.00
20	Oxygen-Fuel Cutting and Welding	0.20	3.74	1.02	4.00	3.69	1.03	4.00
21	Hand Tools	0.16	4.08	0.89	4.00	4.05	0.95	5.00

Table 2
Mean Weighted Discrepancy Scores (MWDS) for Competencies Related to the Performance Competence (*n* = 134) – as ranked by MWDS

Rank	Competency	MWDS	Importance			Ability to Perform		
			M	*SD*	Mo	M	*SD*	Mo
1	Welding Test	5.23	4.20	0.87	5.00	2.96	1.22	3.00
2	Gas Metal Arc Welding	4.70	4.43	0.80	5.00	3.37	1.18	4.00
3	Electricity	4.69	4.16	0.90	5.00	3.03	1.12	3.00
4	Metal Fabrication	4.58	4.34	0.84	5.00	3.29	1.22	4.00
5	Gas Tungsten Arc Welding	4.45	4.08	0.89	4.00	2.98	1.15	4.00
6	Shielded Metal Arc Welding	4.38	4.28	0.80	5.00	3.26	1.29	4.00
7	Environmental and Structures	4.18	3.97	0.91	4.00	2.91	1.11	3.00
8	Planning and Estimation	4.10	4.33	0.94	5.00	3.38	1.18	4.00
9	Metallurgy	4.06	3.75	1.02	4.00	2.64	1.20	3.00
10	Oxygen-Fuel Cutting and Welding	3.84	4.53	0.74	5.00	3.68	1.22	4.00
11	Soil and Water Conservation	3.84	4.16	0.96	5.00	3.24	1.07	3.00
12	Power and Machinery	3.68	4.27	0.84	5.00	3.40	1.15	4.00
13	Precision Measurement Tools	3.57	4.37	0.84	5.00	3.54	1.21	4.00
14	Hand Tools	3.48	4.66	0.69	5.00	3.92	1.12	5.00
15	Plumbing	3.47	3.99	1.01	4.00	3.12	1.20	3.00
16	Plasma Cutting	3.42	4.07	0.90	4.00	3.22	1.23	4.00
17	Power Tools	3.18	4.53	0.77	5.00	3.82	1.08	4.00
18	Safety/Laboratory Management	3.14	4.70	0.66	5.00	4.04	1.14	5.00
19	Soldering	3.00	3.63	0.97	4.00	2.80	1.20	3.00
20	Concrete	2.77	3.59	0.96	4.00	2.82	1.11	3.00
21	Painting and Preservation	1.94	3.86	0.96	4.00	3.36	1.14	4.00

Table 3
Mean Weighted Discrepancy Scores (MWDS) for Competencies Related to the Consequence Competence (*n* = 134) – as ranked by MWDS

Rank	Competency	MWDS	Importance			Ability to Teach Others to Perform		
			M	*SD*	Mo	M	*SD*	Mo
1	Metallurgy	8.12	4.52	8.58	4.00	2.65	1.26	1.00
2	Welding Test	5.24	4.21	0.87	5.00	2.98	1.31	4.00
3	Gas Metal Arc Welding	4.74	4.43	0.80	5.00	3.36	1.21	4.00
4	Metal Fabrication	4.67	4.34	0.84	5.00	3.25	1.25	4.00
5	Electricity	4.61	4.16	0.90	5.00	3.05	1.17	4.00
6	Shielded Metal Arc Welding	4.55	4.28	0.83	5.00	3.23	1.26	4.00
7	Gas Tungsten Arc Welding	4.35	4.07	0.90	4.00	3.00	1.20	4.00
8	Planning and Estimation	4.30	4.34	0.94	5.00	3.35	1.19	4.00
9	Oxygen-Fuel Cutting and Welding	4.21	4.53	0.74	5.00	3.58	1.18	4.00
10	Environmental and Structures	4.14	3.95	0.91	4.00	2.90	1.19	4.00
11	Power and Machinery	4.11	4.28	0.84	5.00	3.30	1.16	4.00
12	Hand Tools	3.97	4.67	0.68	5.00	3.82	1.08	4.00
13	Precision Measurement Tools	3.94	4.39	0.83	5.00	3.47	1.27	4.00
14	Plasma Cutting	3.88	4.10	0.86	4.00	3.13	1.22	4.00
15	Power Tools	3.87	4.53	0.76	5.00	3.68	1.12	4.00
16	Soil and Water Conservation	3.83	4.19	0.95	5.00	3.27	1.20	4.00
17	Safety/Laboratory Management	3.81	4.72	0.65	5.00	3.91	1.15	5.00
18	Plumbing	3.74	4.02	1.00	4.00	3.08	1.27	4.00
19	Soldering	3.06	3.65	0.97	4.00	2.81	1.29	4.00
20	Concrete	2.62	3.60	0.96	4.00	2.87	1.14	4.00
21	Painting and Preservation	2.09	3.86	0.97	4.00	3.32	1.15	3.00

Conclusions, Implications, & Recommendations

Research question one sought to describe the personal, program, and professional characteristics of novice, Texas school-based agricultural science teachers. The majority of new agricultural science teachers indicated that they were female, white, in their late 20's, and taught in mid-size schools in rural areas of Texas. These findings provide further evidence a change in demographical makeup within agricultural education exist. Tummons, et al., (2016) asserted female teacher populations had been on the rise for some time. These findings also give further credibility to Tummons, et al. findings regarding further investigation into the female perspective within agricultural mechanics. With a change in demographics, comes a need to replicate research previously completed with an overwhelming percentage of male respondents. While demographics are not often related to PCK, teacher educators themselves may need to revisit practices, delivery methods, and equipment within their teacher preparation programs. This conclusion would imply that females have slightly different needs than do males in regards to the physical use of equipment and PPE than do males. This implication is substantiated by a practical review of industry available PPE equipment aimed at the specific needs of female users.

Furthermore, most of these teachers had some agricultural mechanics work experience and a little more than half felt comfortable teaching secondary agricultural mechanics courses. This finding is similar to the findings of Rice & Kitchel (2015) who reported Missouri teachers perceiving agriculturally related jobs were an effective source of content knowledge. Further aligning with their study Rice and Kitchel (2015) also reported agriculturally related work experience was a significant predictor of content knowledge and explained about 20% of the variance. This study potentially makes a link between content knowledge and the self-efficacy of agricultural teachers. However, more research regarding self-efficacy and the relationship with PCK needs to be carried out due to the uniqueness in the pedagogy of agricultural education and how PCK could influence other domains of teacher preparation.

Research question two sought to determine the agricultural mechanics in-service education needs of novice, Texas school-based agricultural science teachers, as measured by the knowledge, performance, and consequence competences. Across all three-competence areas, teachers indicated they had professional development needs across all 21 agricultural mechanics skill areas. However, the PCK researchers assert that content knowledge is very specific to individual lessons, topics, and situations (Rice & Kitchel, 2015). Thus, it is important to highlight that strong professional development needs were identified in the areas of welding, metal fabrication, weld testing, and metallurgy. Practically, these are the areas teacher education programs should focus on in both preservice curriculum and during in-service teacher education. These findings are substantiated by Hanagriff, Rayfield, Briers, and Murphy (2014) who reported that almost 90 percent of agriculture teachers in Texas taught agricultural mechanics courses each year. Further, research indicated that agricultural mechanics competencies were being used in the class and laboratory based upon the finding that 45% (f = 438) of agricultural education programs in Texas were involved with the agricultural mechanics project shows across the state (Hanagriff, Rayfield, & Briers, 2014), which are largely comprised of metal fabrication projects. However, researchers should caution against ignoring the remaining skills during professional development instruction. For instance, ignoring the benefit of safe power tool operation in conjunction with the skills related to metal fabrication would be counterproductive. Thus, it is recommended further investigation regarding specific skill acquisition and the impacts on teacher PCK and self-efficacy be carried out. Additionally, a longitudinal study of early career agricultural teachers could lead to insightful relationships between PCK, self-efficacy, student performance, and teacher retention.

Implications from this research are very important to the longevity of early career teachers and the overall welfare of students who work and learn in an agricultural mechanics laboratory. By understanding the knowledge level of these new teachers, adequate and timely professional development opportunities can and should be developed. These in-service education opportunities should focus on skill acquisition across all 21 agricultural mechanics skill areas. To retain these new teachers in an industry that typically loses many early career teachers after their third year, stakeholders (agricultural education faculty, state agricultural education supervisors, and local school administrators) should offer in-service education programs for teachers who are responsible for managing and instructing students in an agricultural mechanics laboratory. Additionally, a focus should be given towards courses taught in degree plans that prepare future teachers and the methods in which agricultural mechanics skills are taught in teacher preparation institutions.

References

Abbitt, J. T. (2011). An Investigation of the Relationship between Self-Efficacy Beliefs about Technology Integration and Technological Pedagogical Content Knowledge (TPACK) among Preservice Teachers. *Journal of Digital Learning in Teacher Education, 27*(4), 134-143. doi:10.1080/21532974.2011.10784670

Ary, D., Jacobs, L. C., & Sorensen, C. (2010). *Introduction to Research in Education*. Belmont, CA: Wadsworth, Cengage Learning (8th ed.)

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, N.J.: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*, New York: W.H. Freeman.

Borich, G. D. (1980). A needs assessment model for conducting follow-up studies. *The Journal of Teacher Education, 31*(3), 39-42. doi:10.1177/002248718003100310

Blackburn, J. J., Bunch, J. C., & Haynes, J. C. (2017). Assessing the relationship of teacher self-efficacy, job satisfaction, and perception of work-life balance of Louisiana agriculture teachers. *Journal of Agricultural Education, 58*(1), 21. doi:10.5032/jae.2017.01014

Blackburn, J. J., Robinson, J. S., & Field, H. (2015). Preservice agriculture teachers' perceived level of readiness in an agricultural mechanics course. *Journal of Agricultural Education, 56*(1), 15. doi:10.5032

Burris, S., Robinson, J. S., & Terry, R. (2005). Preparation of pre-service teachers in agricultural mechanics. *Journal of Agricultural Education*, *46*(3), 12. doi: 10.5032/jae.2005.03023

Carlson, J., Stokes, L., Helms, J., Gess-Newsome, J., & Gardner, A. (2015). *The PCK summit: A process and structure for challenging current ideas, provoking future work, and considering new directions*. Retrieved from New York, NY:

Chen, X. (2009). *Students who study science, technology, engineering, and mathematics (STEM) in postsecondary education.* National Center for Education Statistics - U.S. Department of Education. NCES 20019-161.

Chumbley, S. B., Gill, B. E., & Chesher, L. (2013). *Laboratory safety practices of New Mexico agricultural science teachers.* Paper presented at the 2013 Western Region AAAE Research Conference, Lubbock, Texas.

Clark, M. S., Kelsey, K. D., & Brown, N. R. (2014). The thornless rose: A phenomenological look at decisions career teachers make to remain in the profession. *Journal of Agricultural Education, 55*(3), 13. doi:10.5032/jae.2014.03043

Cresswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five approaches. Thousand Oaks, CA: SAGE Publications, Inc. (2nd ed.).

Diakidoy, I. N., & Iordanou, K. (2003). Preservice teachers' and teachers' conceptions of energy and their ability to predict pupils level of understanding. *European Journal of Psychology of Education, XVIII*(4), 11. doi:10.1007/BF03173241

Dicke, T., Parker, P. D., Holzberger, D., Kunina-Habenicht, O., Kunter, M., & Leutner, D. (2015). Beginning teachers' efficacy and emotional exhaustion: Latent changes, reciprocity, and the influence of professional knowledge. *Contemporary Educational Psychology, 41*, 62-72. doi:http://dx.doi.org/10.1016/j.cedpsych.2014.11.003

Dyer, J. E., & Andreasen, R. J. (1999). Safety issues in agricultural education laboratories: A synthesis of research. *Journal of Agricultural Education, 40*(2), 9. doi: 10.5032/jae.1999.02046

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change. *Journal of Research on Technology in Education, 42*(3), 255-284. doi:10.1080/15391523.2010.10782551

Field, A. (2009). *Discovering statistics using SPSS.* Thousand Oaks, CA: SAGE Publications, Inc. (3rd ed.)

Forsythe, S. (1983). An assessment of agricultural mechanics safety instruction conducted at agricultural teacher education programs across the United States. *Journal of the American Association of Teacher Educators in Agriculture, 24*(1), 12. doi:DOI: 10.5032/jaatea.1983.01041

Geiken, K. B., & Saucier, P. R. (2014, October). Agricultural mechanics curriculum skill standards for U.S. agricultural science teachers: A Delphi study. *Paper presented at the 33rd National Agricultural Mechanics Committee Blue Ribbon Professional Development Conference*, Louisville, KY.

Gliem, J. A., & Miller, G. (1993). Laboratory safety in vocational education: An administrator's perspective. *Journal of Agricultural Education, 34*(3), 26-33. doi: 10.5032/jae.1993.03026

Guay, F., Vallerland, R. J., & Blanchard, C. (2000). On the assesment of situational intrinsic and extrensic motivation: The situational motivation scale. *Motivation and Emotion, 24*(3), 39. doi: 10.1023/A:1005614228250

Gurvitch, R., & Metzler, M. W. (2009). The effects of laboratory-based and field-based practicum experience on pre-service teachers' self-efficacy. *Teaching and Teacher Education, 25*(3), 437-443. doi: http://dx.doi.org/10.1016/j.tate.2008.08.006

Hanagriff, R. D., Rayfield, J., & Briers, G. M., T. (2014). Economic impacts and program involvement in agricultural mechanics competition projects in Texas. *Journal of Agricultural Education, 55*(2), 11. doi:10.5032/jae.2014.02079

Hong, J. Y. (2010). Pre-service and beginning teachers' professional identity and its relation to dropping out of the profession. *Teaching and Teacher Education, 26*(8), 1530-1543. doi:http://dx.doi.org/10.1016/j.tate.2010.06.003

Houck, A., & Kitchel, T. (2010). Assessing preservice agricultural teachers' content knowledge: Conceptualizing and measuring teachers topic specific knowledge of students. . *Journal for Research in Mathematics Education, 39*(4), 28.

Hubert, D., & Leising, J. (2000). An assessment of agricultural mechanics courses requirements in agricultural teacher education. *Journal of Southern Agricultural Education Research, 50*(1), 9.

Hubert, D., Ulrich, D., & Murphy, T. (2000). *Safety and health education analysis of Texas' first year agriculture teachers.* Paper presented at the 27th Annual National Agricultural Education Research Conference, San Diego, CA.

Ingersoll, R. M., & Smith, T. M. (2003). The wrong solution to the teacher shortage *Educational Leadership, 60*(8), 3.

Johnson, D. M., & Fletcher, W. E. (1990). *An analysis of the agricultural safety practices in Mississippi secondary agriculture teachers.* Paper presented at the 39th Annual Southern Agricultural Education Conference, San Antonio, Texas.

Johnson, D. M., & Schumacher, L. G. (1989). Agricultural mechanics specialists identification and evaluation of agricultural mechanics laboratory management competencies: A modified delphi approach. *Journal of Agricultural Education, 30*(3), 23-28. doi:10.5032/jae.1989.03023

Johnson, D. M., Schumacher, L. G., & Stewart, B. R. (1990). An analysis of the agricultural mechanics laboratory managment inservice needs of missouri agriculture teachers. *Journal of Agricultural Education, 31*(2). doi:10.5032/jae.1990.02035

Knobloch, N. A. & Whittington, M. S. (2002). Novice teachers' perceptions of support, teacher preparation quality, and student teaching experience related to teacher efficacy. *Journal of Vocational Educational Research, 27*(3). doi: 10.5328/JVER27.3.331

Kotrlik, J. W., Redmann, D. H., Harrison, B. C., & Handley, C. S. (2000). Information technology related professional development needs of Louisiana agriscience teachers *Journal of Agricultural Education, 41*(1), 18-29. doi:10.5032/jae.0000.01018

Langley, G. C., & Kitchel, T. (2013). *Agricultural mechanics instructors' perception of the health beliefs in their laboratory*. Paper presented at the Western Region American Association for Agricultural Education Research Conference, Lubbock, Texas.

Langley, G. C., Martin, M., & Kitchel, T. (2014). Novice Agriculture Teachers' General Self Efficacy and Sense of Community Connectedness. *Journal of Agricultural Education, 55*(4), 11. doi:10.5032/jae.2014.04001

Langley, G. C., & Saucier, P. R. (2016). *Professional development needs of Texas school-based agricultural educators regarding CNC plasma cutting technology: A snapshot assessment method.* Paper presented at the 2016 NACTA Conference, Honolulu, HI.

Lauermann, F., & König, J. (2016). Teachers' professional competence and wellbeing: Understanding the links between general pedagogical knowledge, self-efficacy and burnout. *Learning and Instruction, 45*, 9-19. doi:http://dx.doi.org/10.1016/j.learninstruc.2016.06.006

Layfield, K. D., & Dobbins, T. R. (2000). An assessment of South Carolina agriculture teachers' inservice needs and perceived competencies. *Proceedings of the 2000 National Agricultural Education Research Conference*, San Diego, CA, 572-584.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, *42*(4), 43-53. doi: 10.5032/jae.2001.04043

McKim, B. R., & Saucier, P. R. (2011). Agricultural mechanics laboratory management professional development needs of Wyoming secondary agriculture teachers. *Journal of Agricultural Education, 52*(3), 12. doi: 10.5032/jae.2011.03075

McKim, B. R., & Saucier, P. R**.** (2011). An Excel-based mean weighted discrepancy score calculator. *Journal of International Agricultural and Extension Education, 49*(2).

Moore, G. E., & Camp, W. G. (1979). Why vocational agricultural teachers leave the profession: A comparison of perceptions *20*(3), 8. doi:10.5032/jaatea.1979.03011

Morse, J. M. (1991). *Qualitative nursing research: A contemporary dialogue*. Newbury Park, CA: SAGE Publications, Inc. (2nd ed.). doi: 10.4135/9781483349015

Office of Management and Budget. (2006). Standards and guidelines for statistical surveys. Retrieved on August 26, 2017 from https://obamawhitehouse.archives.gov/sites/default /files/omb/inforeg/statpolicy/standards_stat_surveys.pdf

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: SAGE Publications, Inc.

