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An Examination of University Agricultural Education Faculty Attiudes toward the Implementation of High Impact Learning Experiences

Theresa Pesl Murphrey, Texas A&M University
Summer F. Odom, Texas A&M University
James Sledd, Texas A&M University

Abstract

Meaningful learning is a goal across the broad field of agricultural education and high impact learning (HIL) experiences are a mechanism that can facilitate this goal. The purpose of this study was to examine university agricultural education faculty's attitudes toward the implementation of high impact learning. Eighty-five faculty from ten agricultural education departments nationwide responded to the survey designed to identify perceptions of high impact experiences for undergraduate and graduate students. The majority of respondents reported that as a student they had participated in study abroad experiences, research projects, internships, and on-site learning activities, such as student teaching. However, neither participation as a student nor current involvement in HIL activities influenced perceptions of HIL. Characteristics that did influence perceptions included teaching experience and departmental support. Those with less teaching experience possessed a stronger perception of the benefit of HIL and those who perceived they had departmental support had less concern for barriers (i.e., time and planning) to HIL implementation. Findings reveal a need for support and training related specifically to the implementation of study abroad activities.

Introduction

Meaningful learning is a goal across the broad field of agricultural education and High Impact Learning (HIL) opportunities are being touted as a way to prepare graduates for employment after graduation. For the purpose of this study, HIL practices were defined as activities that purposefully and systematically encourage students to create new knowledge, make connections across curriculum, explore opinions/views/perspectives beyond their own, and engage in critical thinking. These methods encourage students to connect material learned in class with informal experiences through a high level of student engagement (Kuh, 1995; Kuh, 2008). Eight key elements explain HIL activities (Kuh, O'Donnell, & Reed, 2013): (a) Expectations of performance set at appropriately higher levels; (b) Student's dedication of time and efforts over a great amount of time; (c) Interactions between faculty and peers concerning practical matters; (d) Experiences with diversity, wherein students are exposed to and must contend with people and circumstances that differ from those with which students are familiar; (e) Feedback that is constructive, timely, and frequent; (f) Structured opportunities to reflect and integrate learning; (g) Opportunities to discover relevance of learning through real-world applications; (h) Demonstration of competence for desired skill sets.

HIL experiences provide benefits for students who are actively engaged (Cruce, Wolniak, Seifert, & Pascarella, 2006; Kuh, Kinzie, Cruce, Shoup, & Gonyea, 2006) and critical thinking ability is an area of student need (Harder et al. 2009) that could benefit from HIL activities. The concept of HIL is not new. Chickering and Gamson (1987) recommended seven principles for effective undergraduate education that included very similar items to those recommended by Kuh (2008). However, new recommendations encourage students in higher education to complete multiple HIL experiences during their time in college, especially one during their first year (Kuh, 2008).

College graduates' ability to think critically has declined over time and research has shown a decline in faculty teaching to higher standards to challenge the students (Harder, Roberts, Stedman, Thoron, & Myers, 2009). This decline in focus on critical thinking skills has limited the opportunities for students to sharpen their thinking abilities (Burbach, Matkin, Quinn & Searle, 2012; Whittington, 1995). Kuh (2008) identified 10 learning experiences as examples of high-impact activities that could address this issue: (a) first-year seminars and experiences, (b) common intellectual experiences, (c) learning communities, (d) writing-intensive courses, (e) collaborative assignment and projects, (f) undergraduate research, (g) diversity/global learning, (h) service-learning and community-based learning, (i) internships, and (j) capstone courses and projects. HIL experiences may lead to progressive education outcomes for students.

This study was designed to target priority four, "Meaningful, Engaged Learning in All Environments" of the American Association for Agricultural Education's 2011-2015 Research Priority areas (Doerfert, 2011). The importance of this priority area lies in the need to encourage learners to be actively and emotional engaged in the learning process which can occur when HIL experiences are employed. Teacher behavior has been found to impact student engagement (Estepp & Roberts, 2013) and various approaches including the use of virtual environments (Murphrey, Rutherford, Doerfert, Edgar, & Edgar, 2014), exposure to international experiences (McClure, Danjean, Bunch, Machtmes, & Kotrlik, 2014), and digital gaming (Bunch, Robinson, Edwards, & Antonenko, 2014) have been studied in regard to achieving this goal. While it is presumed that faculty across agricultural education seek to provide HIL for their students, it has not been documented in the literature the degree to which faculty within agricultural education are utilizing HIL within their respective programs or what perceptions faculty hold regarding the benefits or barriers to HIL. There is a need to gain a better understanding of faculty perspectives towards HIL.

Theoretical and Conceptual Framework

This study was guided by the Theory of Planned Behavior (Ajzen, 1991; Ajzen & Fishbein, 1980). The Theory of Planned Behavior is used to predict an individual's behavior using their intentions toward the behavior, attitudes toward the behavior (A), their subjective norms (SN) (perceptions about the importance of others' beliefs about whether or not they should perform the behavior), and the perceptions of how much control the individual has over the behavior (PBC). Figure 1 depicts a visual representation of the Theory of Planned Behavior.

The Theory of Planned Behavior has been used in a number of studies ranging from studying undergraduate students' intentions to study abroad (Schnusenberg, de Jong, & Goel, 2012), predicting undergraduate college students' use of mobile devices in a learning environment (Cheon, Lee, Crooks, & Song, 2012), and examining undergraduate students' choices for short-term and long-term study abroad programs (Fitzsimmons, Flanagan, & Wang, 2013).

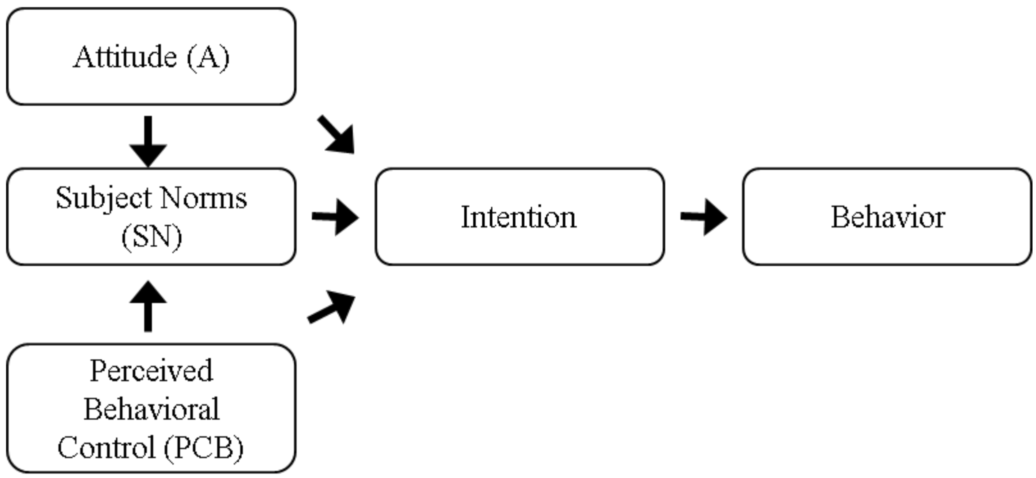

Figure 1. The Theory of Planned Behavior (Presley, Damron-Martinez, & Zhang, 2010).

This study examined university agricultural education faculty's perceptions regarding HIL to understand their attitudes toward using HIL. According to the Theory of Planned Behavior (Ajzen, 1991; Ajzen & Fishbein, 1980), understanding faculty perceptions about HIL is the first step in beginning to understand what impacts their intention to implement HIL experiences and use HIL in their courses. This study did not assess subjective norms or perceived behavioral control as predictors of intention to conduct HIL experiences.