Ramsey, J., & Edwards, C. (2011). Entry–level technical skills that agricultural industry experts expected students to learn through their supervised agricultural experiences: A modified delphi study. *Journal of Agricultural Education, 52*(2), 82-94. doi:10.5032/jae.2011.02082

Rice, A. H., & Kitchel, T. (2015). The relationship between agriculture knowledge bases for teaching and sources of knowledge. *Journal of Agricultural Education, 56*(4). doi:10.5032/jae.2015.04154

Roberts, G., & Ball, A. (2009). Secondary agricultural science as content and context for teaching. *Journal of Agricultural Education*, *50*(1), 81-91. doi:10.5032/jae.2009.01081

Roe, C. L., & Saucier, P. R. (2015). *An examination of school-based Texas agriculture science teacher position announcements for the 2014-2015 academic school year: Are teachers prepared to meet these challenges?* Poster presented at the 2015 North American Colleges and Teachers of Agriculture Conference, Athens, GA.

Saucier, P. R., McKim, B. R., & Tummons, J. D. (2012). A Delphi approach to the preparation of early-career agricultural educators in the curriculum area of agricultural mechanics: Fully qualified and highly motivated or status quo? *Journal of Agricultural Education, 53*(1), 136-149. doi: 10.5032/jae.2012.01136

Saucier, P. R., Terry, J., R., , & Schumacher, L. (2009). *Laboratory management professional development needs of Missouri agriculture educators.* Paper presented at the 2009 Proceedings of the Southern Region of the American Association for Agricultural Education Conference, Atlanta, GA

Saucier, P. R., Vincent, S. K., & Anderson, R. G. (2014). Laboratory safety needs of Kentucky school-based agricultural mechanics teachers. *Journal of Agricultural Education, 55*(2), 16. doi:10.5032/jae.2014.02184

Schultz, M. J., Anderson, R., Schultz, A. M., & Paulsen, T. H. (2014). Importance and capability of teaching agricultural mechanics as perceived by secondary agricultural educators. *Journal of Agricultural Education, 55*(2), 48-65. doi:10.5032/jae.2014.02048

Schumacher, L., Ess, D. R., Strickland, R. M., & King, B. O. (2002). Agriculture mechanics in the new millennium. *Journal of Agricultural Systems Managment, 15*(1), 9.

Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 10. doi:10.3102/0013189X015002004

Sorenson, T. J., Lambert, M. D., & McKim, A. J. (2014). Examining Oregon agriculture teachers professional development needs by career phase. *Journal of Agricultural Education, 55*(5), 14. doi:10.5032/jae.2014.05140

Sorensen, T. J., McKim, A. J., & Velez, J. J. (2016). Why agriculture teachers leave: A national examination of turnover intentions and work-family conflict. *Journal of Agricultural Education*, *57*(4), 186-201. doi: 10.5032/jae.2016.04186

Spector, P. E. (1992). *Summated rating scale construction: An introduction*. Newbury Park, CA: SAGE Publications, Inc. doi: 10.4135/9781412986038

Stubbs, E. A., & Myers, B. E. (2016). Part of what we do: Teacher perceptions of STEM integration. *Journal of Agriculture Education, 57*(3), 13. doi:10.5032/jae.2016.0308

Texas Education Agency (2015). 19 TAC Chapter 130. Texas Essential Knowledge and Skills for Career and Technical Education. Retrieved August 25, 2017 from http://ritter.tea.state.tx.us/rules/tac/chapter130/index.html

Thieman, E. B., Marx, A. A., & Kitchel, T. (2014). "You've always got challenges: Resilience and the preservice teacher *Journal of Agricultural Education, 55*(4), 11. doi:10.5032/jae.2014.04012

Tippens, A., Ricketts, J. C., Morgan, A. C., Navarro, M., & Flanders, F. B. (2013). Factors related to teachers' intention to leave the classroom early. *Journal of Agricultural Education*, *54*(4), 58-72. doi: 10.5032./jae.2013.04058

Trochim, W. M. K. (2006). *Research methods knowledge base: Measurement error*. Retrieved on August 26, 2017 from http://www.socialresearchmethods.net/kb/measerr.php

Tummons, J. D., Langley, G. C., Reed, J. J., & Paul, E. (2016). *Concerns of female preservice agricultural mechanics teachers*. Paper presented at the 2016 National Agricultural Education Research Conference, Kansas City, MO.

Agricultural Mechanics Professional Development Needs of Novice, School-Based Texas Agricultural Science Teachers

Discussant Comments

Catherine W. Shoulders, University of Arkansas

This manuscript presents work that continues the authors' long line of inquiry into the professional development needs of agricultural mechanics instructors. Taking a different turn than previous works, this study focused on the needs of beginning teachers.

The researchers are to be commended on their commitment to closing this gap in the literature. In fact, two papers within this session share an author, and both focused on the professional development needs of agricultural mechanics teachers. The instrumentation and populations are different; however, the findings are much the same: agricultural education teachers need professional development within areas of agricultural mechanics.

The consistency within the conclusions and recommendations of these, and previous, studies, begs the question: are the recommendations being followed? Is anyone offering professional development on agricultural mechanics for these teachers? If so, is anyone assessing its impact? Perhaps those manuscripts are in a different session.

Regarding this manuscript specifically, I appreciated the instrument development, involving both a tried and true measurement of needs, as well as a tailored approach to focus on these teachers specifically. I was left a bit perplexed, however, by the justification for purposeful sampling, which was based on its merits within qualitative research, when this study was clearly quantitative.

Further, I appreciated the authors' connection to PCK, which encourages readers to think beyond the study at hand and consider how information herein can inform studies focusing on other aspects of technical content knowledge, pedagogical knowledge, and PCK.

Finally, I'd like to leave the researchers with a philosophical question that came to the forefront of my thinking while I was reading this manuscript: on page 3, the authors mention that "agricultural education at its roots has been focused on the development of specific skills within the profession". While this is cited information, much of the early work in agricultural education focused on the development of critical thinking and problem solving rather than on the development of specific skills. If we examine agricultural education from these deeper philosophical roots, how can the aims and conclusions of the current study inform further research?

I thank the researchers for the opportunity to read this manuscript, and look forward to seeing where their researcher leads in the future.

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Laboratory Management Needs of Iowa School-Based Agricultural Mechanics Teachers

Abstract

Further investigation is needed to determine the specific laboratory management needs of agricultural education teachers. The theoretical foundation that guided this study was Bandura's theory of self-efficacy (1997). To further align this theory with this study researchers explored the beliefs and one's capabilities to organize and excute the course of action to manage an agricultural mechanics laboratory. The research objectives for this study were: Determine the self-perceived level(s) of importance and ability as related to agricultural mechanics laboratory management competencies and determine the professional development needs of Iowa school-based agricultural education teachers regarding agricultural mechanics laboratory management competencies. Results of the Mean Weighted Discrepancy Scores (MWDS) indicated that teacher's greatest in-service needs revolved around hazardous laboratory conditions and materials. The competencies that ranked the highest included correcting hazardous laboratory conditions, safely disposing of hazardous materials, properly installing and maintaining safety devices and emergency equipment, safely handling hazardous materials, and safely storing hazardous materials. Agricultural education teachers need professional development in the realm of hazardous conditions within the confines of an agricultural mechanics laboratory and handling hazardous materials. Working with hazardous materials is a critical competency that agricultural educators must have when managing any type of laboratory.

Introduction

Agricultural laboratories offer a unique opportunity for agricultural education teachers to expose students to hands-on activities that reinforce both academic and vocational skills (Hubert, Ullrich, Lindner, & Murphy, 2003). The various agricultural laboratories that teachers utilize can include the study of curriculum related to land, animals, greenhouse crops, forestry, aquaponics, and agricultural mechanics. McKim and Saucier (2011) stated that an agricultural mechanics laboratory is a necessary component of a quality agricultural education program. The incorporation of laboratory-based experiences allow students the opportunity to apply scientific inquiry and STEM-based applications (Osborne & Dyer, 2000). Since students learn various psychomotor skills in agricultural mechanics curriculum, a lot of time is spent inside an agricultural mechanics laboratory (Johnson, Schumacher, & Stewart, 1990; McKim & Saucier, 2011).

According to numerous studies, laboratory management is the most important aspect of teaching in any agricultural education laboratory (Blackburn, Robinson, & Field, 2015; Johnson et al., 1990; McKim & Saucier, 2011; Saucier, Terry, & Schumacher, 2009; Saucier & McKim, 2011). Agricultural education teachers must be able to complete various tasks when managing a laboratory such as maintaining a safe working environment, providing safety instruction, and identifying safety hazards (Phipps, Osborne, Dyer, & Ball, 2008). Harper (1984) posited that students are more conscious of safety practices when the teacher exhibits safe behavior and follows proper safety procedures. Having and maintaining positive safety beliefs and procedures are crucial in order to enhance learning opportunities for students in agricultural laboratories (Hubert et al., 2003).

Bruening, Hoover, and Radhakrishna (1991) stated that the physical safety of students must come first, out of all the other duties that an agricultural education teacher has, when teaching students in a laboratory. Since students tend to live in a risk-taking world with disregard towards rules, they are more apt not to know and understand the consequences of unsafe behaviors (Hubert et al., 2003). Saucier, Vincent, and Anderson (2014) posited that agricultural education teachers must be competent and knowledgeable in laboratory management in order to establish a safe learning environment in agricultural laboratories for their students.

If a teacher is incompetent and unknowledgeable in regards to laboratory management, an agricultural laboratory can quickly become unsafe and/or unused (Hubert et al., 2003). According to Hubert, et al., (2003), incompetence of laboratory management could stem from inadequate instruction in pre-service preparation programs. McKim and Saucier (2013) found over a 20 year period that agricultural education instructors were receiving less training in agricultural mechanics, students had less working space in agricultural mechanics laboratories, and programs had an increased student enrollment. Furthermore, Dyer and Andreasen (1999) stated that new agricultural education teachers were ill-equipped in safety. With a decline in required agricultural mechanics courses in pre-service programs, perhaps more in-service professional development opportunities should be held in order for beginning agricultural education teachers to become competent?

Past studies have stated that strategies are needed to help ensure that pre-service and in-service teachers develop technical competence in regards to laboratory management (Blackburn et al., 2015; Johnson et al., 1990; McKim & Saucier, 2011; Saucier et al., 2009; Saucier & McKim, 2011). Hubert et al. (2003) stated that first year teachers and teachers with minimal experience were more open to receive help in regards to agricultural education program safety concerns. With an increased frequency of professional development opportunities offered to beginning teachers, retention rates among these individuals in the agricultural education field should increase (Ruhland & Bremer, 2002). By determining the laboratory management in-service needs of agricultural education teachers, professional developmenet opportunities can be more efficient and effective. This will help ensure beginning and in-service teachers are more compentent and knowledgeable about creating safe learning environments in agricultural education laboratories.

Theoretical Framework

The theoretical foundation that guided this study was Bandura's theory of self-efficacy (1997). Bandura defined self-efficacy as the "beliefs in one's capabilities to organize and execute the course of action required to produce given attainments" (p. 3). Self-efficacy influences a person's choices, actions, the amount of effort they give, how long they persevere when faced with obstacles, their resilience, their thought patterns and emotional reactions, and the level of achievement they ultimately attain (Bandura, 1986). To further align the theory with this study, researchers explored the beliefs and one's capabilities to organize and execute the course of action to manage an agricultural mechanics laboratory.

Purpose and Research Objectives

The purpose of this study was to describe the laboratory management professional development needs of agricultural education teachers in Iowa who instruct students in an agricultural mechanics laboratory. The purpose aligns with the National Career and Technical Education Research Agenda (Lambeth, Elliot, & Joerger, 2008) research problem area (RPA) 5: Program Relevance and Effectiveness, specifically relating to research activity (RA) 5.1.3: Professional Development of Teachers; with secondary implications in RA 1.2.2: CTE Teacher Education. This research also aligns with Research Priority 3 of the American Association for Agricultural Education (AAAE) national standards for teacher-education in agriculture, which suggests that teacher candidates need to be competent in science and be prepared for a 21st century workforce (Roberts, Harder, & Brashears, 2016). The following research objectives were investigated to accomplish this purpose:

1. Identify the personal, professional, and program demographic characteristics of Iowa school-based agricultural education teachers who utilize a laboratory to instruct related courses.

2. Determine the self-perceived level of importance that Iowa school-based agricultural education teachers place upon selected agricultural mechanics laboratory management competencies.

3. Determine the self-perceived ability level that Iowa school-based agricultural education teachers place upon selected agricultural mechanics laboratory management competencies.

4. Determine the professional development needs of Iowa school-based agricultural education teachers for selected agricultural mechanics laboratory management competencies.

Procedures

The population for this quantitative study was school-based agricultural education teachers in Iowa who taught agricultural mechanics courses in a laboratory setting during the spring of 2014. Due to the number of subjects (N = 238) and the ease of electronic data collection, a random sample was selected from a frame of the state's agricultural education teachers and a representative sample size was selected (n = 148) based on recommendations from Krejcie and Morgan (1970).

In 2012, McKim and Saucier analyzed data collected with an instrument (modified by Saucier et. al, 2009) that was used in similar studies conducted in six states (Arkansas, Kentucky, Missouri, Oklahoma, Tennessee, and Wyoming). Furthermore, these researchers used factor analysis and psychometric meta-analysis techniques to "analyze the intercorrelations among three or more measures that reduce the set to a smaller number of underlying factors" and "to investigate the relationship between the same variables" (Ary, Jacobs, & Sorensen, 2010, p. 642 & 645). From their analysis, only 33 agricultural mechanics laboratory management competencies proved to not have issues with multicollinearity. Furthermore, McKim and

Saucier (2012) utilized the 33 competencies and analyzed them using psychometric meta-analysis techniques that divided these competencies into eight constructs.

The data collection instrument modified by McKim and Saucier (2012), was used for data collection in this study. This two-section instrument consisted of 33 statements with double-matrix response scales. One scale was designed to rate the perceived importance of each skill competency (1 = *No Importance*, 2 = *Below Average Importance*, 3 = *Average Importance*, 4 = *Above Average Importance*, 5 = *Utmost Importance*), while the other scale was designed to rate the individual's ability to perform the skill competency (1 = *No Ability*, 2 = *Below Average Ability*, 3 = *Average Ability*, 4 = *Above Average Ability*, 5 = *Exceptional Ability*). The second section of the instrument was used to identify personal, professional, and program characteristics of the respondents and the agricultural education programs where they taught.

The design and format of the data collection instrument was guided by the suggestions of Dillman, Smyth, and Christian (2014). To determine face and content validity, the researchers used a panel of experts. The panel of experts (N = 5) consisted of one faculty member from a university that specialized in working with Iowa agricultural mechanics teachers, three doctoral graduate students with prior school-based agricultural education teaching experience, and an agricultural education faculty member with expertise in instrument development and research methodology. The instrument was deemed valid through this process.

This study used a modified instrument that was based upon the instrument that was used in studies of school-based secondary agricultural education teachers in six states by Saucier, et al. (2009) and later validated by McKim and Saucier (2012). The Cronbach's alpha for the constructs included in that instrument (Saucier, et. al.) ranged from .87-.90, indicating a high level of confidence in the reliability of the instrument.

Electronic data collection protocol of Dillman et al. (2014) was followed for this study. After five points of contact, a response rate of 48.65% (n = 72) was obtained. Non-response error was a relevant concern; therefore, procedures for handling non-respondents were followed as outlined as *Method 1-comparison of early to late respondents* in Lindner, Murphy, and Briers (2001). Therefore, external validity did not threaten the generalizability of the findings of this study to the target population (Lindner, et al., 2001).

Data were analyzed using IBM SPSS Statistics® version 22.0 for Windows™ based computers. In determining the appropriate analysis of the data, the primary guidance was scales of measurement as outlined by Ary, et al., (2010). The first research objective sought to describe selected personal and professional characteristics of school-based agricultural mechanics teachers in Iowa; thus, frequencies and percentages were calculated for gender, first aid training certified, first responder training certified, and type of teacher certification program completed. Mean, range, and standard deviations were calculated for years of teaching experience, years of agricultural mechanics teaching experience, age, average hours per week spent teaching and supervising student Supervised Agricultural Experience (SAE) projects, and university semester credit hours completed in agricultural mechanics courses. Additionally, this objective sought to describe selected characteristics of agricultural education programs in Iowa that offered agricultural mechanics courses. Mean, range, and standard deviations were also calculated for the following characteristics: annual student enrollment for agricultural mechanics courses, average student enrollment per agricultural mechanics course, age of agricultural mechanics laboratory, size of the agricultural mechanics laboratory, total budget for the agricultural education program, total budget for agricultural mechanics consumables, total budget for personal protection equipment used in the agricultural mechanics laboratory, and total budget for tools and equipment for the agricultural mechanics laboratory. Additionally, frequency and percentage were calculated in regard to if students were required to pass a safety exam prior to working in the agricultural mechanics laboratory.

The second research objective sought to describe the perceived importance of selected agricultural mechanics laboratory management competencies by school-based agricultural mechanics teachers while the third research objective sought to describe school-based agricultural mechanics teachers' perceived ability to perform selected agricultural mechanics laboratory management competencies. Mean and standard deviations were calculated for all variables associated with these objectives.

The fourth research objective sought to prioritize the agricultural mechanics laboratory management competencies that needed improvement through professional development, as perceived by school-based agricultural mechanics teachers in Iowa. To determine the professional development needs of the respondents, the Borich (1980) needs assessment model was utilized to determine the discrepancy (importance level and ability level) for each competency. In accordance with this model, a Mean Weighted Discrepancy Score (MWDS) was calculated for each competency using the following formula:

$$\text{MWDS} = \frac{(\text{Importance Rating} - \text{Ability Rating}) \times (M\ \text{Importance Rating})}{\text{Number of Observations}}$$

A large MWDS represents greater in-service needs, while smaller scores represent lesser in-service needs (Borich, 1980).

Findings

Research Objective One

The average respondent was 40 (M = 40.48; SD = 12.83) years of age, had taught school-based agricultural education courses for more than 15 years (M = 15.22; SD = 12.06), and had specifically taught agricultural mechanics courses for 14 years (M = 14.00; SD = 12.16). On average, the respondents completed six university semester credit hours of agricultural mechanics coursework (M = 6.78; SD = 7.63) as a part of their bachelor's degree. Additionally, teachers reported that they supervised student work in the agricultural mechanics laboratory for an average rate of more than 7 hours (M = 7.42; SD = 5.02) per week (see Table 1).