Faculty attitudes were assessed using a conceptual model developed by the researchers (see Figure 2). This model examines individual characteristics, external elements, and overall perceptions of HIL experiences. A review of literature revealed the importance of the role that individual characteristics and external elements serve in influencing individual views and actions. Perceptions related to comfort, knowledge and ease of implementation of HIL as well as perceptions related to benefits and barriers to HIL were identified as relevant to the study. The researchers measured these areas to examine their impact on individual attitudes toward HIL.

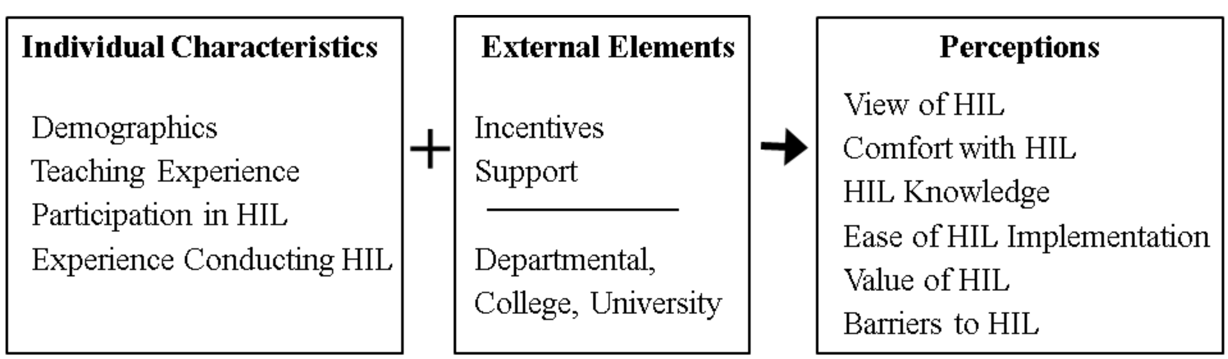

Figure 2. Conceptual model to study High Impact Learning (HIL) in departments of agricultural education.

Purpose and Objectives

The purpose of this study was to examine university agricultural education faculty's attitudes toward the implementation of HIL. Specific objectives included:

1. Identify individual characteristics of faculty in agricultural education regarding the use of HIL.
2. Identify overall agricultural education faculty perceptions of HIL.
3. Identify external elements in agricultural education departments regarding HIL.
4. Describe relationships between specific characteristics of faculty in agricultural education and their attitudes toward HIL.

Methods

A descriptive instrument was created and implemented to examine faculty attitudes toward HIL experiences. In an effort to survey agricultural education faculty employed in programs that were likely to be utilizing HIL, teaching faculty in departments of agricultural education ranked as distinguished by Birkenholz and Simonsen (2011) served as the target population. The population included teaching faculty whose information was collected from each department of agricultural education's website. There were a total of 121 individuals in this population. The responding population was recoded to protect individual identities.

The researcher-developed instrument was pilot tested (n=45) by teaching faculty in a department of animal science, reviewed by three experts in instrumentation, and reviewed by a panel of professionals across agriculture with an understanding of HIL and instrumentation to ensure content and face validity. Modifications were made to the instrument to improve reliability and readability. The instrument included open-ended questions, Likert-type questions, and multiple choice questions. Faculty were asked about their participation in HIL experiences as a student and also requested to provide examples of these high-impact experiences. Perceptions regarding the impact of HIL, the duration for HIL practices, and the effort required to implement HIL was also collected. Comfort level, knowledge, and perceived ease of implementation for each HIL activity of which they were familiar were rated by respondents. Participants were requested to share their background and previous experiences with HIL as well as insight regarding the support received for high-impact practices.

Data collection followed Dillman's (2009) method. Emails were sent to participants with a link to the instrument. A follow-up email was sent every seven days for three weeks. An opt-out option was made available for those who chose not to participate. Eighty-five (n=85) participants responded generating a 70.25% response rate. Given that the response rate was below 85%, procedures for handling nonresponse outlined by Lindner, Murphy, and Briers (2001) were followed. A comparison of early and late respondents revealed no difference between the two groups and thus, findings are generalized to the target population. Cronbach's alpha was used to measure reliability for Likert-type questions. The instrument measured a reliability of .89 for statements indicating benefits of HIL and .74 for questions focused on barriers to HIL. The instrument used in this study included demographic questions to allow for comparison analysis to be conducted based on these different constructs.

Description of the Population

Eighty-five (N=85) agricultural education faculty chose to complete the instrument. The population consisted of 59 males and 26 females. An examination of participants' academic rank was conducted and the review revealed that participants represented four unique groups as indicated in Table 1.

Table 1

Academic Rank of Agricultural Education Faculty Who Responded Regarding High Impact Learning Experiences

	f	%
Lecturer	16	18.8
Assistant Professor	23	27.1
Associate Professor	18	21.2
Professor	28	32.9

Note. N=85

The participants revealed ages ranging from 25 years of age to 65+ years of age as indicated in Table 2. Participants were divided into two age groups consisting of individuals 25-44 years of age (*n*=41) and individuals 45-65 years of age (*n*= 44). These two groups were compared to determine if there was a significant difference between the groups. No significant difference was found.

Table 2

Age Ranges of Agricultural Education Faculty Who Responded Regarding High Impact Learning Experiences

	f	%
25- 34 years old	12	14.1
35- 44 years old	29	34.1
45- 54 years old	20	23.5
55-64 years old	19	22.4
65+ years old	5	5.9

Note. N=85

Findings

Objective 1: Identify individual characteristics of faculty in agricultural education regarding the use of HIL.

The individual characteristics identified in the literature as having the potential to impact the use of HIL included demographics (i.e., gender, age), teaching experience, personal participation in HIL, and experience in conducting HIL. A review of responses revealed that the majority (over 90%) of the respondents indicated they were actively involved in teaching students during the semester in which the study was conducted. Eighty-two percent reported teaching undergraduates, 67% reported teaching students at the master's level, and 55% reported teaching doctoral students.

Number of years of teaching experience ranged from less than a year to over 30 years of service to agricultural education. There were 38 respondents with less than 10 years of service, 39 respondents with between ten and 29 years of service and eight respondents with over 30 years of service. Positions and titles held by respondents were representative of all teaching positions (i.e., Lecturer, Assistant Professor, Associate Professor, and Professor) and respondents represented both males (69%) and females (31%). A high percentage (65.9%) reported having received a teaching award. Based on the names of the awards provided, it was demonstrated that these individuals have been recognized as outstanding educators in the field of agricultural education. Awards ranged from the departmental level to national recognition.

Only 10 respondents indicated that they had not participated in HIL as an undergraduate student, with a high percentage (67%) indicting participation in HIL during both their undergraduate and graduate programs. A review of the experiences participated in reveal a broad array of community, domestic, and international activities as well as experiences that are both traditional (i.e., research, internships, study abroad, capstone projects, conference attendance, student teaching) and those that were unique such as being immersed in a work environment in an international settings and competitive agricultural events. Universally, respondents expressed the value they found through their participation in these activities.

Objective 2: Identify overall agricultural education faculty perceptions of HIL.

Agricultural education faculty expressed a positive view of HIL activities. Not surprisingly, the examples of activities provided by respondents as those they are currently implementing at their institutions mirrored those that they had participated in as a student. Approximately 85% of respondents indicated that they currently implement HIL activities. In regard to the duration of a high impact experience, over 67% indicated that a study abroad should be either 2 weeks or a month, 74% indicated that an internship should last a semester, and research was indicated as taking place over a semester by 51% of respondents and a year by 31% of respondents.

HIL perceptions were collected using a series of Likert-type questions. Table 1 provides a summary of responses regarding perceptions of HIL benefits. A positive perception of HIL activities was revealed overall with the statement "Undergraduates benefit from HIL activities" receiving the most positive response (M = 4.83, SD = .537).