Table 1

Selected Personal and Professional Demographics of School-based Agricultural Education Teachers in Iowa (*n* = 72)

Characteristic	*M*	*SD*	Min	Max
Age	40.48	12.83	22.0	74.0
Years of agricultural education teaching experience	15.22	12.06	0.5	42.0
Years of agricultural mechanics teaching experience	14.00	12.16	0.0	42.0
University semester credit hours earned in agricultural mechanics coursework	6.78	7.63	0.0	30.0
Hours spent supervising student work in the agricultural mechanics laboratory weekly	7.43	5.02	0.0	23.0

To further describe the population, a summary of selected personal and professional demographic characteristics of Iowa school-based agricultural education teachers were identified. The respondents consisted of 49 (68.1%) male and 17 (23.6%) female teachers; six teachers failed to indicate their gender (*f* = 8.3%). As outlined in Table 2, the majority (*f* = 65; 90.3%) of these teachers indicated that they were certified to teach agricultural education through a traditional university teacher education program. Only one teacher indicated that they were certified to teach through an alternative education program (*f* = 1; 1.4%) and six teachers failed to respond to the question (*f* = 6; 8.3%). Almost three quarters of the respondents (*f* = 53; 73.6%) indicated that they received first aid training whereas less than a fifth of the teachers (*f* = 13; 18.1%) indicated receiving first responder training.

Table 2
Selected Professional Demographics of School-based Agricultural Education Teachers in Iowa (*n* = 72)

Characteristic	*f*	%
Type of teacher certification program completed		
Traditional	65	90.3
Alternative	1	1.4
Missing	6	8.3
Completed first aid training?		
Yes	53	73.6
No	12	16.7
Missing	7	9.7
Completed first responder training?		
Yes	13	18.1
No	52	72.2
Missing	7	9.7

The average annual student enrollment for all agricultural mechanics courses per program was 37 students per year (*M* = 37.30; *SD* = 30.07). Respondents indicated that the average student enrollment in their agricultural mechanics classes was more than 13 students (*M* = 13.40; *SD* = 5.08). Teachers also reported that the average age of the agricultural mechanics laboratory was slightly more than 35 years of age (*M* = 35.68; *SD* = 16.20) and was 2,404 square feet (ft^2) in size (*M* = 2,404.73 ft^2; *SD* = 1,916.77 ft^2). When considering the total number of students enrolled in all agricultural mechanics courses and the size of the agricultural mechanics laboratory (ft^2), each student was provided with 202.32 ft^2 (*SD* = 167.45 ft^2) of laboratory workspace. The average total budget for an agricultural education program in Iowa during the

2013-2014 academic school year was \$1,806.12 (*SD* = \$1,672.56). The average budget for agricultural mechanics related consumables was \$945.24 (*SD* = \$1,200.80). Furthermore, the average budgets for personal protection equipment was \$199.52 (*SD* = \$340.87) and tools and equipment was \$609.13 (*SD* = \$1,146.17). Therefore, the average consumable budget spent per student in an Iowa agricultural mechanics program was \$41.68 (*SD* = \$63.15), the average budget spent for agricultural mechanics related personal protection equipment per student was \$6.45 (*SD* = \$9.77), and the average budget spent for tools and equipment per student was \$18.17 (*SD* = \$32.81). Additionally, the majority of teachers (*f* = 53; 73.6%) indicated that they require students to pass a safety exam prior to working in the agricultural mechanics laboratory. See Table 3 for a summary of these data.

Table 3
Selected Program Demographics of School-based Agricultural Education Programs in Iowa (*n* = 72)

Characteristic	*M*	*SD*	Min	Max
Average student enrollment in agricultural mechanics courses	13.40	5.08	0.00	26.00
Total student enrollment in agricultural mechanics courses	37.68	30.07	0.00	125.00
Size of agricultural mechanics laboratory (ft^2)	2,404.73	1,916.77	0.00	10,800.00
Size of agricultural mechanics laboratory work space per student (ft^2)	202.32	167.45	5.56	900.00
Age of the agricultural mechanics laboratory	35.68	16.20	1.00	65.00
Agricultural mechanics consumable budget (\$)	945.24	1,200.80	0.00	7,500.00
Agricultural mechanics consumable budget (\$) per student	41.68	63.15	0.00	316.67
Agricultural mechanics Personal Protection Equipment (PPE) budget (\$)	199.52	340.87	0.00	1,900.00
Agricultural mechanics Personal Protection Equipment (PPE) budget (\$) per student	6.45	9.77	0.00	40.00
Agricultural mechanics Tool and Equipment budget (\$)	609.13	1,146.17	0.00	8,000.00
Agricultural mechanics Tool and Equipment budget (\$) per student	18.17	32.81	0.00	216.22

Research Objective(s) Two, Three, and Four

Research objective two sought to describe Iowa school-based agricultural education teachers' perceived levels of importance of selected competencies of agricultural mechanics laboratory management. *Enforcing a student discipline policy* (*M* = 4.61; *SD* = 0.58), *correcting hazardous laboratory conditions* (*M* = 4.61; *SD* = 0.62), and *maintaining a student discipline policy* (*M* = 4.58; *SD* = 0.61) were perceived to be the three competencies with the highest levels of importance by the respondents. The three competencies that were perceived to have the lowest importance were: *planning an agricultural mechanics public relations program* (*M* = 3.03; *SD* = 0.94), *conducting an agricultural mechanics public relations program* (*M* = 3.06; *SD* = 0.98), *and planning student recruitment activities for the agricultural mechanics program* (*M* = 3.31; *SD* = 0.86). The mean level of importance that respondents placed upon the 33 laboratory management competencies was 3.94 (*SD* = 0.42), or average importance of the construct, and the mean level of importance for each competency ranged from 3.03 to 4.61. (see Table 4)

Research objective three sought to describe teachers' perceived ability to perform selected agricultural mechanics laboratory management competencies. Mean values of school-based Iowa agricultural mechanics teachers' perceived ability to perform selected laboratory management competencies ranged from 2.89 to 4.12 with a mean construct of 3.52 (*SD* = 0.47). *Enforcing a student discipline policy* (*M* = 4.12; *SD* = 0.67), *maintaining a student discipline policy* (*M* = 4.02; *SD* = 0.73), and *developing a student discipline policy* (*M* = 3.97; S*D* = 0.76) were perceived to be the three competencies with the highest ability levels of performance by the respondents. The three competencies that respondents perceived to have the lowest ability to perform were: *planning student recruitment activities for the agricultural mechanics program* (*M* = 2.89; *SD* = 0.83), *conducting an agricultural mechanics public relations program* (*M* = 2.97; *SD* = 0.85), and *installing stationary power equipment* (*M* = 3.16; S*D* = 0.91). Please see Table 4 for a summary of the results.

Research objective four sought to determine the professional development needs of Iowa school-based agricultural education teachers for selected agricultural mechanics laboratory management competencies. The top three competencies, based on MWDS, were *correcting hazardous laboratory conditions* (MWDS = 5.00), s*afely disposing of hazardous material* (MWDS = 4.39), and *properly installing and maintaining safety devices and emergency equipment* (MWDS = 4.31). The bottom three competencies, based on MWDS, were *maintaining computer based student academic records* (MWDS = -0.22), *planning student recruitment activities for the agricultural mechanics program* (MWDS = 0.15), and *maintaining a file of educational projects/ activities for students* (MWDS = 0.26). Please view Table 4 for a detailed summary of the results.

Table 4
Agricultural Mechanics Laboratory Management Needs of Iowa School-Based Agricultural Mechanics Teachers (n = 72)

Rank	Competency	MWDS	Mean Importance Level	*SD*	Mean Ability Level	*SD*
1	Correcting hazardous laboratory conditions	5.00	4.61	0.62	3.53	0.87
2	Safely disposing of hazardous materials	4.39	4.33	0.84	3.32	0.90
3	Properly installing and maintaining safety devices and emergency equipment	4.31	4.43	0.65	3.46	0.89
4	Safely handling hazardous materials	3.91	4.48	0.73	3.61	0.85
5	Safely storing hazardous materials	2.92	4.29	0.78	3.61	0.81
6	Maintaining protective equipment for student use	2.73	4.50	0.61	3.89	0.75
7	Performing routine maintenance of agricultural mechanics lab equipment	2.67	4.16	0.69	3.52	0.86
8	Maintaining a student discipline policy	2.57	4.58	0.61	4.02	0.73
9	Selecting protective equipment for student use	2.37	4.47	0.66	3.94	0.74
10	Enforcing a student discipline policy	2.23	4.61	0.58	4.12	0.67
11	Developing a student discipline policy	2.16	4.45	0.66	3.97	0.76
12	Making minor repairs to the agricultural mechanics laboratory facility	2.12	4.13	0.79	3.61	0.83
13	Identifying equipment required to teach agricultural mechanics skills	1.85	4.08	0.69	3.62	0.86
14	Identifying tools required to teach agricultural mechanics skills	1.81	4.12	0.71	3.68	0.83
15	Making minor agricultural mechanics lab equipment repairs	1.67	3.91	0.71	3.49	0.89
16	Promoting laboratory safety by color coding equipment/marking safety zones/posting appropriate safety signs and warnings	1.40	3.70	0.93	3.32	0.95
17	Installing stationary power equipment	1.36	3.54	0.87	3.16	0.91
18	Identifying supplies required to teach agricultural mechanics skills	1.28	4.02	0.67	3.70	0.78
19	Developing an agricultural mechanics laboratory budget	1.23	3.86	0.91	3.55	1.03
20	Operating within the constraints of an agricultural mechanics budget	1.07	3.91	0.87	3.64	0.99
21	Storing protective equipment for student use	0.99	4.08	0.81	3.83	0.67
22	Developing objective criteria for evaluation of student projects/activities	0.91	3.76	0.66	3.52	0.73
23	Estimating time required for students to complete projects/activities	0.88	3.62	0.76	3.38	0.76
24	Developing a file of educational projects/activities for students	0.80	3.65	0.88	3.43	0.70
25	Utilizing technical manuals to order replacement/repair parts for agricultural mechanics lab equipment	0.66	3.72	0.81	3.54	0.72

(continues)

Table 4 (continued)
Agricultural Mechanics Laboratory Management Needs of Iowa School-Based Agricultural Mechanics Teachers (n = 72)

Rank	Competency	MWDS	Mean Importance Level	*SD*	Mean Ability Level	*SD*
26	Selecting current references/technical manuals	0.50	3.34	0.77	3.19	0.68
27	Identifying current references/technical manuals	0.45	3.37	0.76	3.24	0.68
28	Planning an agricultural mechanics public relations program	0.41	3.03	0.94	2.89	0.83
29	Implementing student recruitment activities for the agricultural mechanics program	0.36	3.40	0.87	3.30	0.74
30	Conducting an agricultural mechanics public relations program	0.27	3.06	0.98	2.97	0.85
31	Maintaining a file of educational projects/activities for students	0.26	3.54	0.82	3.47	0.72
32	Planning student recruitment activities for the agricultural mechanics program	0.15	3.31	0.86	3.27	0.73
33	Maintaining computer based student academic records	- 0.22	3.67	0.83	3.73	0.78

Note: Importance Scale: 1 = *No Importance*, 2 = *Below Average Importance*, 3 = *Average Importance*, 4 = *Above Average Importance*, 5 = *Utmost Importance*; Ability Scale: 1 = *No Ability*, 2 = *Below Average Ability*, 3 = *Average Ability*, 4 = *Above Average Ability*, 5 = *Exceptional Ability*.

Conclusions, Implications, & Recommendations

The purpose of this study was to determine the self-perceived level of importance, ability and professional development needs of Iowa secondary agricultural education teachers in regard to agricultural mechanics laboratory management. The typical agricultural education teacher in Iowa is approximately 40 years old, has been teaching for 15 years and has spent just under 7.5 hours per week supervising students in an agricultural mechanics laboratory over the past 14 years. Unique data that has implications to agricultural education has emerged from this study. The conclusions, implications, and recommendations will be addressed for each research objective below.

Research Objective One

The majority of the participants in the study indicated that they had received first aid training; at least 16% of the teachers had not received any training (9.7% did not respond). However, 70% of the teachers had no training as a first responder. It should be noted that a teacher who is not trained in first aid or first response is not an unsafe instructor. However, Bruening et al., (1991) indicated that the physical safety of students must come first, all other duties that an agricultural education teacher has in a laboratory is secondary. Therefore, first responder training should be conducted for any agricultural education teacher who works in a laboratory where danger is present. While first aid and first responder training should be conducted school-wide, specialized training related to agricultural laboratories should be conducted at the state-level. With the overwhelming majority of participants in Iowa who received a traditional certification, it is possible that the training could be conducted while they are enrolled in their teacher certification programs. Current teachers who lack training in either first aid or first response can work with local emergency management professionals to conduct training within their agricultural mechanics courses preparing both the teachers and their students.

Recommendations for the size of an agricultural mechanics laboratory exist at both the state and national level. Iowa's recommendation for an agricultural mechanics laboratory is 3,200 square feet (The Governor's Council on Agricultural Education, 2000). The national recommendation for an agricultural mechanics laboratory is 120 square feet of floor space per student (Phipps, et al., 2008). The results of this study indicate that the laboratories are 800 square feet below the state recommendations. To further expand on the size of the laboratories in Iowa, Byrd, Anderson, and Paulsen (2015) reported the agricultural mechanics laboratories were over 150 square feet larger in 2015. It is possible that the teachers miscalculated the size of their facility in either of the studies. It is also possible that with the sampling technique implemented, researchers did not collect from the exact same institutions as those sampled in the study by Byrd et al. With the consolidation of small rural schools and new school buildings being constructed on the rise, it is feasible that the new agricultural mechanics laboratories being built are smaller than the old facilities that they are replacing.

The teachers indicated that the students in this study had approximately 200 square feet of space to work in the agricultural mechanics laboratory. The square footage provided to the students is significantly higher than the national recommendation at first glance; however, the national standard is 150 square feet of free space per person. The numbers reported in this study did not take into consideration the amount of free floor space to work, total square footage of the laboratory was the only data collected in regard to the size of the laboratory. However, it is possible that the students are working in areas that exceed the national standard. With class enrollments averaging 13 students in agricultural mechanics courses, it is possible that the teachers in Iowa have followed the suggestions of Saucier, et al., (2014) and have worked with their respective administrators to reduce the number of students in an agricultural mechanics laboratory in an effort to increase student learning and student safety.

Further exploration into the budget that agricultural education teachers are allocated for agricultural mechanics instruction indicates they had received a total budget of approximately $1,750.00, which includes consumables, tools and equipment, and personal protective equipment. This budget is down by almost $250.00 from the figures reported by Byrd et al. (2015). This could be a result of funds cut from the program or funds reallocated to other areas within the agricultural education program. What is alarming from the budget is the $6.45 budget allocated for personal protective equipment. The funds budgeted for PPE barely covers the cost of safety glasses. The cut in funds have led to similar concerns that were expressed by Saucier et al. (2014), will the reduction in funds lead agricultural education teachers to cut out selected safety items or elect to utilize cheaper versions of safety equipment?

One concern that did emerge from the data collected from research objective one was the percentage of teachers who require students to pass a safety exam. Slightly over 73% of the teachers had indicated they required students to pass a safety exam. The teachers are responsible and liable for ensuring a safe environment (i.e. agricultural mechanics laboratory) for students to learn while engaging in experiential learning. While 73% is well beyond a majority, requiring safety exams should be universally required from 100% of students learning in an agricultural mechanics laboratory.

Research Objective(s) Two, Three, and Four

There are a few conclusions that can be drawn from the results of this study. First, agricultural education teachers need professional development in the realm of hazardous materials. Working with hazardous materials is a critical competency that agricultural educators must have when working in any type of laboratory. With the necessity of working with hazardous materials, agricultural educators need opportunities to increase their competency of this skill. Agricultural educators having a low perceived competence and a perception of difficulty will adversely affect a teacher's expectancy of success that can in turn lead to the incorrect behavior when dealing with hazardous materials. One recommendation is to examine if current curriculum being taught in teacher education programs include this competency. Also, state staff and other professional development providers should include this competence in professional development activities which are made available to agricultural education teachers.

Secondly, laboratory maintenance competence is another area in which agricultural educators need more instruction. If an agricultural educator cannot maintain a safe laboratory environment, students can get injured, which could lead to the teacher being dismissed or liable. When an agricultural educator exhibits the incorrect behavior to their students, the wrong behavior becomes more prevalent in the laboratory. Therefore, a proactive stance to providing agricultural education teachers more professional development in this area is paramount. According to Bandura (1997), a change in perceived competence can change the behavior in which the teacher needs to exhibit. It is recommended that professional development opportunities be made available for agricultural education teachers to participate in to increase their competence innumerous areas of agricultural mechanics laboratory management.

Lastly, teachers believe that agricultural mechanics programs do not need recruitment or public relations activities. If recruitment and public relation programs are done correctly, these programs can help enhance the overall agricultural education program by incorporating community support. This lack of importance placed on these competencies may be due to the lack of competence in the agricultural education teacher to instruct agricultural mechanics, therefore, if there is an increase in competence it might lead to a larger importance placed on these competencies. However, this might not be the case, so providing opportunities for agricultural education teachers to come together and develop these competencies is critical.

References

Ary, D., Jacobs, L., & Sorensen, C. (2010). Introduction to research in education. (8th ed.). Belmont, CA: Wadsworth Cengage Learning.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, N.J.: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control,* New York: W.H. Freeman.

Blackburn, J. J., Robinson, J. S., & Field, H. (2015). Preservice agriculture teachers' perceived level of readiness in an agricultural mechanics course. *Journal of Agricultural Education, 56*(1), 172-187. doi: 10.5032/jae.2015.01172

Borich, G. D. (1980). A needs assessment model for conducting follow-up studies. *The Journal of Teacher Education, 31*(3), 39-42. doi:10.1177/002248718003100310

Bruening, T. H., Hoover, T. S., & Radhakrishna, R. B. (1991). *Improving safety practices in agricultural mechanics laboratories*. Proceedings of the 17th Annual National Agricultural Education Research Meeting. Los Angeles, CA.

Byrd, A. P., Anderson, R. G., & Paulsen, T. H. (2015). Does agricultural mechanics laboratory size affect agricultural education teachers' job satisfaction?. *Journal of Agricultural Education*, *56*(1), 6-19. doi: 10.5032/jae.2015.01006

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, phone, mail, and mixed-mode surveys: The Tailored Method. John Wiley & Sons, Hoboken, NJ.

Dyer, J. E., & Andreasen, R. J. (1999). Safety issues in agricultural education laboratories: A synthesis of research. *Journal of Agricultural Education, 40*(2), 46-52. doi: 10.5032/jae.1999.02046

Harper, J. G. (1984). *Analysis of selected variables influecing safety attitudes of agricultural mechanics students*. Paper presented at the Central Region Research Conference in Agricultural Education, Chicago, IL.

Hubert, D., Ullrich, D., Lindner, J., & Murphy, T. (2003). An examination of Texas agriculture teacher safety attitudes based on a personal belief scale from common safety and health practices. *Journal of Agricultural Systems, Technology and Management, 17,* 1-13.

Johnson, D. M., Schumacher, L. G., & Stewart, B. R. (1990). An analysis of the agricultural mechanics laboratory management inservice needs of Missouri agriculture teachers. *Journal of Agricultural Education, 31*(2), 35-39. doi:10.5032/jae.1990.02035

Krejcie, R. V. & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*, 607-610. https://doi.org/10.1177/001316447003000308

Lambeth, J. M., Elliot, J., & Joerger, R. M. (2008). The National Career and Technical Education Research Agenda. *Techniques*, *83*(7), 52-55.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43-52. doi:10.5032/jae.2001.04043

McKim, B. R., & Saucier, P. R. (2011). Agricultural mechanics laboratory management professional development needs of Wyoming secondary agriculture teachers. *Journal of Agricultural Education*, *52*(3), doi: 10.5032/jae.2011.03075

McKim, B. R., & Saucier, P. R. (2012). A multi-state factor-analytic and psychometric meta-analysis of agricultural mechanics laboratory management competencies. *Journal of Agricultural Education*, *53*(2), doi: 10.5032/jae.2012.02139

McKim, B. R., & Saucier, P. R. (2013). A 20-year comparison of teachers' agricultural mechanics laboratory management competency. *Journal of Agricultural Education, 54*(1), 153-166. doi: 10.5032/jae.2013.01153

Osborne, E. W., & Dyer, J. E. (2000). Attitudes of Illinois agriscience students and their parents toward agriculture and agricultural education programs. *Journal of Agricultural Education, 41*(3), 50-59. doi: 10.5032/jae.2000.03050

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. L. (2008). *Handbook on agricultural education in public schools* (6^{th} ed.). Clifton Park, NY: Thomas Delmar Learning.

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds.). (2016). *American Association for Agricultural Education national research agenda: 2016-2020*. Gainsville, FL: Department of Agricultural Education and Communication.

Ruhland, S. K., & Bremer, C. D. (2002). Professional development needs of novice career and technical education teachers. *Journal of Career and Technical Education, 19*(1). Retrieved from http://scholar.lib.vt.edu/ejournals/JCTE/v19n1/ruhland.html.

Saucier, P. R., & McKim, B. R. (2011). Assessing the learning needs of student teachers in Texas regarding management of the agricultural mechanics laboratory: Implications for the professional development of early career teachers in agricultural education. *Journal of Agricultural Education*, *52*(4), 24-43. doi: 10.5032/jae.2011.04024

Saucier, P. R., Terry, Jr. R, & Schumacher, L. G. (2009). Laboratory management in-service needs of Missouri agriculture educators. *Paper presented at the 2009 Southern Region of the American Association for Agriculture Education Conference,* USA, 176-192.

Saucier, P. R., Vincent, S. K., & Anderson, R. G. (2014). Laboratory safety needs of Kentucky school-based agricultural mechanics teachers. *Journal of Agricultural Education, 55*(2), 184-200. doi: 10.5032/jae.2014.02184

The Governor's Council on Agricultural Education. (2000). *Guidelines for agricultural education in Iowa secondary schools.* Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiF0Zv49ovWAhWCQCYKHR9TDYsQFggmMAA&url=http%3A%2F%2Fiaffa.bizland.com%2Fsitebuildercontent%2Fsitebuilderfiles%2FGuidelinesforQualityHSAgEdPrograms.doc&usg=AFQjCNFSVv2l8xsJbRlpXR6EdzEYq0YFEA

Laboratory Management Needs of Iowa School-Based Agricultural Mechanics Teachers

Discussant Comments

Catherine W. Shoulders, University of Arkansas

This manuscript presents work that continues the authors' long line of inquiry into the professional development needs of agricultural mechanics instructors. As stated in the manuscript, the instrument used herein has been used in at least six other states in the past ten years, making Iowa's agricultural education teachers the most recent group who's needs regarding agricultural mechanics professional development have been discovered.

The researchers are to be commended on their commitment to closing this gap in the literature. As is evident in the introduction, the authors have served as experts in this area over the past decade. The methods utilized to collect data are solid, leading to conclusions and implications that can improve teacher preparation in agricultural mechanics, and as is stated in the manuscript, make an impact on safety within laboratories.

With the consistency in studies of this nature over time comes a profession-wide question: has data saturation been reached? At what point do we see enough consistency in findings across states to determine the needs of agricultural mechanics teachers are known, at least for the time being? Is any work being done to attempt to address these needs? Again, these questions are more philosophical in nature, and not necessarily directed at the authors. Examining the effectiveness of our research lines with respect to these challenging questions can assist in keeping our research relevant and impactful on the profession.

The conclusions led me to ponder a few researcher-specific questions as well. First, 73% of the respondents indicated requiring a safety exam in their classes, leading the researchers to recommend that these exams should be universally required. Is there any evidence that indicates including safety exams improves safety within agricultural laboratories? Perhaps this is a direction in which the researchers might consider going in future research endeavors.

Finally, the researchers recommend that competencies regarding hazardous materials be included within preservice teacher education programs. With programs already working within a decreasing number of credit hours, are there ways in which this recommendation might be put into practice without reducing credit hours focusing on other needed competencies?

I thank the researchers for the opportunity to read this manuscript, and look forward to seeing where their researcher leads in the future.

A Measure of Safety Climate Attitudes in the Agricultural Mechanics Laboratory

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Abstract

Educational laboratory management is, and has consistently been for some time, a paramount issue in school-based agricultural education (SBAE). Agricultural mechanics laboratories are found in many SBAE programs. One of the most important issues an SBAE teacher faces in the agricultural mechanics laboratory is safety. Identifying and cultivating a culture of safety in students early on is a key to reducing injuries and accidents. The purpose of this study was to gauge safety climate attitudes within a post-secondary agricultural mechanics laboratory. The population for this study was post-secondary agricultural students, many of whom were preservice SBAE teachers, who were enrolled in two agricultural mechanics courses. Through the lens of Ajzen's (1991) Theory of Planned Behavior, the safety climate of the students was assessed by the Safety Climate Attitudes Questionnaire. The highest mean scores were found in the constructs of Personal Motivation for Safe Behavior and Positive Safe Practices. The lowest mean scores were found within the constructs of Risk Justification and Fatalism. Negligible differences in safety climate attitudes were discovered between biological sex and student classifications. We recommend that further study of this topic be conducted in teacher education programs to understand preservice teachers' attitudes toward safety in laboratory environments.

Introduction & Review of Literature

Educational laboratory management is, and has consistently been for some time, a paramount issue in school-based agricultural education (SBAE) (McKim & Saucier, 2011a, 2011b, 2012, 2013; Phipps, Osborne, Dyer, & Ball, 2008; Saucier & McKim, 2011; Saucier, McKim, & Tummons, 2012; Saucier, Vincent, & Anderson, 2014). From a historical standpoint, laboratories have existed to provide learning opportunities of many types, with a particular interest in providing hands-on skill and knowledge applications (Twenter & Edwards, 2017), and presently range in type from agricultural mechanics to greenhouse and nursery to agriscience facilities (Phipps et al., 2008; Shoulders & Myers, 2012). This diversity of laboratory types and purposes allows SBAE programs to meet a variety of challenges and tasks for SBAE students, including specialized skill and knowledge development, experiential learning, an introduction to agricultural industry settings, and engaging, hands-on topics that present new and novel opportunities for both students and teachers (Phipps et al., 2008; Shoulders & Myers, 2012; Shoulders & Myers, 2013; Twenter & Edwards, 2017).

As SBAE laboratories are a popular portion of modern programs (Phipps et al., 2008; Shoulders & Myers, 2012), SBAE teachers are expected to be competent in their abilities to effectively, and safely, manage such environments (Saucier et al., 2014). Effective and efficient laboratory management often includes budgeting, facilities planning, maintenance needs, and more (McKim & Saucier, 2011a, 2011b; Saucier et al., 2012), all of which can contribute to a broader theme of safety. As recently described by Tummons, Langley, Reed, & Paul (2017), teachers have concerns about working in a laboratory environment. Likewise, school administrators have expressed uncertainty about whether SBAE equipment (e.g., tools, etc.) and facilities (e.g., educational laboratories) are up-to-date (Kalme & Dyer, 2000), thus provoking questions about the culture of educational laboratory safety.

In the context of SBAE, agricultural mechanics laboratories remain widely available for use (Phipps et al., 2008; Shoulders & Myers, 2012; Shoulders, Blythe, & Myers, 2013). The prominence of agricultural mechanics curricula and laboratories within SBAE programs has enjoyed a long history as program cornerstones (Burris, Robinson, & Terry, 2005; Twenter & Edwards, 2017). Agricultural mechanics-related activities in SBAE programs have been noteworthy in helping to impact farm safety knowledge among secondary students (Schafbuch, Vincent, Mazur, Watson, & Westneat, 2016), serving as a context for mathematics integration (Parr, Edwards, & Leising, 2006), challenging students' capacities for problem-solving (Blackburn & Robinson, 2016; Pate & Miller, 2011), and providing positive economic impacts in communities (Hanagriff, Rayfield, Briers, & Murphy, 2014). As such, the impact potential of this curriculum area is certainly worth considering.

Preparing SBAE teachers to provide the aforementioned opportunities through agricultural mechanics instruction is of great concern (Burris et al., 2005). Teachers should be prepared, either through preservice training or inservice workshops, to successfully utilize agricultural mechanics facilities and curricula to positively impact secondary students (Burris et al., 2005; McKim & Saucier, 2011a, 2011b). Resources availability, including prior and current training in laboratory management (e.g., safety needs, etc.), is an important consideration for teachers as well (McCubbins, Wells, Anderson, & Paulsen, 2017). Recent agricultural education scholarship has indicated that considerable relationships exist between available teaching resources and teaching satisfaction (Byrd, Anderson, & Paulsen, 2015), as well as between tool and equipment adequacy and perceived competency to teach agricultural mechanics (McCubbins et al., 2017). Perhaps such resources impact laboratory safety climate as well.

SBAE teachers have many different types of responsibilities, with one of the most important of these being maintaining laboratory safety (Phipps et al., 2008; Talbert, Vaughn, Croom, & Lee, 2014). Laboratory activities represent a large part of most SBAE programs (Franklin, 2008; McKim & Saucier, 2011a). Students in agricultural mechanics laboratories are exposed to numerous processes which could pose serious injury to students, teachers and other stakeholders (Phipps et al., 2008). When utilizing such environments, teachers have a responsibility to all stakeholders, particularly students, to teach and maintain a high regard for safety of all who enter the learning laboratory (Talbert et al., 2014). SBAE teachers often hold a high regard for safety instruction throughout agricultural mechanics curricula, typically perceiving it as of the utmost importance (Shultz, Anderson, Shultz, & Paulsen, 2014). Teachers typically regard themselves as highly competent to provide safety instruction to students (Shultz et al., 2014). This is a very fortunate occurrence considering the teacher's role in ensuring a safe working environment (Phipps et al., 2008).

Not surprisingly, safety education has been a topic that has, historically, garnered some interest from agricultural education scholars, particularly in the area of agricultural mechanics. Preyer and Williams (1977) studied "diffusion of safety education" (p. 28) into Alabama agricultural mechanics programs, while Bettis and Crawford (1972) sought to develop an agricultural mechanics laboratory safety scale to “predict whether one student may be prone to have more accidents than another student” (p. 22). School administrators have, in the past, taken a substantial interest in safety education as well, as noted by Gliem and Miller (1993a, 1993b), indicating that they, as stakeholders, certainly value a safe laboratory environment. Interestingly, Dyer and Andreasen (1999) described that SBAE teachers may not be entirely current in their knowledge and teaching practices regarding safety and may, even worse, be neglecting this vital portion of their positions as safe environment providers. Is this true now? To this end, Dyer and Andreasen (1999) recommended that future research should address “teachers’ attitudes toward safety.” (p. 51). As a result, a question remains: What are, in the context of the present study, post-secondary agricultural students, particularly preservice teachers’, attitudes toward safety in an agricultural mechanics laboratory?

Identifying and cultivating a culture of safety in students early on is a key to reducing injuries and accidents (Gillen, Goldenhar, Hecher, & Schneider, 2013). Safety culture can be defined as the product of individual and group attitudes, perceptions, and values about workplace behaviors and processes that collectively result safety work units and reliable organizational products (Cox & Flin, 1998). Torner and Pousette (2009) found that four of the main factors that contribute to safety standards were: project characteristics, organization structure, collective group safety values, and individual competencies and attitudes. SBAE teachers have a unique opportunity to cultivate a climate of safety among their students, which should be an expectation when considering the power of teachers to set high expectations for safe working practices and conditions (Phipps et al., 2008). This early exposure of a culture focused on safety will allow those students entering the classroom to have appropriate safety competencies, ultimately helping to lead to reduced accidents in the workplace. Educational stakeholders, including administrators, expect that a climate of safety be established in an agricultural mechanics laboratory (Gliem & Miller, 1993a, 1993b), and SBAE teachers should be expected to meet such expectations (Dyer & Andreasen, 1999; Talbert et al., 2014). These expectations should be extended to preservice teachers as well.

Theoretical Framework

The Theory of Planned Behavior (Ajzen, 1991) was used to frame this study. This theory built upon concepts of the Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), by adding components which accounted for individual’s behavioral control. The Theory of Planned Behavior suggests an individual’s behavior is influenced by his or her attitude toward the behavior, subjective norm, and perceived behavioral control (see Figure 1).

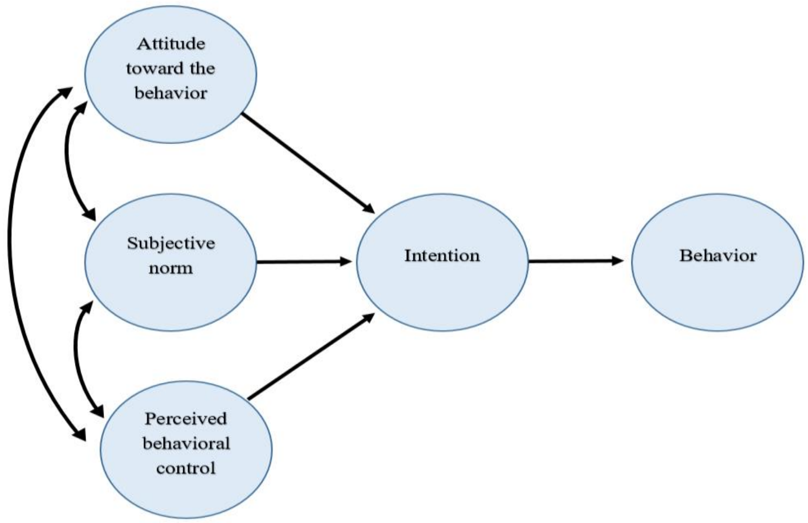

Figure 1. Theory of Planned Behavior (Ajzen, 1991)

Perceived behavioral control, or "perceived control over performance of a behavior" (Ajzen, 2002, p. 668), is how easy or difficult the individual perceives the performance of the behavior (Ajzen, 1991). Ajzen (1991) indicated an individual's perceived behavioral control often varies between actions and circumstances. In contrast to perceived behavioral control, or self-efficacy belief, actual behavioral control describes the individual's actual skills, abilities, and other prerequisites needed to perform the behavior (Ajzen, 1991, 2002). According to the Theory of Planned Behavior, the combination of perceived behavioral control and behavioral intention, serves as a means of directly predicting behavioral achievement (Ajzen, 1991). Ajzen (1991) offered two rationales to explain this linkage: (1) an increase in perceived behavioral control will likely increase effort exerted to successfully achieve a behavior, and (2) perceived behavioral control can sometimes be used as substitute to measure actual control.

Aside from perceived behavioral control, attitude toward the behavior and subjective norms serve as independent predictors of intention (Ajzen, 1991). Ajzen (1991) indicated attitude toward the behavior refers to an individual's positive or negative evaluation of the behavior in question. Subjective norms, a social prediction factor, accounts for an individual's perceived social pressure to carry out, or not carry out a given behavior (Ajzen, 1991). When an individual has a positive attitude about a behavior, and perceives the action to be socially acceptable, they are more likely to carry out the particular behavior. The predicting factors of intention (i.e., attitude toward the behavior, social norms, and perceived behavioral control) can independently, or jointly, influence an individual's intention to perform a behavior (Ajzen, 1991). Regarding the measurement of these three factors, Ajzen (2002) reported the measures could be assessed by directly inquiring about individual's capability to perform a given behavior, or indirectly by assessing individuals perceived capability to manage facilitating or impeding factors.

In the lens of the Theory of Planned Behavior (Ajzen, 1991, 2002), the behavior of focus was proper implementation of safety practices by post-secondary agricultural students in an agricultural mechanics laboratory. A variety of factors were evaluated to assess students' intentions and perceived abilities to adhere to specified safety practices when working in the laboratory. Serving as direct and indirect determinants of intention to work safely in the laboratory, items which assessed the students' attitudes toward safe behavior and the social pressure they associated with the safe actions were included in the instrument. Moreover, this safety climate attitudes study evaluated the students' perceived control regarding the performance of safe behaviors.

Developing a deeper understanding of the factors which influence students' intentions to work safely, can potentially assist SBAE teachers, and other instructors which facilitate learning in a laboratory setting, to bolster laboratory safety and to develop a strong sense of safety climate. The present study provided insight on the safety climate attitudes of post-secondary agricultural students in a post-secondary setting. It should be noted that many of the students who participated in the present study were preservice SBAE teachers who will quite possibly, in time, be leading the learning process in an agricultural mechanics laboratory environment. As a result, we postulated that the safety practices observed and acquired by the preservice teachers who were enrolled in the courses could potentially influence how safe working environments are, in turn, developed by these individuals once they begin teaching their own students at the secondary level.