Table 1

Perceptions of the Benefits of High Impact Learning Experiences for Students as Indicated by Responding Agricultural Education Faculty.

	1 SD	2 D	3 N	4 A	5 SA	N/A	M*	SD
Statement	*f*	*f*	*f*	*f*	*f*	*f*		
Undergraduates benefit from HIL activities.	1	0	0	10	72	2	4.83	.537
HIL activities are an important concept to provide for students' experiences.	1	0	1	13	69	1	4.77	.588
HIL activities are beneficial for graduate students.	0	1	1	20	62	1	4.70	.555
Students will benefit from participating in HIL activities.	2	0	2	13	66	2	4.70	.745
HIL activities prepare students for careers.	1	0	3	24	56	1	4.60	.679

Note. N=85; Scale: 1 = Strongly Disagree (SD), 2 = Somewhat Disagree (D), 3 = Neither Agree or Disagree (N), 4= Somewhat Agree (A), 5= Strongly Agree (SA), Not Applicable (N/A); *Means were calculated excluding "Not Applicable" responses.

Agricultural education faculty perceptions of HIL were also collected using a series of Likert-type questions related to barriers to HIL. Table 2 provides a summary of responses regarding perceptions of potential barriers to HIL experiences. The statement "HIL activities are too expensive" (M=2.51, SD=1.04) received the highest mean response.

Table 2

Perceptions of Barriers Related to High Impact Learning Experiences for Students as Indicated by Responding Agricultural Education Faculty.

	1 SD	2 D	3 N	4 A	5 SA	N/A	M*	SD
Statement	*f*	*f*	*f*	*f*	*f*	*f*		
HIL activities are too expensive.	14	32	24	12	3	0	2.51	1.04
It is difficult to fit HIL activities into degree plans and/ or curriculum plans.	24	32	7	16	6	0	2.39	1.27
HIL activities require too much planning and preparation.	19	38	11	15	2	0	2.33	1.08
HIL activities require too much time.	29	31	9	16	0	0	2.14	1.09
HIL distracts from subject matter content.	55	21	3	3	3	0	1.56	.98

Note. N=85; Scale: 1 = Strongly Disagree (SD), 2 = Somewhat Disagree (D), 3 = Neither Agree or Disagree (N), 4= Somewhat Agree (A), 5= Strongly Agree (SA), Not Applicable (N/A); *Means were calculated excluding "Not Applicable" responses.

Knowledge/Awareness of HIL in general, as well as the predominant HIL activities, was assessed. Table 3 provides an overview of self-reported knowledge/awareness of HIL activities including perception of their comfort with each of these activities and their perceived ease of implementation of each of these activities. Findings reveal a greater familiarity (i.e., comfort and knowledge) with "research" and "internships" as HIL. However, all categories were rated as "Somewhat Knowledgeable" indicating that respondents have some knowledge of all HIL activities listed.

Table 3

Responding Agricultural Education Faculty Perception of Comfort, Knowledge, and Ease of Implementation of High Impact Learning Activities.

	Comfortable			Knowledgeable			Perceived Ease of Implementation		
	Not	Somewhat	Very	Not	Somewhat	Very	Very Difficult	Difficult	Easy
	f %	f %	f %	f %	f %	f %	f %	f %	f %
HIL in general	0 0%	28 33%	47 55%	0 0%	32 38%	43 51%	2 2%	43 51%	29 34%
Study Abroad	22 22%	31 37%	30 35%	22 26%	29 34%	30 35%	17 20%	56 66%	8 9%
Internships	5 6%	16 19%	63 74%	5 6%	20 24%	56 66%	2 2%	39 46%	41 48%
Research	4 5%	23 27%	56 66%	2 2%	23 27%	55 65%	5 6%	42 49%	33 39%

Note. N values are different for each category and are provided in the order of Comfortable, Knowledgeable, and Perceived Ease of Implementation for each area. HIL in general: N=75, 75, 74; Study Abroad: N=83, 81, 81; Internships: N= 84, 81, 82; Research: N= 83, 80, 80.

Objective 3: Identify external elements in agricultural education departments regarding HIL.

The external elements under investigation were specifically the role of incentives and the role of support. Over 67% of respondents indicated that they do not receive incentives to conduct HIL activities, while approximately 16% do receive incentives. Of those who reported receiving incentives, examples included both monetary incentives (i.e., supplemental pay, financial support for travel, a salary increase, financial support for professional development) and non-monetary incentives (i.e., release time from other duties, opportunity to work with motivated students, research opportunities). Sufficient data to answer the question as to whether or not incentives impacted perceptions of benefit or barriers to HIL was not available.

Faculty perceptions regarding support received to conduct HIL activities at their institution was collected by addressing the departmental, college, and university levels. As shown in Table 4, respondents reported support from all three levels. However, support from the university was the lowest of the three. The data revealed that respondents receive the most support from their department.

Table 4

Support for High Impact Learning Activities at the Department, College and University Level Reported by Agricultural Education Faculty

	Very Unsupportive		Un-supportive		Neutral		Supportive		Very Supportive	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Department (N=85)	1	1.2	2	2.4	5	5.9	32	37.6	45	52.9
College (N=84)	0	0	3	3.5	4	4.7	42	49.4	35	41.2
University (N=83)	0	0	4	4.7	14	16.5	38	44.7	27	31.8

Note. Scale: 1 = Very Unsupportive, 2 = Unsupportive, 3 = Neutral, 4= Supportive, 5= Very Supportive.

Analysis of respondents' perceptions of the benefit of HIL revealed no significance difference when we compared "Supportive" and "Very Supportive" responses regarding college or university support. However, a significant difference in the means was revealed regarding the statement "HIL activities prepare students for careers" in regard to departmental support. Those indicating their department was "Very Supportive" (M= 4.78, SD =.420) was significantly higher (p=.047) in agreement with this statement than those indicating their department was "Supportive" (M= 4.52, SD = .626) with an effect size of d=.415. Further analysis of these two groups in regard to barriers to HIL, revealed that those who reported "Supportive" versus "Very Supportive" in regard to departmental support revealed a significant difference in means for the statements "HIL activities require too much time" (Supportive: M=2.56, SD=1.19; Very Supportive: M=1.8, SD=.894; p= .003; d=.639) and "HIL activities require too much planning and preparation" (Supportive: M=2.53, SD=1.107; Very Supportive: M=2.02, SD=.892; p=.036; d=.461). The statement regarding "time" was also significant in regard to college support (Supportive: M=2.43, SD=1.19; Very Supportive: M=1.89, SD=.963; p=.030; d=.454). No significant difference regarding support at the university level was identified.

Some respondents indicated in the open-ended response area that incentives do not and would not impact their implementation of HIL. These individuals expressed that providing these types of experiences were an inherent part of their job and that they gained enjoyment and satisfaction from providing the experiences. However, several respondents indicated specific incentives that would encourage them to implement additional HIL activities. Out of the 61 comments received regarding incentives that would encourage implementation of HIL activities, the primary areas were financial backing, support with planning/implementation/logistics, recognition, and allocated time/release time. These items were mentioned again in regard to what is needed for instructors to facilitate HIL activities. Support (e.g., clerical, financial) and recognition of required time and effort were indicated as necessary in order to broadly implement HIL activities. Many individuals indicated that exact needs for implementation would vary depending on the actual activity. However, in most cases there would be clerical and planning needs and this form of support was critical. One respondent specifically shared that one critical component of a high impact experience are "self-driven students" who are prepared to engage in the experience.

Objective 4: Describe relationships between specific characteristics of faculty in agricultural education and their attitudes toward HIL.

An analysis of respondents' perceptions of benefits of HIL and barriers to HIL was conducted based on specific characteristics.