This study of safety climate attitudes aligns with Research Priority Three of the National Research Agenda (NRA) of the American Association for Agricultural Education (AAAE), Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016). Safe working environments are extraordinarily important for student well-being and progress in laboratory-based instruction (Dyer & Andreasen, 1999; Phipps et al., 2008; Preyer & Williams, 1977; Talbert et al., 2014). Reinforcing safety as students leave educational institutions and move into the workforce may help to reduce accidents in their future occupations, thereby possibly helping to avert costs incurred by their future employers. Employers often value safety as a tenet of their organizational cultures (Reese, 2016). SBAE teachers are in a prime position to address workforce development needs (Stripling & Ricketts, 2016), and properly-managed, safe laboratory environments can help to serve the best interests of all SBAE stakeholders (Saucier et al., 2014), including employers associated with the agricultural industry.

Purpose & Objectives

The purpose of this study was to gauge the safety climate attitudes within a post-secondary agricultural mechanics laboratory. To address this purpose, the following objectives were established to guide this study:

1. Measure safety attitudes of post-secondary agricultural students within the constructs of *Personal Motivation for Safe Behavior*, *Personal Safety Practices, Risk Justification, Fatalism,* and *Optimism*.

2. Measure students' opinions of safety instruction in the post-secondary agricultural mechanics laboratory by demographic characteristics.

3. Determine any perceived differences between students' safety attitudes and demographic characteristics.

Methods & Procedures

The sample population for this study was post-secondary agricultural students enrolled in introductory agricultural mechanics at Texas A&M University-Kingsville (TAMUK). Upon approval by the TAMUK Institutional Review Board (IRB), the present study was initiated. Students were asked to complete a questionnaire that measured their perceptions of the safety climate in the post-secondary agricultural mechanics laboratory. This convenience sample was collected from students at TAMUK in one of two agricultural mechanics courses (e.g., "Introduction to Agricultural Systems" [AGSC 1451] and "Agricultural Building Requirements" [AGSC 4353]). Fifty-one students (N = 51) were asked to complete the questionnaire. Forty-fix students (n = 46) completed the questionnaire, resulting in a response rate of 90.2%.

To measure attitudes toward safety, we used a modified version of the Safety Climate Attitudes Questionnaire (Williamson, Feyer, Cairns, & Biancotti, 1997). The questionnaire was modified by substituting the words *employee* with *students*, *employer* with *instructor*, *workplace* with *laboratory*, and *work day* with *classwork*. This consisted of 27 items on a five-point Likert-type scale (e.g., 1 = *Strongly Disagree*; 2 = *Slightly Disagree*; 3 = *Neutral*; 4 = *Slightly Agree*; 5 = *Strongly Agree*) related to safety: *Personal Motivation for Safe Behavior* (e.g., "*It would help me to work safer if my instructor praised me for safe behavior.*"), *Positive Safety Practices* (e.g., "*There is adequate safety training in the lab."*), *Risk Justification* (e.g., "*When working unsafely, it is because I was in a hurry.*"), *Fatalism* (e.g., "*If I was worried about safety all the time then no work would be done.*"), and *Optimism* (e.g., "*If I work safely I will avoid accidents.*").

Students were then asked to rank the level of adequate instruction they had received in relation to laboratory instruction and safety practices in the agricultural mechanics laboratory. Demographics questions were added at the end of the questionnaire. Validity was established through a panel of experts consisting of nine agricultural education faculty, two inservice SBAE teachers, and previous use of the instrument (Williamson et. al, 1997). To assess the reliability of the instrument, post-hoc reliability was assessed. The overall Cronbach's alpha reliability coefficient was .78, while the safety attitude constructs had reliability coefficients which ranged from .70 to .85 (*Personal Motivation for Safe Behavior* (α = .74); *Positive Safety Practices* (α =. 85); *Risk Justification* (α =. 70); *Optimism* (α =. 78); *Fatalism* (α =.79)). According to Nunnally and Bernstein (1994), reliability estimates ranging from .70 to .80 are acceptable within the social science research context. Based on this recommendation, the overall and construct reliability coefficients had satisfactory internal consistency.

This study is descriptive, as it also employed a methodology that allowed post-secondary agricultural students to describe factors that influenced their feelings of laboratory safety climate. Due to the nature of this study, caution should be taken when generalizing the findings or when making inferences beyond the sample population. The raw scores should be interpreted carefully, as the scales are ordinal. According to Boone and Boone (2012), analysis of Likert-type and Likert-scale data are different and must be reported as such. Likert-type data that do not contribute to a composite scale are treated as individual questions, and reported using descriptive statistics (e.g., median, mode, and frequencies), where Likert-type data that contribute to a composite score (e.g., Likert-scale) are reported using means and standard deviations for variability (Boone & Boone, 2012). Warmbrod (2014) posited that although the individual items fail to represent a mean-item score, "the content of single items (statements) on a Likert scale collectively define, describe, and name the meaning of the construct quantified by the summated score" (p. 32). Ergo, it is appropriate to provide the items, with associated frequencies of response, when describing the unidimensional constructs (Warmbrod, 2014). Based on the aforementioned recommendations (Boone & Boone, 2012; Warmbrod, 2014), means and standard deviations were used to describe Likert-scale data which contributed to a summated score; frequencies, percentages and modes were used to describe respondents' selections on the individual statements. Moreover, demographic and background data of the respondents were calculated using descriptive statistics (i.e., frequencies and percentages). All data were collected via Qualtrics® and transferred to IBM Statistical Package for the Social Sciences (SPSS®) Version 25, which was subsequently used for data analysis.

Results

Of the 46 respondents involved with this study, two students (*n* = 2; 4.3%) failed to report their biological sex and grade classification. The respondents were mostly male (*n* = 36; 78.3%) and consisted of six freshmen (13.0%), 10 sophomores (21.7%), 10 juniors (21.7%), and 18 seniors (39.1%). Thirty-nine (84.8%) of the respondents were previously members of the FFA. In relation to the number of post-secondary agricultural mechanics courses students had previously taken, 21.7% (*n* = 10) had never taken a course, 19.6% (*n* = 9) had previously taken one course, 32.6% (*n* = 15) had taken two courses, and 26.1% (*n* = 12) had previously taken three or more courses. One student (*n* = 1; 2.2%) did not report the number of post-secondary agricultural mechanics courses that he/she had previously taken.

The first objective sought to determine post-secondary agricultural students' safety attitudes surrounding the *Personal Motivation for Safe Behavior*, *Positive Safety Practices*, *Optimism*, *Risk Justification*, and *Fatalism* constructs. The students' scores varied by construct and individual prompt, but some patterns were identified. The students indicated the highest levels of agreement with items belonging to the *Personal Motivation for Safe Behavior* (*M* = 3.95; *SD* = 0.84), *Positive Safety Practices* (*M* = 3.83; *SD* = 1.03) and *Optimism* (*M* = 3.44; *SD* = 1.11) constructs (see Table 1).

Table 1

Mean Student Scores on Safety Attitude by Construct (n = 46)

Construct	*M*	*SD*
Personal Motivation for Safe Behavior	3.95	0.84
Positive Safety Practices	3.83	1.03
Optimism	3.44	1.11
Risk Justification	3.28	1.22
Fatalism	2.34	1.18

Note. 1 = *Strongly Disagree*; 2 = *Slightly Disagree*; 3 = *Neutral*; 4 = *Slightly Agree*; 5 = *Strongly Agree.*

The students indicated the lowest levels of agreement on items associated with the *Risk Justification* (M = 3.28; SD = 1.22) and *Fatalism* (M = 2.34; SD = 1.18) constructs. Of the five constructs included on the researcher-modified Safety Climate Attitudes Questionnaire, *Fatalism* was the only construct which students reported a slight disagreement with.

Based on recommendations from previous literature (Warmbrod, 2014), descriptive statistics were presented to provide insight on the respondents' selections on individual items within each of the five constructs (i.e., *Personal Motivation for Safe Behavior*; *Positive Safety Practices*; *Risk Justification*; *Fatalism*; *Optimism*). The modes associated with the items in the *Personal Motivation for Safe Behavior* were mostly four (*Slightly Agree; n = 6*), while "*It would help me to work safely if the proper equipment was provided more often.*" had a mode of five (*Strongly Agree*) and "*It would help me to work safely if I was rewarded more (grades) for safe behavior*." had a mode of three (*Neutral).* Of the six items belonging to the construct of *Positive Safety Practices*, four items had a mode of four (*Slightly Agree*) and the items "*The instructor is concerned with students' safety.*" and "*All safety rules and procedures in the lab really work.*" had a mode of five (*Strongly Agree*). All four items pertaining to *Risk Justification* had reported modes of four (*Slightly Agree*; see Table 2).

Table 2
Safety Attitudes of Post-Secondary Agricultural Students (n = 46)

	f (%)					*Md*
Prompt	*1*	*2*	*3*	*4*	*5*	
It would help me to work safely if my classmates supported safe behavior more.[a]	1 (2.2)	1 (2.2)	10 (21.7)	18 (39.1)	16 (34.8)	4
It would help me to work safely if the proper equipment was provided more often.[a]	0	2 (4.3)	11 (23.9)	16 (34.8)	17 (36.9)	5
It would help me to work safely if we were given safety training more often.[a]	1 (2.2)	12 (26.1)	14 (30.4)	10 (21.7)	8 (17.4)	4
It would help me to work safely if safety procedures were more realistic.[a]	2 (4.3)	3 (6.5)	14 (30.4)	19 (41.3)	8 (17.4)	4
It would help me to work safely if the instructor carried out more lab safety checks.[a]	1 (2.2)	5 (10.9)	21 (45.7)	12 (26.1)	7 (15.2)	4
It would help me to work more safely if my instructor praised me on safe behavior.[a]	2 (4.3)	3 (6.5)	16 (34.8)	14 (30.4)	11 (23.9)	4
It would help me to work safely if the instructor listened to my recommendations.[a]	1 (2.2)	1 (2.2)	19 (41.3)	18 (39.1)	7 (15.2)	4
It would help me to work safely if I was rewarded more (grades) for safe behavior.[a]	2 (4.3)	5 (10.9)	17 (36.9)	9 (19.7)	13 (28.3)	3
The instructor is concerned with students' safety.[b]	3 (6.5)	1 (2.2)	7 (15.2)	10 (21.7)	25 (54.3)	5
Our instructor supplies enough safety equipment.[b]	1 (2.2)	0	9 (19.7)	18 (39.1)	18 (39.1)	4
All safety rules and procedures in the lab really work.[b]	1 (2.2)	3 (6.5)	11 (23.9)	16 (34.8)	15 (32.6)	5
There is adequate safety training in the lab.[b]	1	1	9	18	17	4

	(2.2)	(2.2)	(19.7)	(39.1)	(36.9)	
Everybody works safely in the laboratory.[b]	3 (6.5)	7 (15.2)	12 (26.1)	9 (19.7)	15 (32.6)	4
Our school checks equipment to make sure it is free of faults.[b]	10 (21.7)	4 (8.7)	12 (26.1)	9 (19.7)	11 (23.9)	4
When I have worked unsafely it is because I didn't know what I was doing wrong at the time.[c]	7 (15.2)	10 (21.7)	12 (26.1)	15 (32.6)	2 (4.3)	4
When I have worked unsafely it is because I was not trained properly.[c]	15 (32.6)	11 (23.9)	12 (26.1)	7 (15.2)	1 (2.2)	4
When I have worked unsafely it is because the right equipment was not provided or working.[c]	11 (23.9)	3 (6.5)	18 (39.1)	10 (21.7)	4 (8.7)	4
When I have worked unsafely it is because I needed to complete the task quickly.[c]	7 (15.2)	3 (6.5)	13 (28.3)	15 (32.6)	8 (17.4)	4
I cannot avoid taking risks in the lab.[d]	10 (21.7)	2 (4.3)	17 (36.9)	9 (19.7)	4 (8.7)	4
Safety works until we are busy then other things take priority.[d]	7 (15.2)	6 (13.0)	13 (28.3)	17 (36.9)	1 (2.2)	1
Accidents will happen no matter what I do.[d]	9 (19.7)	4 (8.7)	10 (21.7)	14 (30.4)	7 (15.2)	1
If I was worried about safety all the time then I would not get my lab work done.[d]	15 (32.6)	8 (17.4)	9 (19.7)	7 (15.2)	4 (8.7)	1
I can't do anything to improve safety in the lab.[d]	17 (36.9)	12 (26.1)	10 (21.7)	4 (8.7)	1 (2.2)	1
Not all accidents are preventable, but most will not be injured in the lab.[e]	2 (4.3)	5 (10.9)	15 (32.6)	17 (36.9)	5 (10.9)	4
It is not likely that I will have an accident because I am a careful person.[e]	3 (6.5)	4 (8.7)	16 (34.8)	17 (36.9)	4 (8.7)	4
In the normal coursework, I do not encounter any dangerous situations.[e]	5 (10.9)	6 (13.0)	17 (36.9)	14 (30.4)	2 (4.3)	4
People that work safely and follow lab procedures will always be safe.[e]	4 (8.7)	6 (13.0)	17 (36.9)	11 (23.9)	6 (13.0)	3

Note. 1 = *Strongly Disagree*; 2 = *Slightly Disagree*; 3 = *Neutral*; 4 = *Slightly Agree*; 5 = *Strongly Agree;* [a]Personal Motivation for Safe Behavior; [b]Positive Safety Practices; [c]Risk Justification; [d]Fatalism; [e]Optimism; *Md* = Mode.

The construct which contained the statements with the lowest overall modes was *Fatalism*. Four items from this category (i.e., *Fatalism*) had reported modes of one (*Strongly Disagree*) and the item "*I cannot avoid taking risks in the lab.*" was the only item in this construct which had a mode of four (*Slightly Agree*). The respondents slightly agreed (*Md* = 4) with three items and had neutral feelings (*Md* = 3) about one item associated with the construct of *Optimism*.

Objective two was to measure students' perceptions of safety instruction provided in the post-secondary agricultural mechanics laboratory by demographic characteristics (i.e., biological sex, grade classification, etc.). The students' perceptions of safety instruction were operationalized by two items: "*I feel that the students get adequate instruction in safety in the lab.*" and "*Our instructor demonstrates safe use of tools and equipment.*" Of the 46 respondents in this study, only 44 students responded to the demographic items regarding biological sex and grade classification. Both male (*n* = 36) and female (*n* = 8) students slightly agreed (*Md* = 4) with the first statement. Similarly, respondents from both biological sexes responded positively to the second item "*Our instructor demonstrates safe use of tools and equipment.*" Specifically, male students strongly agreed (*Md* = 5) and female students slightly agreed (*Md* = 4) with the statement (see Table 3).

Table 3
Opinions of Laboratory Safety Instruction by Demographic Characteristics (n = 44)

	I feel that the students get adequate instruction of safety in the lab.						Our instructor demonstrates safe use of tools and equipment.					
	f (%)					*Md*	*f (%)*					*Md*
	1	*2*	*3*	*4*	*5*		*1*	*2*	*3*	*4*	*5*	
Male	0	1 (2.7)	6 (16.7)	18 (50.0)	11 (30.6)	4	3 (8.3)	0	6 (16.7)	13 (36.1)	14 (38.9)	5
Female	0	0	1 (12.5)	3 (37.5)	4 (50.0)	4	0	0	1 (12.5)	3 (37.5)	4 (50.0)	4
Fr.	0	0	0	5 (83.3)	1 (16.7)	4	0	0	0	5 (83.3)	1 (16.7)	4
So.	0	0	3 (30.0)	3 (30.0)	4 (40.0)	5	0	0	3 (30.0)	4 (40.0)	3 (30.0)	4
Jr.	0	1 (10.0)	1 (10.0)	2 (20.0)	6 (60.0)	4	2 (20.0)	0	1 (10.0)	1 (10.0)	6 (60.0)	4
Sr.	0	0	3 (16.7)	11 (61.1)	4 (22.2)	4	1 (5.6)	0	3 (16.7)	6 (33.3)	8 (44.4)	5

Note. 1 = *Strongly Disagree*; 2 = *Slightly Disagree*; 3 = *Neutral*; 4 = *Slightly Agree*; 5 = *Strongly Agree.* Male (*n* = 36), Female (*n* = 8), Freshman (*n* = 6), Sophomore (*n* = 10), Junior (*n* = 10), Senior (*n* = 18); *Md* = Mode.

When viewed from the standpoint of grade classification, freshman (n = 6) and juniors (*n* = 10) slightly agreed (*Md* = 4) with both statements, while sophomores (*n* = 10) and seniors (*n* = 18) indicated slight (*Md* = 4) to strong (*Md* = 5) agreement with both statements. Specifically, the sophomores strongly agreed (*Md* = 5) with the statement "*I feel that the students get adequate instruction of safety in the lab.*" and slightly agreed (*Md* = 4) with the statement regarding the demonstration of safe behavior by the instructor. Conversely, students who identified as seniors slightly agreed (*Md* = 4) with the first statement and strongly agreed (*Md* = 5) with the second statement.

Objective three sought to evaluate possible differences between students' perceived safety attitudes by demographic characteristics. Male students (*n* = 20) indicated higher levels of agreement with statements related to the *Positive Safety Practices* (*M* = 3.92; *SD* = 0.93), *Fatalism* (*M* = 2.63; *SD* = 1.24), and *Optimism* (*M* = 3.50; *SD* = 1.19) constructs, while female students (n = 20) reported higher agreement with items belonging to the *Personal Motivation for Safe Behavior* (M = 4.06; SD = 0.81) and *Risk Justification* (M = 3.33; SD = 1.05) constructs (see Table 4).