Benefits of HIL. In regard to benefits of HIL, no significant difference was found based on gender, age, whether or not a respondent had participated in an HIL activity as a student, or if the respondent was currently implementing an HIL activity. However, there were three areas in which significant differences in responses related to benefits of HIL were found: number of years teaching, whether or not a respondent had won an award, and if the respondent was currently teaching doctoral students.

Respondents were compared based on the number of years of teaching. We compared those who reported working 12 or fewer years with those working 13 or more years, due to a natural break in the data. The comparison revealed the statement "Students will benefit from participating in HIL activities" to be significant (p=.042, d=.349), with those teaching 12 years or less having a mean of 4.89 (SD=.315) and those with 13 years or more having a mean of 4.61 (SD=.802).

A comparison of groups based on whether or not respondents had received a teaching award revealed a significant difference in the response to "Undergraduates benefit from HIL activities" (p=.034, d=.314). Those who reported not having received a teaching award (M=4.96, SD=.189) had a higher mean than those who had received a teaching award (M=4.76, SD=.637).

Of those who reported teaching students at the time of this study, a comparison was made between those who teach doctoral students and those who do not teach doctoral students. Those who teach doctoral students had a significantly (p=.012, .409) lower mean (M=4.55, SD=.928) than those who do not teach doctoral students (M=4.93, SD=.262) for the statement "Students will benefit from participating in HIL activities."

Barriers to HIL. An analysis of respondents' perceptions of barriers to HIL was also conducted based on specific characteristics. In regard to barriers to HIL, no significant difference was found based on gender, age, whether or not a respondent had received a teaching award, the number of years of teaching, what level (i.e., undergraduate, master, doctoral) of student taught, whether or not a respondent had participated in an HIL activity as a student, or if the respondent was currently implementing an HIL activity.

General Perceptions. In order to ensure face validity, a definition of HIL activities was provided at the beginning of the instrument in order to obtain responses to the questions that matched the definition of HIL as defined within the context of the study. However, the last question on the survey requested respondents to share what they believed makes HIL activities different than a non-HIL activity. A total of 68 responses were received from the 85 respondents. The characteristics that described HIL activities included increased scope and duration, encouragement of critical thinking, relevance, application, increased depth of thought, experiential engagement, out-of-the-classroom experiences, real-world, transformative learning, self-responsibility, holistic, and engaging. As one respondent stated, "whether the experience is beneficial to the student depends upon the student background, the timing of the experience, financial situations, and ...other factors."

Conclusions

Based on examination of the data, we concluded that respondents are aware of HIL activities, have a positive perception of the benefits of HIL, and recognize barriers to implementing HIL. Findings revealed that demographics such as age and gender did not impact respondents' perceptions of benefits or barriers to HIL. We also concluded that whether or not a person experienced HIL as a student or is currently implementing HIL did not impact his/her perceptions. However, teaching experience and the level of students taught did impact perceptions of the benefits of HIL. Given that respondents with fewer years of experience, those who taught non-doctoral students, and those who had not received a teaching award had a stronger perception of the benefit of HIL, we concluded that these characteristics can impact perception of HIL benefits.

Findings related to respondents' perceptions of support from their department, college, and university reveal that the perception of support impacts faculty regarding perceptions of HIL benefit and barriers to HIL. We concluded that the more departmental support one has, the less of a concern barriers including time and planning become. Departmental support appeared to be most impactful, followed by college support and then university support. Given that none of the levels of support (i.e., department, college, or university) received a mean score of 5.0 (Very Supportive), this reveals a need for an increase in support.

While mean scores were high in regard to positive statements indicating the benefits of HIL activities, none of the statements received a mean score of 5.0. This indicates there is still room for improving faculty perceptions of HIL. Based on responses regarding knowledge of HIL, we concluded that while faculty are familiar with HIL in general, they are most familiar with HIL in the form of internships and research. Study abroad activities received the highest percentage (86%) of responses indicating them as "difficult" or "very difficult," and we concluded that faculty specifically need assistance in this area. Given that over 67% of respondents reported they do not receive incentives for conducting HIL, we concluded incentives to conduct HIL are not common practice across departments of agricultural education.

Implications and Recommendations

High Impact Learning (HIL) experiences have been documented to be beneficial for students (Cruce, et al, 2006; Kuh, et al., 2006). The implication exists that if we better understand faculty perceptions toward HIL we will be better prepared to provide HIL experiences to students. This study utilized the Theory of Planned Behavior (Ajzen, 1991; Ajzen & Fishbein, 1980) as a framework to document university agricultural education faculty members' attitudes toward HIL. Findings revealed that agricultural education faculty have a positive attitude toward HIL and many are implementing HIL experiences.

It was thought that faculty currently implementing HIL could have a more positive perception of HIL benefits; however, this was not supported by the data. There was no difference in perceptions based on whether or not a respondent was implementing HIL. Findings did reveal that as a faculty member gains experience in teaching and earns teaching awards, the perception of the benefit of HIL to students may be less. This could mean that these individuals are more confident in their teaching strategies and thus do not see HIL as much of an imperative as less experienced teachers. It could also mean that as instructors gain experience they are increasingly implementing HIL in their classroom and there is an assumption that HIL is a natural part of their courses. Yet one other variable that may impact this perception about HIL experiences is the more recent attention given to HIL activities by universities. The implication exists that continuous exposure to the importance of HIL is needed regardless of teaching experience. Further, the conclusion that faculty who teach doctoral level students had a lower perception of HIL benefit could be a reflection of the assumption that all doctoral level experiences are expected to be high impact. Additional study is needed to understand this difference.

Study conclusions reveal that respondents recognize HIL as a valuable aspect of a student's college career. However, as indicated in the findings there is a need to provide opportunities for faculty to gain more knowledge regarding areas such as study abroad. There is also a need to address the perception that study abroad activities are difficult to implement. This could be addressed through support and incentives. Findings related to the perception of departmental support for HIL is noteworthy. Those individuals who perceived departmental support reported barriers as less of an issue. There is an implication that departmental leaders can directly impact HIL implementation by providing support.

Understanding faculty perceptions of HIL can enable improved planning and advancement of HIL activities within departments of agricultural education. Administrators must provide support, assistance, and incentives for faculty to engage in HIL activities so that obstacles are overcome and "meaningful, engaged learning in all environments" as shared by the American Association for Agricultural Education's 2011-2015 Research Priority areas can be achieved. Departments of agricultural education can use findings from this study as a guide to encourage continued implementation of HIL. We argue that agricultural education has always strived to be a very application-based field; thus, HIL is not a new approach. The goal of this study was to document HIL use in departments of agricultural education and articulate faculty perceptions of benefits and barriers to HIL. Additional research is recommended that assesses subjective norms and perceived behavioral control as predictors of intention to conduct HIL experiences.

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A Qualitative Examination of Success Factors for Tenure-Track Women Faculty in Postsecondary Agricultural Education

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Abstract

With the growing need for agricultural institutions to provide solutions to global concerns, environmental issues, food security and sustainable agriculture, competent individuals are needed to lead in excellence and innovation. The role of gender in determining success in the workplace has been studied from many perspectives. The purpose of this qualitative study was to document success strategies of women agricultural education faculty in postsecondary education, synthesize these strategies into meaningful and useful suggestions, and review these strategies using the framework of the Theory of Work Adjustment. Data analysis involving a seven step process allowed confirmation of meaning and ensured that all concepts presented were included and accurately represented. The synthesized summary of success factors identified three overarching themes: change is inevitable, reflect and prepare, and time management. The remaining themes were grouped into four primary areas: (a) workplace awareness and expectations, (b) proactive strategies to facilitate success, (c) critical internal actions, and (d) critical external actions. Each of these four areas was further divided into context groupings that included foundation, individual, cooperation, and balance. The findings of this qualitative study are not generalizable, but results can be transferrable and have utility in this manner.