Table 4

Students' Perceived Safety Attitudes by Biological Sex (n = 46)

	Males (n = 36)		Females (n = 8)	
Construct	*M*	*SD*	*M*	*SD*
Positive Safety Practices	3.92	0.93	3.74	1.29
Personal Motivation for Safe Behavior	3.84	0.83	4.06	0.81
Optimism	3.50	1.19	3.38	1.01
Risk Justification	3.23	1.34	3.33	1.05
Fatalism	2.63	1.24	2.04	1.02

Note. 1 = *Strongly Disagree*; 2 = *Slightly Disagree*; 3 = *Neutral*; 4 = *Slightly Agree*; 5 = *Strongly Agree.*

Both male (n = 36; M = 2.63; SD = 1.24) and female (n = 8; M = 2.04, SD = 1.02) students indicated the lowest levels of agreement with items belonging to the *Fatalism* construct, but a difference was observed between male and female students regarding their highest levels of agreement. Males (n = 36) showed the strongest agreement towards the *Positive Safety Practices* construct (M = 3.92; SD = 0.93). Females (n = 8) indicated the strongest agreement towards the *Personal Motivation for Safe Behavior* construct (M = 4.06; SD = 0.81).

Conclusions, Limitations, Implications, & Recommendations

The findings of the present study revealed that students reported moderate to low safety climate attitudes on items related to *Optimism*, *Risk Justification*, and *Fatalism*; slightly higher safety climate attitudes were expressed for *Personal Motivation for Safe Behavior* and *Positive Safety Practices* items. The items belonging to the *Fatalism* construct received the lowest agreement by the students, reflecting the students' views on the controllability and importance of safety. According to Williamson et al. (1997), the *Fatalism* factor is an enduring personal characteristic contributing to safety, which is rarely amendable to change. This finding implies that the post-secondary agricultural students at TAMUK perceive themselves to have control over their personal safety in the laboratory environment. Conversely, *Personal Motivation for Safety* items received the highest level of agreement, indicating the students were motivated to promote safety in the lab.

No noticeable differences regarding attitudes toward safety instruction or safety construct scores were observed between male and female students regardless of student classification. In an industry setting, Williamson et al. (1997) discovered statistically significant (p < .001) differences in safety climate attitudes of workers who perceived workplace hazards and workers with no hazards in their workplace. Moreover, differences were reported between workers who previously experienced an accident, and those who had not (Williamson et al., 1997). These variables should be explored in future agricultural mechanics scholarship to determine if similar phenomena are present in secondary, and additional post-secondary, laboratory settings.

In accordance with the findings of the present study, we concluded that the post-secondary students who participated in this study held safety practices in the agricultural mechanics laboratory in high regard, that the agricultural mechanics course instructor helped to create a culture of safety through safe and effective instruction, and that there were no noticeable differences between male and female students regarding attitudes toward safety. In the context of agricultural mechanics education, these conclusions help to shine light on how students, including preservice SBAE teachers, value safe working environments and prioritize helping to create and maintain a culture of safety within such settings.

As noted earlier, many of the students who participated in the present study were preservice SBAE teachers, many of whom may teaching agricultural mechanics content in a laboratory setting at some point during their careers. As such, it was certainly positive to see that these individuals, as part of the larger population in the present study, hold great value for safe working conditions. It is desired that these attitudes will be maintained as they transition into their own classrooms. Dyer and Andreasen (1999) expressed concern that many SBAE teachers may have relaxed attitudes toward safety in the agricultural mechanics laboratory. Hopefully, this will not be the case with these professionals. Education administrators desire and expect safe working environments for students (Gliem & Miller, 1993a, 1993b), and SBAE teachers should not disappoint. In that vein, the post-secondary agricultural students who were not preservice SBAE teachers valued safety as well. It is desired that as these students graduate and take positions outside of education (e.g., the agricultural industry, etc.) continue to place great priority on safety in their places of employment. Safety has become a staple in many employers' cultures, and it is expected that it will continue to do so in the future (Reese, 2016).

We recognize that the relatively small population of students included in the present study (n = 46) serves as a limitation for generalizability. Further, as this study was conducted at only one institution, the results cannot be generalized beyond TAMUK or the respondents. We do recommend, however, that additional research be conducted with other students who engage in post-secondary agricultural mechanics coursework to develop a firmer grasp of safety climate attitudes with this type of population. This is particularly true with preservice SBAE teachers. As teachers help to set standards and expectations for safety within the environments under their care (Phipps et al., 2008; Talbert et al., 2014), their training in, and adherence to, proper safety practices, as well as understanding the need for effective laboratory safety management, are vital to ensuring that SBAE programs' agricultural mechanics laboratories are conducive to safe operation (Dyer & Andreasen, 1999). Developing a deeper understanding of the safety climate in an educational laboratory environment, along with the safety-related attitudes and perceptions of the students, is paramount to addressing safety needs.

Teacher educators who teach agricultural mechanics coursework should ensure that their own practices mirror what should be occurring in SBAE program laboratories. As teacher education programs continue to help develop preservice SBAE teachers' agricultural mechanics content knowledge and skills (Burris et al., 2005), consideration should be given to ensuring that preservice teachers are prepared to manage agricultural mechanics laboratories (McKim & Saucier, 2011b). Agricultural mechanics laboratories are often complex places that demand a good deal of attention to function (Saucier et al., 2014). Present in many SBAE programs nationwide (Shoulder & Myers, 2012; Twenter & Edwards, 2017), agricultural mechanics laboratory teaching is easily expected to be an expected duty of an SBAE teacher. To aid with understanding the safety-related attitudes of preservice teachers, perhaps teacher educators responsible for post-secondary agricultural mechanics coursework should consider implementing a safety climate attitudes assessment within their coursework. Per Ajzen (1991), attitudes toward a concept or idea (e.g., laboratory-related safety) can ultimately influence intentions to act. Dyer and Andreasen (1999) expressed considerable concern regarding safety education in teacher preparation programs. The use of the Safety Climate Attitudes Questionnaire could serve as a formative, or even summative, assessment of preservice teachers' safety attitudes in a post-secondary agricultural mechanics course. Further research into the phenomena of teacher preparation programs' safety training could yield useful results for future practice.

Agricultural mechanics curricula and laboratories can serve as excellent vehicles for a multitude of teaching and learning purposes, including facilitating thinking and reasoning skills (Blackburn & Robinson, 2017; Pate & Miller, 2011), emphasizing academic content such as mathematics (Parr et al., 2006), providing economic returns in communities (Hanagriff et al., 2014), and developing opportunities to connect to local stakeholders through service-oriented projects (Schafbuch et al., 2016). These experiences and benefits can certainly result in great strides toward the provision of capable individuals needed by the agricultural industry (Stripling & Ricketts, 2016). To meet these provisions and opportunities, however, teachers must be prepared to ensure that students are working in safe conditions (Phipps et al., 2008) that can help to instill good work-related habits in youth. Gillen et al. (2013) noted that the early instillation of following safety practices can be useful to help reduce injuries and accidents. The safety-oriented cultures of many modern organizations desire employees who can follow safety practices and make good judgments (Reese, 2016). Agricultural education at all levels should prepare to address these desires.

References

Ajzen, I, (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. doi:10.1016/0749-5978(91).90020

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Psychology, 32*(4), 665–683. doi: 10.1111/j.1559-1816.2002.tb00236.x

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice Hall.

Bettis, M. D., & Crawford, H. R. (1972). Experimental development and evaluation of a shop safety attitude scale. *Journal of the American Association of Teacher Educators in Agriculture, 13*(3), 22-28. doi:10.5032/jaatea.1972.03022

Blackburn, J. J., & Robinson, J. S. (2016). Determining the effects of cognitive style, problem complexity, and hypothesis generation on the problem solving ability of school-based agricultural education students. *Journal of Agricultural Education*, *57*(2), 46-59. doi:10.5032/jae.2016.02046

Boone, H. N., Jr. & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension 50*(2), 2TOT2. Retrieved from https://www.joe.org/joe/2012april/pdf/JOE_v50_2tt2.pdf

Burris, S., Robinson, J. S., & Terry, R., Jr. (2005). Preparation of pre-service teachers in agricultural mechanics. *Journal of Agricultural Education*, *46*(3), 23-34. doi:10.5032/jae.2005.03023

Byrd, A. P., Anderson, R. G., & Paulsen, T. H. (2015). Does agricultural mechanics laboratory size affect agricultural education teachers' job satisfaction? *Journal of Agricultural Education*, *56*(1), 6-19. doi:10.5032/jae.2015.01006

Cox, S., & Flin, R. (1998). Safety culture: Philosopher's stone or man of straw? *Work Stress, 12*, 189–201, doi:10.1080/02678379808256861

Dyer, J. E., & Andreasen, R. J. (1999). Safety issues in agricultural education laboratories: A synthesis of research. *Journal of Agricultural Education, 40*(2), 46-54. doi:10.5032/jae.1999.02046

Fishbein, M., & Ajzen, I. (1975). *Beliefs, attitudes, intentions, and behaviors.* Reading, MA: Addison-Wesley Publishing Company.

Franklin, E. A. (2008). Description of the use of greenhouse facilities by secondary agricultural education instructors in Arizona. *Journal of Agricultural Education*, *49*(3), 34-45. doi:10.5032/jae.2008.03034

Gillen, M., Goldenhar, L. M., Hecher, S., & Schneider, S. (2013). Safety culture and climate in construction: Bridging the gap between research and practice. *Center for Construction Research and Training*, Workshop Report - Center for Construction and Training. Retrieved from https://www.cpwr.com/sites/default/files/CPWR_Safety_Culture_Final_Report.pdf

Gliem, J. A., & Miller, G. (1993a). Administrators' attitudes, policies, and procedures regarding safety in vocational education laboratories. *Journal of Agricultural Education, 34*(4), 1-7. doi:10.5032/jae.1993.04001

Gliem, J. A., & Miller, G. (1993b). Laboratory safety in vocational education: An administrator's perspective. *Journal of Agricultural Education, 34*(3), 26-33. doi:10.5032/jae.1993.03026

Hanagriff, R. D., Rayfield, J., Briers, G., & Murphy, T. (2014). Economic impacts and program involvement in agricultural mechanics competition projects in Texas. *Journal of Agricultural Education*, *55*(2), 79-90. doi:10.5032/jae.2014.02079

Kalme, N., & Dyer, J. E. (2000). Perceptions of Iowa secondary school principals toward agricultural education. *Journal of Agricultural Education, 41*(4), 116-124. doi:10.5032/jae.2000.04116

McCubbins, OP, Wells, T., Anderson, R. G., & Paulsen, T. H. (2017). Examining the relationship between the perceived adequacy of tools and equipment and perceived competency to teach agricultural mechanics. *Journal of Agricultural Education*, *58*(2), 268-283. doi:10.5032/jae.2017.02268

McKim, B. R., & Saucier, P. R. (2011a). Agricultural mechanics laboratory management professional development needs of Wyoming secondary agriculture teachers. *Journal of Agricultural Education*, *52*(*3*), doi:10.5032/jae.2011.03075

McKim, B. R., & Saucier, P. R. (2011b). Assessing the learning needs of student teachers in Texas regarding management of the agricultural mechanics laboratory: Implications for the professional development of early career teachers in agricultural education. *Journal of Agricultural Education, 52*(4), 24-43. doi:10.5032/jae.2011.04024

McKim, B. R., & Saucier, P. R. (2012). A multi-state factor-analytic and psychometric meta-analysis of agricultural mechanics laboratory management competencies. *Journal of Agricultural Education*, *53*(2), 139-152. doi:10.5032/jae.2012.02139

McKim, B. R., & Saucier, P. R. (2013). A 20-year comparison of teachers' agricultural mechanics laboratory management competency. *Journal of Agricultural Education, 54*(1), 153-166. doi:10.5032/jae.2013.01153

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.

Parr, B. A., Edwards, M. C., & Leising, J. G. (2006). Effects of a math-enhanced curriculum and instructional approach on the mathematics achievement of agricultural power and technology students: An experimental study. *Journal of Agricultural Education, 47*(3), 81-93. doi:10.5032/jae.2006.03081

Pate, M. L., & Miller, G. (2011). Effects of think-aloud pair problem solving on secondary-level students' performance in career and technical education courses. *Journal of Agricultural Education*, *52*(1), 120-131. doi:10.5032/jae.2011.01120

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. (2008). *Handbook on agricultural education in public schools* (6th ed.). Clifton Park, NY: Thomson Delmar Learning.

Preyer, Jr., P., & Williams, D. L. (1977). Variables related to the diffusion of safety education into Alabama agribusiness education programs. *Journal of the American Association of Teacher Educators in Agriculture, 18*(3), 27-32. doi:10.5032/jaatea.1977.03027

Reese, C. D. (2016). *Occupational health and safety management: A practical approach* (3rd ed.). Boca Raton, FL: CRC Press.

Saucier, P. R., & McKim, B. R. (2011). Assessing the learning needs of student teachers in Texas regarding management of the agricultural mechanics laboratory: Implications for the professional development of early career teachers in agricultural education. *Journal of Agricultural Education, 52*(4), 24-43. doi:10.5032/jae.2011.04024

Saucier, P. R., McKim, B. R., & Tummons, J. D. (2012). A Delphi approach to the preparation of early-career agricultural educators in the curriculum area of agricultural mechanics: Fully qualified and highly motivated or status quo? *Journal of Agricultural Education, 53*(1), 136-149. doi:10.5032/jae.2012.01136

Saucier, P. R., Vincent, S. K., & Anderson, R. G. (2014). Laboratory safety needs of Kentucky school-based agricultural mechanics teachers. *Journal of Agricultural Education, 55*(2), 184-200. doi:10.5032/jae.2014.02184

Schafbuch, M. L., Vincent, S. K., Mazur, J., Watson, J., & Westneat, S. (2016). The CROPS curriculum experiment: Evaluating the farm safety knowledge gained among secondary Appalachia youth. *Journal of Agricultural Education, 57*(2), 134-145. doi:10.5032/jae.2016.02134

Shoulders, C. W., & Myers, B. E. (2012). Teachers' use of agricultural laboratories in secondary agricultural education. *Journal of Agricultural Education, 53*(2), 124-138. doi:10.5032/jae.2012.02124

Shoulders, C. W., & Myers, B. E. (2013). Teachers' use of experiential learning stages in agricultural laboratories. *Journal of Agricultural Education, 54*(3), 100-115. doi:10.5032/jae.2013.03100

Shoulders, C. W., Blythe, J. M., & Myers, B. E. (2013). Teachers' perceptions regarding experiential learning attributes in agricultural laboratories. *Journal of Agricultural Education, 54*(2), 159-173. doi:10.5032/jae.2013.02159

Shultz, M. J., Anderson, R. G., Shultz, A. M., & Paulsen, T. H. (2014). Importance and capability of teaching agricultural mechanics as perceived by secondary agricultural educators. *Journal of Agricultural Education, 55*(2), 48-65. doi:10.5032/jae.2014.02048

Stripling, C. T., & Ricketts, J. C. (2016). Research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century. In T. G. Roberts, A. Harder, & M. T. Brashears. (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020.* Gainseville, FL: Department of Agricultural Education and Communication.

Talbert, B. A., Vaughn, R., Croom, B., & Lee, J. S. (2014). *Foundations of agricultural education* (3rd ed.). Upper Saddle River, NJ: Pearson Education Inc.

Torner, M., & Pousette, A. (2009). Safety in construction: A comprehensive description of the characteristics of high safety standards in construction work from the combined perspective of supervisors and experienced workers. *Journal of Safety Research, 40(6*), 399-409. Retrieved from https://ac.els-cdn.com/S0022437509001030/1-s2.0-S0022437509001030-main.pdf?_tid=ba12cbe2-ffa5-11e7-892e-00000aab0f27&acdnat=1516647472_c156520b37a1b4b3b5ab44de63ab537a

Tummons, J. D., Langley, G. C., Reed, J. J., & Paul, E. E. (2017). Concerns of female preservice teachers in teaching and supervising the agricultural mechanics laboratory. *Journal of Agricultural Education*, *58*(3), 19-36. doi:10.5032/jae.2017.03019

Twenter, J. P., & Edwards, M. C. (2017). Facilities in school-based, agricultural education (SBAE): A historical inquiry. *Journal of Agricultural Education*, *58*(3), 275-292. doi:10.5032/jae.2017.03275

Warmbrod, J. R. (2014) Reporting and interpreting scores derived from Likert-type scales. *Journal of Agricultural Education*, *55*(5), 30-47. doi:10.5032/jae.2014.05030

Williamson, A. M. Feyer, A. M., Cairns, D. & Biancotti, D. (1997). Measuring safety climate: The role of safety perceptions and attitudes. *Safety Science*, *25*, 15-27. Retrieved from https://ac.els-cdn.com/S0925753597000209/1-s2.0-S0925753597000209-main.pdf?_tid=18ba1a52-ffa5-11e7-90ba-00000aab0f6b&acdnat=1516647201_cf5748f7a1b0750ba4eff0a87658d243

The Development of Preservice Agriculture Teachers' Pedagogical Content Knowledge through a Greenhouse for Teachers Course

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The purpose of this qualitative research study was to explain the development of preservice agriculture teachers' PCK for the concept of plant fertilizers within a content-focused methods course. The emergent central phenomenon was an overall lack of PCK development for plant fertilizers, highlighted by five main themes that impeded the development. Preservice teachers felt less self- efficacious in horticulture content knowledge and possessed a greater desire for horticulture content knowledge over pedagogical knowledge. Additionally, the preservice teachers exhibited development of horticulture content knowledge and mathematics content knowledge through the unit. Finally, the lack of a content knowledge foundation inhibited the development of PCK in preservice teachers, despite the purpose of the course and vision of the instructor. Recommendations include more purposeful integration of PCK at the preservice level, utilization of tools like the CoRe rubric (Loughran, Mulhall, & Berry, 2004) during lesson planning, increased field experience imbedded in the teacher preparation program, and a more careful examination of the preservice teachers' pre-existing content knowledge base prior to enrollment in the content-focused methods course.

Introduction

Teachers perform a significant role in the process of student knowledge acquisition and construction (Gablinske, 2014). Effective teaching of any content area requires teachers to develop a variety of professional knowledge bases that undergird instruction (National Research Council, 2010). Historically, there have been shifts in which knowledge bases are considered most important for effective teachers to possess, with content knowledge and pedagogical knowledge both having periods of focus in early research, certification, and professional development efforts (Ong, 1958). Shulman (1986) recognized the importance of content knowledge during a time when pedagogical knowledge was at the forefront of education reform. He postulated that teachers possessed more than just content knowledge and pedagogical knowledge alone, and coined the term pedagogical content knowledge (PCK) to describe knowledge specific for teaching content (Shulman, 1986).