Introduction

With the growing need for agricultural institutions to provide solutions to global concerns, environmental issues, food security and sustainable agriculture, competent individuals are needed to lead in excellence and innovation. With a reported 45% female participation in FFA chapters studied (Lawrence, Rayfield, Moore, & Outley, 2013), a reported “increasing number of female teachers nationwide entering the profession” (Sorensen & McKim, 2014, p.126), and a reported 57.2% female enrollment in undergraduate studies in a College of Agriculture at a large land grant institution (Texas A&M University, 2014), it is critical that woman faculty role models exist. Priority One of the National Research Agenda for Agricultural Education (Doerfert, 2011) calls for the preparation of a scientific and professional workforce that addresses the challenges of the 21st century. In order to prepare this workforce, diverse faculty in departments of higher education, including women, must be retained.

An abundance of research has been conducted that focuses on understanding secondary agricultural education teacher retention and job satisfaction (Clark, Kelsey, & Brown, 2014; Tippens, Ricketts, Morgan, Navarro, & Flanders, 2013; Sorensen & McKim, 2014). Clark, et al., (2014) found that successful career teachers “balanced work, family, and community life, reduced known, stressors, and found satisfaction that led to long-term engagement in the profession" (p. 43). Tippens, et al., (2013) reported that females were more likely to leave the profession earlier and had slightly lower job satisfaction. Sorensen and McKim (2014) reported that improved work life balance yielded increased job satisfaction and commitment to the profession. While these findings provide a good foundation for understanding retention and job satisfaction within secondary agricultural education, they do not address the population of university agricultural education faculty.

According to the American Council on Education (2011), the retention of women in tenure-track positions and advancement to full professor as compared to men is low. For faculty starting out in tenure-track positions, the numbers are about even in terms of men and women. However, the number of associate professors quickly drops to only about 42% for women. Within doctoral institutions, women comprise 29.1% of tenure track positions and men comprise 55.8 % of tenure track position. The remaining faculty come from non-tenure track positions. There is a need to examine retention factors which impact female faculty advancement to tenure.

Furthermore, there is a need to understand what impacts the success of women in academic leadership positions in nontraditional career fields such as agricultural education so that there are women capable and qualified to fill important leadership roles in postsecondary institutions for the discipline. Currently, there are few women positioned to take on critical leadership roles in colleges and universities (Airini et al., 2011; The White House Project, 2009). Postsecondary institutions face the challenge of finding qualified and effective leaders who can lead their college or university and take on other leadership positions (Rubin, 2004). One reason given for the lack of prepared leaders is that there are fewer women qualified and positioned to take on these critical roles like provost, vice president, dean, director, and department head (Airini et al., 2011; The White House Project, 2009). Because tenure is often a prerequisite for advancing to leadership positions, many women are at a disadvantage for being considered for these positions (Lennon, Spotts, & Mitchell, 2012). In a study to understand faculty intent to lead within a land grant system, Lamm, Lamm, and Strickland (2013) reported that control over time to develop leadership skills "was the only significant predictor of intent" (p. 92).

The role of gender in determining success in the workplace has been studied from many perspectives. The journey that women take to achieve career success is different than men due to many factors (Nicholson & West, 1988). Melamed (1996) reports that in order for women to progress to higher levels they have to rely on their merits and show that they have the required skills, abilities and qualifications to be successful at their job. Similarly, the factors of education level and work experience are more likely to benefit women in enhancing their credibility and credentials than men. This is also articulated within the secondary agricultural education environment in which female agricultural educators reported having to "prove their ability" (p. 17), deal with stereotyping, and handle the high stress environment (Baxter, Stephens, & Thayer-Bacon, 2011). Regarding individuals working in tenure-track careers in academia, it has been shown that men have historically been more successful than women in terms of salary, promotion, and prestige of the particular institution employing them (Manchester, Leslie, & Kramer, 2010).

Gender discrepancies in academia have been highlighted in recent literature. According to The White House Project (2009, p. 10), women make up 57% of all college students but only

26% of full professors, 23% of university presidents, and women account for less than 30% of college and university board members. The average percentage of women leaders in academia is 24.53% whereas the average percentage of men is 64.7%. In addition, female faculty have not made much progress in closing the salary gap with their male peers. According to Lennon, et al., (2012), women earn close to 20% less than their male counterparts at four-year institutions. An examination of research productivity in the *Journal of Agricultural Education*, revealed no females as productive faculty (Harder, Goff, & Roberts, 2008) during the time period of 1996-2005. However, attainment of leadership positions by women in colleges and universities is about more than just the numbers; successful women leaders work with students, and through positive experiences with them, perspectives toward women in leadership positions have the potential to change. Successful women also serve as role models to younger women who aspire to the path of leadership (Lennon et al., 2012).

Airini et al. (2011) found five themes to describe factors that help or hinder the advancement of women in university settings: work relationships, university environment, invisible rules, proactivity, and personal circumstance (p. 59). Other influences identified as leading to success for women seeking leadership roles in academia include strong family upbringing (Astin & Leland, 1991; Cubillo & Brown, 2003; Hennig & Jardim, 1977; Madsen, 2007), excellent mentoring (Madsen, 2007), and spousal support (Woo, 1985). In the specific discipline of agriculture, six women deans in colleges of agriculture were interviewed to describe their personal journeys to becoming deans of agriculture (Kleihauer, Stephens, & Hart, 2012). This study found that women who became deans had the following in common: (a) first born children, (b) influenced by qualities of their parents and had spousal support, and (c) had mentors who recognized their gifts and talents and encouraged them to seek out leadership positions (Kleihauer et al., 2012). To increase the number of women in academia who are positioned for leadership roles in colleges and universities, it is imperative that factors which enable women to achieve tenure and job success be examined.

Theoretical Framework

The Theory of Work Adjustment (Bretz & Judge, 1994; Dawis & Lofquist, 1984) guided our study by providing a framework for examining factors which lead to the success of women faculty in departments of agricultural education in a university setting. This theory is based on the concept of "the interaction between the work personality and the work environment" (Rounds, Dawis, & Lofquist, 1987, p. 298). Each is depicted as impacting the other and level of satisfaction is a result of this interaction.

Individuals who were selected to participate in this research were female faculty members in agricultural education at the post-secondary level who were successful in gaining tenure and recognition within a university setting, and were in leadership positions at their university. Achieving tenure is the first step for female faculty to be in positions for leadership roles within colleges and universities. Job tenure is the most basic indicator of job satisfaction because it represents the state in which both the individual and the work environment find each other to be acceptable and thus "fit"; the Theory of Work Adjustment suggests a relationship between person-environment fit, job satisfaction, and tenure (Bretz & Judge, 1994; Dawis & Lofquist, 1984). The factor of person-environment fit describes the attribute that those who fit the organization are more than likely attracted to the organization, are favorably evaluated by the organizational members, and display greater work motivation and perform better than those who do not have a good fit. Person-environment fit also suggests that those who fit the organizational environment will be more successful over time than those who are not a good fit (Bretz & Judge, 1994). Consequently, the reinforcements of fit can even constrain the behavior of individuals to match those of what the organization desires. Thus, those who fit are more likely to stay longer, experience greater job satisfaction, and end up with more career success (Bretz & Judge, 1994). Job satisfaction refers to the “individual worker’s subjective evaluation of the degree to which his or her requirements are met by the work environment” (Bretz & Judge, 1994, p. 32).

By examining the success strategies of women agricultural education faculty, we can begin to assess those factors which allow female faculty to achieve fit with their institution and discipline, lead to greater job satisfaction and tenure at their job, and ultimately help female faculty in agricultural education be more successful and positioned for leadership roles at colleges and universities. This study did not test the Theory of Work Adjustment; instead it sought to contextualize this theory for female faculty in agricultural education by providing insight into factors that would enhance their ability to “fit” with their organization or department, be successful in achieving tenure and promotion, and even lead to greater career success such as leadership positions at their university.

Purpose and Methodology

The purpose of this qualitative study was to document success strategies of women agricultural education faculty in postsecondary education, synthesize these strategies into meaningful and useful suggestions, and review these strategies using the framework of the Theory of Work Adjustment.

The design for this study was a qualitative content analysis. Through content analysis, researchers are able to study indirect human behavior through analysis of communications (Fraenkel, Wallen, & Huyn, 2012). This study examined the presentations of six women faculty in agricultural education who shared key success strategies for women in tenure-track positions in postsecondary agricultural education. These women were selected to participate in the presentation series because they met the following criteria: (a) rank of full professor, and (b) involved in academia (either in agricultural education or had advanced to a higher leadership position at their institution). The presentations occurred over the course of one academic year and were shared with participants at one academic institution through a speaker series which involved a lunch and Skype format for the presentation. Each of the individuals presented a one-hour session covering best practices and top ten things to remember in regard to success for tenure-track females within agricultural education in higher education. The title of each presentation varied but the overall goal was to provide recommendations and guidance for success in higher education. Presentation material was summarized into a one-page handout for each session. The participants agreed to have their presentations recorded for purposes of this research. Institutional Review Board approval was received to conduct research using data collected and to follow-up with presenters.

Data analyzed as a part of the study included PowerPoint slides, presentation handouts, notes taken during the live session, and notes taken during a detailed review of the recorded presentation. Each set of top ten recommendations along with individual notes were coded with the letters A-E (a random letter representing each of the six presenters) to maintain confidentiality. Data analysis followed the ethnographic content analysis (ECA) approach (Bryman, 2012). "ECA follows a recursive and reflexive movement between concept development-sampling-data, collection-data, coding-data, and analysis-interpretation" (Bryman, 2012, p. 559). The data were unitized, compared and integrated into units to investigate emergent themes, categorized, and reported as themes and constructs. Data analysis involving a seven step process allowed confirmation of meaning and ensured that all concepts presented were included and accurately represented.

Step one involved each presentation handout being coded with each item listed coded to match the presenter. Notes taken during the live session were also coded and items from handouts and notes were sorted into categories to result in a one page summary that included nine primary areas. This analysis resulted in the following nine categories: honesty, time, networking, being in the right place, training/learning, offering help, asking for help, personal life, and professional behavior.

The second step involved two researchers who had not attended the live sessions watching each of the recorded sessions and recording detailed notes. The six presentations were reviewed over a six week time period. The two researchers compared notes following the viewing of each presentation. Categories emerged as statements were grouped according to their representative themes based on topic/areas mentioned. Combined research notes from the two researchers resulted in a one-page summary for each presenter and were coded with the same codes as the initial data analysis to ensure that all comments could be associated with the correct presenter.

Categories that resulted from step one and step two were compared during step three. This comparison revealed items to be combined or separated. The original nine categories transformed into 23 categories. Each of the 23 categories consisted of multiple supporting statements that were coded based on the presenter.

Step four required a peer debriefing that was held by a team of three researchers (i.e., the researcher who had coded the live sessions and handouts, and the two researchers who had coded the recorded sessions) to review the resulting summary (Peer Debriefing Document #1) to determine themes and constructs. These themes were organized into an initial framework which consisted of three prominent themes that emerged from the data and indicated actions within the participants' control: (a) Workplace Awareness and Expectations, (b) Proactive Strategies to Facilitate Success, and (c) Critical Internal Actions. Two overarching categories were identified: "Change is Inevitable, Reflect and Prepare," and "Time Management."

The initial framework was re-visited in light of the literature and additional modifications were made in the arrangement of themes and constructs for step five. The three researchers worked together to verify understanding and accurately categorize all statements. The concepts (which had been typed and categorized) were cut apart and rearranged on a large table to enable free movement of all items. Once arranged by order and category, these items were taped to a large sheet of paper. The framework was analyzed for consistency and care was taken to ensure that concepts were not duplicated and that all items listed were supported by comments/statements of the presenters. Each theme/concept was noted with the codes of the presenter associated with that item. This analysis resulted in Peer Debriefing Document #2.

During step six a debriefing session was held with a fourth researcher who had not been involved in the initial data analysis but had attended the live sessions to confirm the categories. This review allowed confirmation of categories. Minor adjustments were made to increase accuracy and understanding of the resulting framework. A summary table of major findings along with a one-page explanation of the table resulted from this analysis.

The final step, step seven, involved the summary table and table explanation being submitted for review to the six presenters to check for accuracy. Feedback was received from three presenters within two weeks and minor edits and additions were incorporated into the table. The updated table was sent out to the remaining three presenters for review and two presenters responded with minor edits.

The trustworthiness of this study was established through Lincoln and Guba's (1985) concepts of credibility, transferability, dependability, and confirmability. Credibility was established through peer debriefing sessions and follow-up with presenters (Lincoln & Guba, 1985); transferability was established through the use of purposive sampling and participant quotes throughout the findings of the study (Erlandson, Harris, Skipper, & Allen, 1993); and dependability and confirmability were established through the use of audit trails, peer audits, and researcher-kept reflexive journals (Lincoln & Guba, 1985). Participants were provided the themes which emerged and given the opportunity to provide feedback to the researchers to ensure the information correctly reflected their intentions.

The researchers were the primary instruments for collecting data in this study, which is a characteristic of qualitative research (Merriam, 2009). While this should be acknowledged as a potential source of bias in the study, careful attention was made to ensure the data accurately reflected the participants' intentions. To control for bias, the data was coded and analyzed by two researchers who were not tenure-track faculty and did not attend the live presentations as well as the other researcher. Peshkin (1988) noted researchers' subjectivities can be the underlying factor for distinctiveness of the research and "one that results from the unique configuration of their personal qualities joined to the data they have collected" (p. 18).

Results

The results are best presented in the form of a summary table in an effort to provide clear and easy to interpret themes. Table 1 provides the synthesized summary of success factors shared by respondents in regard to tenure-track women faculty in postsecondary agricultural education.

Table 1

A Synthesized Summary of Success Factors for Tenure-Track Women Faculty in Agricultural Education in Higher Education based upon Six Presentations by Successful Women Faculty

Overarching Themes:

Change (A,F); **Reflection** (A,B,F); **Time Management** (B,C,D,E)

	Workplace Awareness and Expectations	**Proactive Strategies to Facilitate Success**	**Key Internal Actions**	**Key External Actions**
Foundation	Avoid office politics (C,D) Know workplace culture (B,C,F)	Be an expert (C) Network and build relationships (A,B,D,E,F)	Maintain integrity (A,B,D) Be a good citizen (B,D,F)	Communicate effectively while recognizing office dynamics (A,B,C,F)
Individual	Understand expectations (B,C,D,E) Gather feedback (A,B,C,D)	Seek and apply for grants (A,B,C,D,E,F) Use grants to generate journal articles (C) Join professional associations to continue learning (A,B,C,D,E,F) Find a mentor and be a mentor (B,C,D,F) Take initiative for recognition (B,C,D,F)	Know yourself and improve (A,B,D,F) Incorporate your passion with research (B,C,D,F) Practice scholarship (B,E) Enjoy your job (B,F)	Present yourself in a professional manner (A,C)

			Serve on committees (A,C,F)	
Cooperation		Maintain collegiality (B2)	Collaborate with others (A,B,C,D,E,F) Know your external constituents (B2) Offer and receive help (A,B,C,D,E,F)	Know what you can contribute (B,D,F)
Balance		Avoid over commitment (B,C,D)	Commit to the appropriate activities (B2)	Maintain personal time (A,B,C,D,F)

Note. Columns represent "Primary Themes Identified"; Rows represent "Context"; Letters (A,B,C,D,E,F) represent codes for each respondent.