PCK research has blossomed over the past three decades, with various models and definitions utilized across education disciplines to describe the elusive knowledge base (Kind, 2009). More recently, Morrison and Luttenegger (2015) defined PCK as a teacher's intersection of content knowledge, pedagogy, and the context of the learning situation. The foundation of PCK lies in a teacher's ability to convey knowledge to students effectively and aid them in developing a deeper understanding of content (Morrison & Luttenegger, 2015). PCK is not solely based on what a teacher knows about a content area, but rather how they are able to use that knowledge purposefully while teaching their students (Beyer & Davis, 2011).

Despite the importance of PCK in the literature, empirical research illuminates a struggle for teachers in numerous education disciplines to develop this complex knowledge base (Ball, Thames, & Phelps, 2008). Specifically, in agricultural education, Rice and Kitchel (2015a) found preservice teachers were displeased with the quality and quantity of content knowledge gained in their teacher education programs and their perceived ability to transfer that knowledge to their future classrooms for teaching. While time and experience are necessary ingredients in the cultivation of PCK, development can begin to occur at the preservice level with the aid of teacher preparation programs (Hume & Berry, 2011; Magnusson, Krajcik, & Borko, 1999; and Schneider & Plasman, 2011). One such course with potential to develop PCK in preservice agriculture teachers is the Greenhouse for Teachers course at the [University]. This qualitative study will focus on elucidating the PCK trajectory of preservice agriculture teachers within the context of a plant fertilizers unit within the Greenhouse for Teachers course.

Literature Review

PCK has become accepted across education disciplines as a dynamic form of teacher knowledge that is constantly being expanded and transformed from other teacher knowledge bases (Nilsson, 2008). At times, it can seem meaningless because of it extensity, or it can seem reiterative because of its narrowness (Nilsson & Loughran, 2011). Various models and definitions have attempted to further describe PCK, often including knowledge of students, knowledge of instructional strategies, knowledge of curriculum, and knowledge of assessment, all within a content area context, as essential components (Kind, 2009). More recently, PCK has been defined as not only specific to a particular concept or topic, but also specific to the individual teacher, their personal beliefs, and the situation (Van Driel & Berry, 2012). PCK research studies have explored disciplines ranging from science education, to elementary education, to agricultural education; have focused on both practicing and preservice teachers; and have targeted topics as broad as plant science and as specific as using particle models in chemistry (De Jong, Van Driel, & Verloop, 2005; Magnusson et al., 1999; Nilsson & Loughran, 2011; and Rice & Kitchel, 2017).

Regardless of the context or domain, PCK is a critical knowledge base not only for practicing teachers to possess, but also for preservice teachers to begin to develop (Kilic, 2009). Preservice agriculture teachers typically spend four years in a teacher preparation program with the expectation that upon completion they will gain the knowledge needed and the skills necessary to effectively teach their future students (Rice & Kitchel, 2015a). University teacher educators have similar goals when preparing preservice teachers. If teachers are not well-versed in the content they are teaching, they are in danger of passing on misconceptions and inaccurate information to their students (Darling-Hammond & Bransford, 2005). The desire to adequately prepare preservice teachers for the numerous challenges they will face in their future classrooms is a priority for teacher educators nationwide (Stuart & Thurlow, 2000).

However, preservice teachers do not enter teacher preparation programs as blank slates. Contrarily, they bring with them preformed beliefs about education based on their prior knowledge and experiences (Stuart & Thurlow, 2000). These beliefs are usually formed early, and they rarely fade away, even after years of purposeful instruction (Darling-Hammond & Bransford, 2005; Kagan, 1992). The challenge for teacher educators resides in the fact that many of those beliefs are inaccurate and faulty, which can lead to issues in the development of preservice teacher knowledge, including PCK (Stuart & Thurlow, 2000). Nilson and Loughran (2011) contributed to the research of PCK development in preservice teachers with a study involving preservice elementary science teachers. Their study showed if preservice teachers are engaged in purposefully identifying, self-assessing, and clearly developing their knowledge of teaching in a specific content area, their understanding of PCK can increase (Nilsson & Loughran, 2011).

There have been a myriad of studies exploring the PCK of preservice teachers. In their science-based study, Nilsson and Loughran (2011) utilized the content representations (CoRe) rubric designed by Loughran, Mulhall, and Berry (2004) to research the development of PCK in preservice elementary science teachers enrolled in a science methods course. They discovered PCK exploration can offer an alternative way of thinking about preservice teacher preparation that goes beyond traditional teaching methods (Nilsson & Loughran, 2011). Finally, Rice and Kitchel (2015a) uncovered a lack of agricultural content knowledge confidence in preservice teachers at a large mid-western university. The participants in the study revealed hesitance for teaching agriculture subjects for which they did not feel efficacious in the content (Rice & Kitchel, 2015a).

There have been few studies conducted that relate to the PCK development of preservice teachers specifically in agricultural education (Rice & Kitchel, 2015b). Schneider and Plasman (2011) recommended more research concentrate on preservice teacher PCK development within specific topic contexts. For this study, not only was agricultural education the overarching discipline of focus, but the specific topic of plant fertilizers was highlighted. According to the Georgia Department of Education (2013), plant science and horticulture are among the most commonly taught content areas in Georgia. This study heeds the previous scholar recommendations through its investigation of preservice agriculture teachers' PCK development in one of the more commonly taught areas of agriculture.

Purpose and Research Question

The purpose of this qualitative research study was to utilize grounded theory methods to explain the development of preservice agricultural teachers' PCK for the concept of plant fertilizers during a fertilizers and supplements unit. This unit was a part of the Greenhouse for Teachers course curriculum at the [University]. The central question guiding the study was: How does preservice agriculture teachers' PCK for the concept of plant fertilizers develop during a Greenhouse for Teachers content-focused methods course? This study aligns with priority four of the 2016-2020 National Research Agenda- meaningful and engaged learning in all environments (Roberts, Harder, & Brashears, 2016).

Methodology

This research study employed a grounded theory design. Grounded theory was selected based on the exploratory nature of the central research question. PCK is a complex knowledge base that develops over time with experience (Hashweh, 2005; Kind, 2009). Because this study was focused on a developmental process, grounded theory methodology was an appropriate methodological fit (Birks & Mills, 2015). Additionally, conceptualization of preservice teachers' PCK development for a specific concept (plant fertilizers) can serve as a foundation for future studies. Specifically, this study was guided by the work of Birks and Mills (2015).

The purpose of a grounded theory approach is to generate new theory from collected data (Birks & Mills, 2015). Because grounded theory is consistent with the philosophy of pragmatism, this grounded theory study was approached using a pragmatic lens (Birks & Mills, 2015). According to Birks and Mills (2015), the ontological, epistemological, and methodological roots of the pragmatic paradigm are in line with grounded theory methodology.

It is important that I not only share the epistemological lens that guided my study, but also disclose my positionality because of its impact on my research (Creswell, 2013). As an undergraduate student, I was enrolled in numerous methods and curriculum development courses that were designed to develop pedagogical knowledge. I have also taken courses that covered a range of content knowledge areas including: agricultural technologies, soils, and aquaculture, to name a few. When I began my student teaching experience, I realized there was something missing from my teacher training. I possessed some content knowledge and some pedagogical knowledge, but I failed to learn how to link the two together. I am currently a practicing agriculture teacher, and I continue to find myself attempting to link content knowledge and pedagogical knowledge in my instruction. The goal of my research is to conceptualize the PCK of preservice teachers, so the findings can be used to assist teacher preparation programs.

Participants

Participants in this study included six preservice agricultural education teachers enrolled in a Greenhouse for Teachers course. Preservice teachers were chosen as the population to determine how their PCK for the concept of plant fertilizers were formed. All participants were in their third year of the agricultural education program. Educational backgrounds of the participants prior to enrollment in the program varied. Commonalities included all preservice teachers had all taken introductory-level education courses before the Greenhouse for Teachers course. Three out of the six preservice teachers had taken a Soils and Hydrology content course and an Agriscience for Teachers content focused methods course at the [University]. All six preservice teachers will be completing their student teaching experiences one year following their participation in this study.

Data Sources and Collection

PCK can be explored using a wide array of methods, and more than one data source is recommended for thorough investigation (Morrison & Luttenegger, 2015). To effectively elucidate the development of PCK, even for a concept as specific as plant fertilizers, it was important to investigate different sources of data that could reveal PCK. Four sources of qualitative data were collected including: pre-observation interviews, classroom observations, field memos, and post-observation interviews. Triangulation was achieved by utilizing the four data sources to corroborate evidence (Creswell, 2013). The use of various sources of data added rigor to the collection process and increased the probability that PCK would be captured given this study focused on only one concept within the course (Creswell, 2013).

Because PCK is content and topic specific, the plant fertilizers unit within the Greenhouse for Teachers course was utilized for data collection and focused on the following Georgia Department of Education (2013), General Horticulture and Plant Science standard:

AFNR-GHPS-9
Explore the use of plant fertilizers and proper fertilizing methods.

The unit was taught over a course of two class meetings. The first day was used primarily for lecture. In this lecture, the professor began and ended with discussions about pedagogical strategies that could be used to teach the content. He also included instruction in the content knowledge involved in a plant fertilizers unit. The second day was used for application of that content knowledge. The preservice teachers were divided into three groups in a greenhouse laboratory setting to perform three separate lab activities related to the concept of plant fertilizers. The laboratory activities included the following: irrigation controls, temperature controls, and water-soluble fertilizers. The groups rotated in thirty-minute increments with the purpose of developing knowledge in the content of plant fertilizers as well as how to teach that content to future middle and high school students.

Data from this study were collected spring of 2016 during the plant fertilizers unit in a Greenhouse for Teachers course. Pre-observation interviews took place at least one week prior to the classroom observations of the unit. These one-on-one semi-structured interviews were audio recorded for transcription. The following are examples of questions that the preservice teachers were asked during the pre-observation interviews: 1) Tell me about your background in plant science specifically related to this plant science unit, 2) why did you enroll in AG ED 4040, Greenhouse for Teachers, 3) what specific teaching strategies could be used if you were teaching this unit, 4) what specific assessment strategies could be used to teach this unit, and 5) what are your beliefs about teaching greenhouse and plant science? Each day of the unit was observed, and the researcher recorded field notes during each classroom observation. The purpose of the observations was to provide further context to the unit and to enable the researcher to witness first- hand student and instructor interactions, questions that arose from instruction, and were utilized as prompts for questions in the post-observation interviews.

Post-observation interviews were conducted after the unit was complete. It was important to conduct the interviews as soon as possible after the completion of the unit, so the events from class were easier to recall for the preservice teachers. These interviews reflected on the unit and were designed to encourage preservice teachers to think more deeply about their PCK development for plant fertilizers. The following are examples of questions that the preservice teachers were asked during the post-observation interviews: 1) What aspects of this unit (if any) contributed to your ability to teach this unit in the future, 2) what aspects of this unit (if any) contributed to your ability to design curriculum for this unit in the future, 3) what aspects of this unit (if any) contributed to your ability to create assessments for this unit in the future, 4) What aspects of this unit (if any) contributed to your understanding of student learning for teaching this unit in the future, and 5) what specific teaching strategies could be used if you were teaching this unit?

Data Analysis

Following the guidelines of Birks and Mills (2015), this grounded theory study required collection and analysis of data to be completed simultaneously. Each interview and observation video was transcribed verbatim. All data sources were used during data analysis. Constant comparative analysis was performed to compare data against data (Birks & Mills, 2015). Data were sorted during collection, initial codes were developed, and questions were altered to explore emergent phenomena present in the data (Birks & Mills, 2015).

NVivo 10 qualitative software was the data management platform used for analysis. All verbatim transcriptions, field memos, and observation videos were loaded into the program for analysis. NVivo 10 was utilized to organize and code data, establish connections between codes, create memos, and organize literature related to the study. Open, axial and selective coding procedures were followed to develop codes, connect codes into categories, and to develop themes, respectively (Birks & Mills, 2015).

Validation Strategies

Four validation strategies for qualitative work as described by Creswell (2013) were utilized in this study. The strategies included: triangulation, clarifying researcher bias, member checking and rich, thick description. The four data sources collected throughout the study were utilized to provide evidence of the phenomena. Triangulation was attained by gathering the data from both pre and post observation interviews, classroom observations, and field memos. Corroborating evidence from all four data sources were used to shed light on the emergent themes (Creswell, 2013). Researcher bias was clarified by addressing past experiences, prior bias or prejudices, and orientations that could have possibly shaped the interpretation of the study (Creswell, 2013). Rich, thick description was used to provide a clear explanation of the development and findings of the study, including participant quotes and researcher observations (Creswell, 2013). Finally, the researcher engaged in member checking of the findings to ensure accuracy of the participants' responses (Creswell, 2013). This is the most crucial technique for establishing credibility in qualitative research (Lincoln & Guba, 1985). Member checking in this particular study involved restating and summarizing information during interviews, checking transcripts, and sharing emergent findings with participants for feedback.

Findings

The emergent central phenomenon was an overall lack of PCK development for plant fertilizers. Instead, the data centered around the preservice teachers' development of horticulture content knowledge, rather than their development of PCK for plant fertilizers. Five main themes surfaced that impeded the PCK development of preservice teachers during a Greenhouse for Teachers course.

Preservice Teachers Felt Less Self- Efficacious in Horticulture Content Knowledge

The six preservice teachers in this study all had minimal backgrounds in horticulture content, specifically in the topic of plant fertilizers. Although they did recall content-related courses taken in high school and college, there was an overall low perceived self-efficacy among the preservice teachers in relation to horticulture content knowledge. During her pre-observation interview prior to the beginning of the unit, Callie reflected on her past college courses and experiences, “I really don’t have any background in any kind of plant structures, fertilization, anything like that.” After the unit concluded, Callie’s self-efficacy had not changed much. When asked what areas of content she felt confident in, she replied,

> Honestly, only animal science. That’s the only one that I would feel like I could go into the classroom [and teach] and really that’s kind of a stretch. Horticulture is getting there just because its bringing a lot of stuff back from high school that I did learn, but as far as being able to walk into a classroom and being able to teach a lesson, I think animal science would be the only one.

Ashley and Lindsey also expressed concerns with content knowledge levels related to horticulture and their ability to teach that content to future students. Ashley stated, “The fertilization part I don’t know a lot about at all”. Lindsey shared, “I feel like I’m not extremely confident in any area of agriculture”. The preservice teachers enrolled in the class did not express confidence in their ability levels related to plant fertilizers content before or after the unit, making it difficult for PCK to develop.

Preservice Teachers Possessed a Greater Desire for Horticulture Content Knowledge over Pedagogical Knowledge

Another element that impeded the development of PCK in the Greenhouse for Teachers course was the preservice teachers’ personal desire for content knowledge procurement, rather than pedagogical knowledge or PCK. They expressed aspirations related to content knowledge acquisition during both the pre and post-interviews and classroom observations. I observed the preservice teachers asking questions related solely to developing content related knowledge. During an interview, when asked why she enrolled in the course, Marsha responded,

> Well since I am going to be an ag teacher, I’m most likely going to have a greenhouse. I figured it would be good to learn about greenhouses and have more knowledge about them, because really all I knew before was, yes, we have one, it controls the temperature, and you grow plants in it.

Even after being asked her overall goal for the unit, Marsha’s response was strictly content-related. “I’m hoping that I will have a better understanding for greenhouses and plants in general.”

Ashley described an earlier instance in the course when Dr. James presented ways future students of the preservice teachers could utilize what they were learning in a horticulture class within their Supervised Agricultural Experience Programs. She did not think class time should be spent on that topic. “I feel like we could have spent less time on that [Supervised Agricultural Experience Programs] and going ahead and gone to the greenhouse and got things, seed in and stuff like that”. The preservice teachers’ expressed desire for learning content knowledge over pedagogical knowledge, or even a combination of the two, could have negatively affected the development of PCK throughout the unit.

Preservice Teachers Exhibited Development of Horticulture Content Knowledge and Mathematics Content Knowledge

Although there was no substantial evidence that PCK was developed among the preservice teachers, it was clear that they developed some content knowledge related to the unit topic, plant fertilizers. During field observations, it was easy to observe the preservice teachers gaining content knowledge. Most of the class discussions for the two days of observation related to fertilizers and how to operate the fertigation system. They continuously asked questions of the instructor, Dr. James, that were specifically related to the content, rather than how to teach that content. When asked what information he gained from the unit, John focused mainly on content-related items.

I learned how to find the rate of water soluble fertilizer, doing that math. I learned how to set the irrigation system where you can add fertilizer through it, the overhead irrigation. I really liked learning how to calculate the math part because I didn't know how to do that before and it's really useful to know how to do that.

There weren't any preservice teachers who shared a pedagogical-based learning outcome from the unit, even when prompted by "What aspects of this unit, if any, contributed to your ability to teach this unit in the future?" and other similar questions. The second day of field observations also highlighted content knowledge development in horticulture. The class of preservice teachers was divided into groups, and each group was given a different greenhouse system. While rotating through the stations, I observed the preservice teachers discussing how to work the systems, but there was no evidence or discussion of what strategies they could use to teach those systems or struggles in their future careers as agriculture teachers.

The first day of observations was used for whole-group discussion in the classroom. While observing on the first day, I noticed development of a different type of content knowledge. Along with horticulture-based content knowledge, the preservice teachers also developed mathematics content knowledge, specifically within the area of conversions. During the discussion, Dr. James mentioned a mathematics concept to the teachers called the "rule of 75". Dr. James assumed the preservice teachers had heard of the concept before, however, there was not a single preservice teacher in the room who knew or understood the concept. Due to this lack of understanding, Dr. James focused his instruction on the "rule of 75". This lack of background knowledge led to more time being spent on content knowledge development in both horticulture and mathematics.

Following my observations, I altered the post-observation interview questions to include discussion of the "rule of 75". All participants admitted they had no prior knowledge of the math concept. When asked about the topic, Lindsey replied, "I'd never heard of it, so yeah, I was pretty lost too". John had a similar response. "I had no idea what he was talking about, at all." After the unit, however, the preservice teachers felt as if they understood the math-related content knowledge taught during the unit. Callie made this evident in her post-observation interview. "He taught us how to mix fertilizers, how to calculate certain requirements for different plants, so how each plant, what they need, and how to calculate that, and then how to actually mix it." Content knowledge in horticulture and mathematics related to plant fertilizers were developed, but there was no real evidence of pedagogical development or PCK for the preservice teachers.

The Lack of Content Knowledge Foundation Inhibited the Development of PCK in Preservice Teachers

The preservice teachers' lack of horticulture content knowledge before the unit, or even the course, and its inhibition of the development of PCK, was a fourth theme that emerged during the study. Analysis of the pre-observation interviews revealed a lack of content knowledge possessed by most of the preservice teachers before the start of the unit. Callie stated her lack of content background, "I don't have an understanding [of plant fertilizers], so I really need everything I can get out of the class". This suggested basic content knowledge of fertilizers would need to be taught. As a result, the majority of the time for the fertilizers unit was spent on developing basic content knowledge among the preservice teachers.

During the first day of field observations, I noticed the preservice teachers constantly asked content-related questions. The professor, Dr. James, spent most of his time during the unit answering content-related questions, and explaining material he expected the preservice teachers to already know. When Dr. James first mentioned the "rule of 75", he realized the preservice teachers didn't know as much as he thought. He asked John, "Where else do you see that [rule of 75]? John responded, "I haven't". The entire class had confused looks on their faces. Dr. James replied, "Alright that's okay. Anybody ever seen that before?" When none of the preservice teachers reacted, he proceeded to explain the "rule of 75" to the preservice teachers.

The first day of the unit was spent in the classroom. Dr. James began the day by having the students review a model for experiential learning. This learning model was learned by the preservice teachers within the course, but it was not taught during the plant fertilizers unit. After a quick review, he introduced the topic of water-soluble fertilizers. From there, the discussion continued with numerous questions from the preservice teachers about how to calculate fertilizer concentration and how to operate the dosimeter (a device that injects a small quantity of concentrated fertilizer solution into the irrigation line in a greenhouse). The questions initiated by the preservice teachers revealed a lack of content knowledge in horticulture and math, related to plant fertilizers, to build upon before the unit even began.

The second day of the unit, the class worked in groups to operate one of three different systems in the greenhouse. The time spent during class that day was again focused almost entirely on content knowledge development, because the instructor saw a need to for the preservice teachers to start learning the content at an introductory level. Following announcements, Dr. James began the discussion by recalling a question asked by Ashley at a previous class meeting. This question began the content-based discussion that would last the remainder of the observation time. The preservice teachers' lack of content knowledge in plant fertilizers resulted in a lack of time for pedagogical skill development during the unit; therefore, the preservice teachers could not connect the content and pedagogical knowledge bases of fertilizers to develop PCK.

A Lack of PCK Developed, Despite the Purpose of the Course and Vision of the Instructor

The purpose of this study was to describe the preservice teachers' development of PCK for the concept of plant fertilizers. Instead, there were factors throughout the unit that inhibited the development of PCK. Before observation of the fertilizers unit, there was an anticipation that preservice teachers would potentially feel confident and prepared about teaching agricultural content related to fertilizers when beginning their career as an agricultural education teacher. Preservice agricultural education teachers did not develop PCK for the concept of fertilizers.

Callie made it evident she learned the content material, but she did not make the connection to pedagogy needed to develop PCK. "I think that it [fertilizers] was taught to where we could understand it, but I'm not sure that I have a great foundation of how to teach that to other students." Amy also thought she grasped the content of fertilizers, but she failed to connect the reason why the topic should be taught to her future students. "I don't understand, like, I understand why we had to learn it, but it' s not really anything that we can teach. Because they can't really mess with the fertilizer, because you can't really trust a high school student to do it." After the unit, Marsha was able to share numerous examples of content knowledge she gained from the two days of instruction; however, when asked if there was anything that occurred during the course of the unit that influenced her ability to teach this in the future, she replied, "I don't really think there was any". Overall, the development of PCK among preservice teachers during the plant fertilizers unit was virtually non-existent. The preservice teachers failed to see the connection of taking the content they already knew or learned during this unit and applying it to teaching future students.

Discussion

In this research, the original goal was to use grounded theory methods to explain the development of preservice agriculture teachers' PCK for the concept of plant fertilizers. The emergent central phenomenon was an overall lack of PCK development during the unit, highlighted by five themes that impeded the development. This study has echoed the findings of related studies by reiterating the complex nature of PCK development (De Jong et al., 2005).

If a teacher does not possess PCK, he or she is more likely to have a low self-efficacy related to teaching that content area (Kola & Sunday, 2015). Interviews with preservice agriculture teachers in this study revealed their low self-efficacy levels in horticulture-related content. This lack of self-efficacy impeded PCK development. The preservice teachers felt as if they could not teach if they did not understand the content they were teaching. Pendergast, Garvis, and Keogh (2011) found that as a greater understanding of the teaching profession is gained, the self-efficacy level of preservice teachers declines. The first theme that impeded the development of PCK in this study supports this finding. The participants in this study had all taken at least two introductory-level education courses. It is possible their low self-efficacy stemmed from their budding understanding of the reality that comes with being a teacher. In addition, the preservice teachers had very little, if any, background in the content area of plant fertilizers. The experience that was mentioned by the participants included high school classes that, for most, took place three to four years prior to the Greenhouse for Teachers course. The lack of content related courses in the past could have contributed to their low self-efficacy, because they did not feel proficient in the content.

Similar to this study, Rice and Kitchel (2015a) discovered a lack of confidence in preservice teachers' agricultural content knowledge at the University of Missouri. It is possible the lack of confidence and self-efficacy in plant fertilizers resulted in the preservice teachers' desire for content knowledge, rather than pedagogical knowledge or PCK. A large amount of class time during the unit was used for the professor to stop and explain content-related terms and concepts. The focus on content knowledge development guided by their desire to gain fundamental fertilizer knowledge, could have led to the preservice teachers missing the pedagogical aspect of the unit or course entirely. Content knowledge is the foundation for PCK development, however, the learning does not stop there (Ozden, 2008). The preservice agriculture teachers entered the unit with a desire for content knowledge acquisition, and they attained that goal. However, just because they are now more confident in plant fertilizers content, does not mean they can effectively teach that material to future students. It is critical for preservice teachers to know and understand the subject matter being taught, but it is also important they know how to teach it to a diverse group of learners and are able to assess their learning (Gardner, 2006).

During the pre-observation interview stage, all the preservice teachers expressed a lack of content knowledge foundation for plant fertilizers. When compared to the post-observation interviews, this revealed that the lack of a content knowledge foundation impeded the development of PCK. More and more preservice teachers are entering agriculture education programs with a limited amount of content knowledge in various areas of agriculture (Rice & Kitchel, 2015a). Over half of the preservice teachers in the study felt as if they would not feel confident teaching a horticulture course to middle and high school students. They felt more confident in the agriculture areas in which they had a strong content background, such as animal science. According to the Georgia Department of Education (2013), agriculture teachers should be prepared to teach a wide variety of agriculture content areas. In this case, the professor of the Greenhouse for Teachers course had to take time to fill in the content knowledge gap of plant fertilizers, at the expense of the purpose of the unit, PCK development.

The development of PCK in preservice teachers is an extremely complex process (De Jong et al., 2005). This research was an attempt to exhibit that process of development, but instead highlighted several impediments to the process. The purpose of the unit was to develop preservice agriculture teachers PCK in plant fertilizers. There were inhibitors during the unit that stunted PCK development. Preservice teachers need to enter content-focused methods courses with a stronger background and understanding of the content knowledge associated with the subject matter at hand, so more time can be spent on combining the existing pedagogical and content knowledge to more purposefully form PCK.

Recommendations for Practice and Research

If preservice teachers are encouraged to understand PCK as a knowledge base, they will be more aware of the process they are undertaking (Kind, 2009). Therefore, it is recommended the syllabus of the Greenhouse for Teachers course be structured to include exposure of PCK as a knowledge base. Instructing the preservice teachers on the basics of PCK could increase the likelihood that they understand what they are supposed to be gaining from the course. This could possibly decrease time spent exploring content knowledge and increase the time spent on PCK.

In addition to including PCK as a part of the syllabus, it is recommended the instructor of the course clearly exhibit the purpose of the Greenhouse for Teachers course at the beginning of the semester. Goal setting is an integral part of motivation and learning for all ages (Schunk, 2012). In the future, setting learning goals for the preservice agriculture teachers could increase the likelihood of PCK development. If the preservice teachers are told what is expected of them, and they make a commitment to meet those expectations, they are likely to alter their performance to work toward achieving those goals (Schunk, 2012). If goals for pedagogy, content, and PCK development are set in place, it could increase the likelihood of PCK development in preservice agriculture teachers in future Greenhouse for Teachers courses.

In addition to setting goals, the professor could incorporate the CoRe rubric designed by Loughran et al. (2004). The CoRe rubric is a valuable tool that can increase preservice chemistry teachers' awareness of components that will eventually lead to their PCK development (Hume & Berry, 2011). If incorporated in the Greenhouse for Teachers course, the CoRe rubric could positively impact the PCK development of preservice teachers. The findings from Hume and Berry's (2011) study demonstrate CoRe rubrics could be an ideal beginning for the growth of PCK, regardless of the educational backgrounds of the preservice teachers. It is recommended the instructor incorporate the use of CoRe rubrics to aid students in developing their PCK.

Field experience is a central component to effective teacher preparation (Darling-Hammond, 2006). It could be beneficial for preservice agriculture teachers in the Greenhouse for Teachers course to visit middle and high school classrooms where horticulture is being taught. As a part of the current course curriculum, the preservice teachers visit different schools to see the structures of greenhouses, but it is likely a visit to see teaching in those classrooms and greenhouses could be more effective for their PCK development. An increased exposure to teaching through early field experience could facilitate a connection between the pedagogical knowledge and content knowledge of the preservice teachers.

In addition to recommendations for components within the course, it is also recommended the course be placed in a later sequence of the preservice teachers' preparation program. Most preservice agriculture teachers in the study expressed very little background in both pedagogical knowledge and horticulture content knowledge. Since the structure of the Greenhouse for Teachers course does not currently warrant any pre-requisite courses, it could be beneficial to place it later in the preservice teachers' course sequence, after additional methods and curriculum development courses. Finally, a content related course, like Soils and Hydrology, could serve as a pre-requisite for preservice teachers enrolled in Greenhouse for Teachers.

It is also recommended more research be conducted to explore how PCK develops among preservice agriculture teachers. This study only focused on one unit within a single course at the [University]. Since only one unit was represented, the same findings may not hold true for other units within the course. This study could be replicated with similar units and courses at the [University] and other universities that engage in agriculture teacher preparation. It is also possible that studying PCK development in preservice teaching is too ambitious; maybe their development for PCK does not occur until later in the teacher education program. It is recommended more studies be conducted to determine the PCK development in practicing student teachers. Studies of this nature could better inform the profession about when PCK development begins to be revealed, leading to more purposeful PCK development of preservice teachers.

References

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education, 59*(5), 389-407. doi:10.1177/0022487108324554

Beyer, C. J., & Davis, E. A. (2011). Learning to critique and adapt science curriculum materials: Examining the development of preservice elementary teachers' pedagogical content knowledge. *Wiley Periodicals, Inc.* 130-157. doi: 10.1002/sce.20466

Birks, M., & Mills, J. (2015). *Grounded theory: A practical guide*. Los Angeles, CA: Sage Publications.

Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches*. Thousand Oaks, CA: Sage Publications.

Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco, California: Jossey-Bass.

De Jong, O., Van Driel, J., & Verloop, N. (2005). Preservice teachers' pedagogical content knowledge of using particle models in teaching chemistry. *Journal of Research in Science Teaching*, 42, 947-964.

Gablinske, P. B. (2014). A case study of student and teacher relationships and the effect on student learning. *Open Access Dissertations*. Paper 266.

Gardner, H, (2006). *Multiple intelligences: New horizons.* New York, NY: Basic Books.

Georgia Department of Education (2013). Career, technical, and agricultural education career clusters/pathways. Retrieved from: https://www.georgiastandards.org/standards/Pages/CTAE-Career-Clusters-Pathways.aspx

Hashweh, M. Z. (2005). Teacher pedagogical constructions: A reconfiguration of pedagogical content knowledge. *Teachers and Teaching: Theory and Practice*. *11*(3). 273-292. doi:10.1080/13450600500105502

Hume, A., & Berry, A. (2011). Constructing CoRes- a strategy for building PCK in pre- service science teacher education. *Research in Science Education, 41*(3), 341-355. doi: 10.1007/s11165-010-9168-3

Kagan, D. M. (1992). Implications of research on teacher belief. *Educational Psychologist, 27*, 65-90

Kilic, H. (2009). The nature of preservice teachers' pedagogical content knowledge. [online] http://www.cerme7.univ.rzeszow.pl/WG/17a/CERME7_WG17A_Kilic.pdf

Kind, V. (2009). Pedagogical content knowledge in science education: Potential and perspectives for progress. *Studies in Science Education, 45*(2), 169-204.

Kola, A. J., & Sunday, O. S. (2015). A review of teacher self-efficacy, pedagogical content knowledge and out-of-field teaching: Focusing on Nigerian teachers. *International Journal of Elementary Education*. *4*(3), 80-85.

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Loughran, J., Mullhall, P., & Berry, A. (2004). In search of pedagogical content knowledge in science: Developing ways of articulating and documenting professional practice. *Journal of Research in Science Teaching, 41*(4), 370– 391.

Magnusson, S., Krajcik, J., & Borko, H. (1999). Nature, sources, and development of pedagogical content knowledge for science teaching. In J. Gess-Newsome & N. G. Lederman (Eds.), *Examining pedagogical content knowledge* (pp. 95-132). Netherlands: Kluwer Academic Publishers.

Morrison, A. D., & Luttenegger, K. C. (2015). Measuring pedagogical content knowledge using multiple points of data. *The Qualitative Report, 20*(6), 798-809.

National Research Council. (2010). *Preparing teachers: Building evidence for sound policy*. Committee on the Study of Teacher Preparation Programs in the United States, Center for Education. Division of Behaviors and Social Sciences Education. Washington, DC: The National Academies Press.

Nilsson, P. (2008). *Learning to teach and teaching to learn: Primary science student teachers' complex journey from learners to teachers*. Dissertation. Linkoping Studies in Science and Technology Education No 19.

Nilsson, P., & Loughran, J. (2011). Exploring the development of pre-service science elementary teachers' pedagogical content knowledge. *Journal of Science Teacher Education, 23*, 699-721. doi: 10.1007/s10972-011-9239-y

Ong, W.J. (1958). *Ramus, method and the decay of dialogue.* Cambridge, MA: Harvard University Press.

Ozden, Mustafa. (2008). The effect of content knowledge on pedagogical content knowledge: The case of teaching phases matters. *Educational Sciences: Theory and Practice*. *8*(2), 633-645.

Pendergast, D, Garvis, S. & Keogh, J. (2011). Pre-service student-teacher self-efficacy beliefs: An insight into the making of teachers. *Australian Journal of Teacher Education, 36*(12), 46-58.

Rice, A. H., & Kitchel, T. (2015a). Preservice agricultural education teachers' experiences in and anticipation of content knowledge preparation. *Journal of Agricultural Education, 56*(3), 90-104.

Rice, A. H., & Kitchel, T. (2015b). The relationship between agriculture knowledge bases for teaching and sources of knowledge. *Journal of Agricultural Education, 56*(4), 154-169. doi:10.5032/jae.2015.04153

Rice, A. H., & Kitchel, T. (2017). Shaping pedagogical content knowledge for experienced agriculture teachers in the plant sciences: A grounded theory. *Journal of Agricultural Education,58*(4), 50-64. doi:10.5032/jae.2017.04050

Roberts, T. G., Harder, A., & Brashears, M. T. (Eds). (2016). American Association for Agricultural Education national research agenda: 2016-2020. Gainesville, FL: Department of Agricultural Education and Communication.

Schneider, R. M. & Plasman, K. (2011). Science teacher learning progressions: A review of science teachers' PCK development. *Review of Educational Research, 81*(4), 530-565. doi:10/3102/0034654311423382

Schunk, D. H. (2012). *Learning theories: An educational perspective* (6th ed.). Boston, MA: Pearson Education Inc.

Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4-14. doi:10.3102/0013189X015002004

Stuart, C., & Thurlow, D. (2000). Making it their own: Preservice teachers' experiences, beliefs and classroom practices. *Journal of Teacher Education,* (*51*)2, 113-121.

Van Driel, J. H., & Berry, J. (2012). Teacher professional development focusing on pedagogical content knowledge. *Educational Reseracher, 41*(1). 26-28. doi: 10.3102/0013189X11431010

The Development of Preservice Agriculture Teachers' Pedagogical Content Knowledge through a Greenhouse for Teachers Course

Discussant Comments

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This manuscript presents a study regarding the complex relationship between technical content knowledge, pedagogical knowledge, and pedagogical content knowledge. For decades, teacher educators within agricultural education have debated the merits of courses that attempt to blend the three areas. This manuscript utilizes a qualitative approach to examine the impact of such a course on preservice teachers' pedagogical content knowledge. The methodology used also enabled the researchers to gather evidence relating what was learned outside of the realm of pedagogical content knowledge. In the case of this study, the qualitative methods enabled the unexpected, and frankly, disappointing, results to add quite a bit of meaningful knowledge to the literature base.

I'd like to first commend the researchers' use of a grounded theory approach. The justification for such an approach was well constructed, and the complex nature of pedagogical content knowledge is obviously a theory still evolving. The researchers should also be commended for "calling a spade, a spade"; while their previous experiences may have led them to anticipate the course having some impact on students' PCK, the findings clearly point out that PCK was nowhere on the students' radar. The recommendations and discussion bring careful thought and value to these findings, building the evolving theory of PCK within agricultural education.

The two questions I had while reading the paper were brought up in the discussion. First, the manuscript eludes to an order in which technical content knowledge, pedagogical knowledge, and pedagogical content knowledge can be most effectively developed. Are there implications for coursework and content within courses? Teacher education programs are operating with decreasing wiggle room; the order in which these three areas is taught could impact student learning. Second, the researchers noted that failing to introduce PCK and the related goals of the course to the students could have prevented them from considering PCK during their learning experiences. I was surprised this was not a foundational component of the course; why has this focus not been included past the title of the course in previous years?

Overall, this was an informative, rigorous study presented in a well-written manuscript. It is a valuable piece to add to the knowledge base of PCK within agricultural education.