Description of Themes

There were three overarching themes that emerged: change is inevitable (A, F), reflect and prepare (A, B, F), and time management (B, C, D, E). Each of these items was mentioned multiple times in the context of impacting overall success. As noted by respondents, "prepare yourself for change" (F), "reflect on where you are now and where you want to be" (D), and "organize your time by hours and days" (E).

The remaining themes were grouped into four primary areas (represented by columns): (a) workplace awareness and expectations, (b) proactive strategies to facilitate success, (c) critical internal actions, and (d) critical external actions. A close examination of the items in each of the four areas revealed overlapping concepts or similarities across the columns. We found that there were four words that could describe the context of these categories (represented by rows): foundation, individual, cooperation, and balance. Foundation relates to the context of the basic building blocks in an environment. Individual relates to the context of specific items relevant to you; these items could be different for each person and relates to individual choice. Cooperation relates to the context specifically related to those actions that deal with interaction with people. Balance encompasses aspects that impact quality of life and productivity at the individual level.

Workplace Awareness and Expectations

Workplace awareness and expectations relate to the position and institution where one is employed. Awareness and acceptance of aspects that come with the position is critical. Some situations already exist and some will evolve. Themes in this area included office politics, workplace culture, understanding expectations, gathering feedback, collegiality, and avoiding over commitment. As noted by respondents, "don't get involved in office politics" (C) and know department and university/college culture" (B). Further, the importance of knowing expectations (B, C, D) and gathering feedback (A, B, C, D) was stressed. As one respondent stated, "Get 360 degree feedback early and often" (C). The significance to "seek balance in your job" (B) and avoid being over committed (B, C, D) was expressed as important for allowing you to have "time for creativity" (C).

Proactive Strategies to Facilitate Success

Proactive strategies to facilitate success focused on areas related to becoming an expert, building a network, taking initiative, and collaborating with others. Each of these items relate to other people. In order to succeed and thrive, you cannot do this by yourself – you need to be proactive in building relationships and your individual decision of engagement will impact your success. Communication and cooperation with others in your field, university, college, department, and unit are critical. Respondents provided guidance that included to "become a content expert and know your science" (C), "engage with colleagues in the professional community" (F), "create a good reputation" (B), and introduce yourself to people" (A). "Work relationships" (A, B, D, E) were indicated as a critical component of success.

Items specifically related to activities at the individual level included the application for grants, participation in professional associations, identifying a mentor, taking initiative for recognition, and serving on committees. All respondents indicated the importance of applying for grants. However, specific advice included "use a team approach to obtain grant funding" (A), "serve on grant review panels" (D), and "apply for big and small grants" (F). As one respondent stated, "grant seeking will naturally lead to more journal articles" (C). Involvement in professional associations was encouraged by all respondents. Specific advice included, "use associations to stay updated on your field" (F), "attend professional development seminars to improve skills" (D), and use associations to "continue to learn" (A). An encouragement to engage in a mentorship process was not limited to "find[ing] a mentor" (F, D) but also extended to serving as a mentor (C, F). As one respondent stated, you will be able to "learn from others experiences" (B). The importance of taking initiative for recognition was articulated by respondents as a critical step. "Do not be humble about achievements" (D), "apply for awards" (B) and "keep good records" (D). Finally, "serv[ing] on committees" (A, C, F) was articulated as an important aspect of success because it allows others to know you.

Collaboration with others was noted by all respondents as a critical aspect of facilitating success. It was noted that collaboration should take place "across different colleges, universities, and departments" (C). "Being a team player" (B), "clear communication" (A), and "get[ting] different perspectives and opinions from others" (B) can encourage success. Offering and receiving help was also noted as critical by all respondents. It was noted that it was critical to "get different perspectives and opinions from others" (B), "accept complements" (A), and "offer help to others" (F).

Critical Internal Actions

Critical internal actions relate to self-awareness and being true to yourself. You need to uphold elements of good character. Success also encompasses the individual person being successful in their personal life. These are a part of you and may be more difficult to change/control. Multiple respondents indicated the importance of maintaining integrity (A, B, D). "Don't undermine your credibility" (A) and "do what you say you will" (B). The importance of "be[ing] a good citizen" (B, D) was also expressed as critical. The areas of internal actions also related to knowing yourself and improving. "Know your strengths and weaknesses" (B, C) and identify what you can improve upon (A, F). "Passion" (B, C) was a word used by respondents to articulate the need for individuals to match their interests with their research, teaching, and service. "Passion helps you stay motivated" (C). You need to "find the right fit" (F) and "play to your strengths" (C). Caution was shared in regard to focus on teaching (B, E). "Don't focus all of your energy on teaching, learn to be a scholar" (E). Respondents also encouraged individuals to "do what you like and like what you do" (F). Enjoyment and fun was expressed as critical for true success. Finally, the concepts of knowing what you can contribute (B, D) and how to maintain work-life balance were also expressed as critical internal actions. You need to "make a valuable contribution to your university" (B) but "work doesn't define you, you define work" (A). The importance of maintaining personal time was articulated by multiple respondents (A, B, C, D, F). As one respondent stated, "we are doing a disservice to society by not having time to be creative" (C).

Critical External Actions

Critical external actions relate to how you handle yourself (i.e., dress, voice, manners, and behaviors). You can change or alter these aspects. Respondents expressed the importance of clear communication. As one respondent stated, "do not ruminate around men with power" (C). Effective communication involves that we "avoid negativity" (F), "be approachable" (A), "spread optimism" (F), and "develop credibility" (B). This can be further enhanced through presenting ourselves in a professional manner. "Be mindful of dress" (C), "speak in an authoritative tone" (C), and "look the part in presence, dress, and speech" (A).

Review of Themes Using the Theory of Work Adjustment

The Theory of Work Adjustment (TWA) (Bretz & Judge, 1994; Dawis & Lofquist, 1984) provides a lens through which to look at the summarized themes collected in the study. TWA suggests potential for interaction among person-environment fit, job satisfaction, and tenure. Given that study participants were purposefully selected due to their success within academia, tenure within the job environment is a given. Each of these individuals has multiple years of employment at their respective institutions. Thus, the strategies documented in Table 1 are based on that success. The TWA factor of "person-environment fit" can be seen specifically in items listed under the category of "Workplace Awareness and Expectations" as well as across the contexts of “Foundation,” “Individual,” and “Cooperation,” while the factor of “job satisfaction” can be seen under the category of “Key Internal Actions” and across the context of “Balance.”

Conclusions

The findings of this qualitative study are not generalizable, but results can be transferrable and have utility in this manner. Based on findings, it was concluded that individuals can proactively control their success in their careers through actions outlined in the data or reactively respond to situations outside of their control. These findings are consistent with research studies related to what women must do to achieve advancement within their careers (Kleihauer et al., 2012; Melamed, 1996).

Given that the TWA elements can be seen within the summary of success themes documented, we concluded that the themes documented have the potential to impact the outcome of interaction within one’s work environment. The suggestion of a relationship between person-environment fit, job satisfaction, and tenure as noted by the theory of work adjustment (Bretz & Judge, 1994) is supported by these findings. Respondents specifically noted the need for individuals to find their fit within the organization. The concept of job satisfaction was also noted through the concepts of enjoyment and passion. In fact, given that study participants had achieved success in their field and also displayed high job satisfaction, we concluded that the strategies they provided could assist other female faculty in achieving success and job satisfaction.

The themes identified by Airini et al. (2011) (i.e., work relationships, university environment, invisible rules, proactivity, and personal circumstance) regarding the advancement of women are supported by this study. Findings articulate the importance of building strong work relationships and understanding workplace culture. The concept of proactivity is strongly supported through specific comments made by respondents in regard to taking initiative and serving in specific roles such as serving on committees. Just as Madsen (2007) noted the importance of mentoring, respondents from this study also emphasized the value that mentoring plays in success for women faculty. It was concluded that this study supports the findings of Airini et al. (2011) and Madsen (2007).

Spousal support (Woo, 1985) and family upbringing (Astin & Leland, 1991; Cubillo & Brown, 2003; Hennig & Jardim, 1977; Madsen, 2007) were not mentioned by the respondents in this study. It is possible that the absence of these items relate to the focus of the study which was to document success strategies. Given that both spousal support and family upbringing are not items that one would have control over, it is possible that respondents did not see these items as relevant.

Discussion and Recommendations

Given the female enrollment in both secondary (Lawrence et al., 2013) and post-secondary (Texas A&M University, 2014) agricultural education, it is critical that women faculty in higher education emerge as role models for these students. Success strategies shared revealed realistic and practical advice that could benefit the profession of agricultural education by retaining faculty who can provide excellence and consistency in building a scientific and professional workforce (Doerfert, 2011).

Given that the identified strategies could be categorized into the areas of "foundation," "individual," "cooperation," and "balance," this speaks to the fact that these strategies work well within certain contexts/frameworks. In other words, the strategies are not a list of "to-dos" but rather "guidelines for success" for women faculty according to where you are within the organization and your career. Further research is needed to clearly identify these strategies with phases along one's career path.

Female tenure-track faculty within agricultural education at the postsecondary level were the focus of this study. Therefore, individuals with these characteristics are the primary beneficiaries of the conclusions of this study. The identification of the overarching themes of "change is inevitable," "reflect and prepare," and "time management" offer clear advice and guidance for these individuals. It is recommended that the strategies shared be carefully considered especially by those early in their career.

While this study was intended to target female tenure-track faculty in agricultural education, it is believed that the strategies identified are appropriate for all tenure-track faculty as they are adaptable and articulate clear advice for advancing in one's career. It is recommended that this information be shared broadly with faculty in agricultural education and case studies be conducted to document successful implementation of these strategies to provide a clear picture of implementation. It is believed that knowing a strategy is much different than implementing one. This qualitative study adds to the body of research related to the advancement of women in university settings.

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Motivations to Study Abroad: A Case Study of the College of Agricultural and Life Sciences Agribusiness Short-Term Study Abroad Program

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Abstract

The purpose of this study was to gain a better understanding of the participants' motivations and their perceived importance related to a short-term study abroad experience. This was an observational case study of the North Carolina State University College of Agricultural and Life Sciences Agribusiness Short-Term Study Abroad Program with the 2014 program student participants. The study explored student participants' motivations to participate in a short-term study abroad program and tried to gain understanding of the participants' perceived importance of international experiences. The researchers found students were motivated to participate in a short-term study abroad program because of the short-term length aspect, the completion of course credits, and encouragement from other people, both other students and faculty. The participants viewed short-term international experiences as an opportunity to experience culture, gain an advantage in their future career fields, learn additional content knowledge, acquire new experiences, and participate in new social opportunities.

Introduction

Our society is developing an increasingly international focus, requiring people within the university to globalize in order to stay current (Nehrt, 1993). According to many scholars, globalizing undergraduate education programs is gaining importance (Bruening & Frick, 2004) and all undergraduate students need to have a strong international experience before they graduate (NASULGC, 1997). In order to improve student success and enhance student engagement, Kuh (2008) stated universities must, "make it possible for every single student to participate in at least two high-impact activities during his or her undergraduate program, one in the first year, and one taken later in relation to the major field" (p. 21). One high-impact educational activity Kuh speaks of is diversity/global learning.

The main goal of international education is to produce graduates with global perspectives (Pickert, 1992). One component of international education is study abroad (Tritz & Martin, 1997). Brooks, Frick, and Bruening (2006) suggested colleges of agriculture should consider the importance of study abroad and consider making it a mandatory experience for all students. Studying abroad is the best way for undergraduate students to gain international perspectives in agricultural studies programs (Brooks et al., 2006). Briers, Shinn and Nguyen (2010) stated faculty should be focused on creating and organizing experiences to provide global opportunities.

Briers et al. (2010) found students are most motivated to participate in an international experience based on how much the international experience will contribute to their overall life experience. Having the opportunity to live in another country or culture was also a motivating factor for students. Furthermore, students were motivated to study abroad since international experiences look attractive on resumes (Briers et al., 2010). Jarvis and Peel (2008) completed a study inquiring about students' motivations to study in another country. The top motivations revealed were: the wish to broaden their awareness of the world, the desire to travel and study in another country for a long time, the wish to meet new people, and the desire to experience another culture (2008). Other motivations included: studying abroad seemed like a challenging experience, they wanted a change from their everyday home life, they heard positive comments from friends about studying abroad, and lastly they viewed it as a way to enhance their career opportunities (2008).

International experiences help students understand other cultures while widening their worldview by showing them their previous perceptions and understanding of other countries and cultures were narrow (Bruening & Frick, 2004; Zhai & Scheer, 2002). Participants in a study by Kasravi (2009) recognized several benefits including personal development, a better self knowledge and understanding, flexibility, cultural knowledge, international knowledge, motivation, and career development. Kitsantas (2004) noted studying abroad enhanced cross-cultural skills, helped the participants become more proficient in subject matter, and improved their socializing skills. Banks (2001) stated students gain multicultural citizenship by participating in study abroad programs, international exchanges, or courses which allow direct contact with foreign nationals.

Another recognized benefit includes increased employment opportunities. When students enter their careers with a global view, global perspectives and knowledge of other cultures, students have an advantage over ones who do not have this experience and knowledge (McGowan, 2007). Briers et al. (2010) show studying abroad improves competiveness in the global market. According to Bruening and Shao (2005), one in six U.S. jobs are connected directly with international trade. Large companies that work with other countries value and look to hire culturally diverse employees with language skills (Acker & Scanes, 1998). Almost all jobs in the future will require or benefit from employees that have a global understanding and awareness (Bikson, 1996).

Theoretical Framework

Theory of Planned Behavior

The theoretical framework guiding this study was informed by two theories, the Theory of Planned Behavior and the Two Factor Theory. The Theory of Planned Behavior (Ajzen, 1991) states a person's attitude toward a behavior, the subjective norm, and the perceived control of a behavior can lead to intentions which can then predict human behavior (Ajzen, 1991). Ajzen (2006) states as a rule for the theory, "the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behavior" (p. 1). In relation to this study, student behaviors about studying abroad, their subjective norms, and perceived control over the international experience can predict their intentions of studying abroad.

Herzberg's Motivational Theory

In Frederick Herzberg's Two Factor Theory, Herzberg noted two separate groups of factors that have a strong impact on motivation. These factors are usually related to satisfaction or dissatisfaction. Herzberg refers to hygiene factors as preventative methods to reduce the risk for dissatisfaction. If any factors such as poor pay, poor physical working conditions and poor interpersonal relations exist, then employees will likely have job dissatisfaction. Opposite of these hygiene factors are the motivational factors which can result in satisfaction and productivity. These motivational factors include things such as recognition, achievement, and growth. This growth Herzberg mentioned is when the employee is given an opportunity to gain a new experience that is interesting (Herzberg, 1959). Study abroad programs are new and interesting opportunities for students, which may motivate students and create internal satisfaction, ultimately increasing their productivity in their academic careers and future employment. According to the National Research Agenda for Agricultural Education, there is a need to examine meaningful learning in a variety of contexts and the contribution of engagement learning to achievement, life and career readiness, and professional success (Doerfert, 2011).

Purpose and Objectives

The purpose of this study was to gain a better understanding of the participants' motivations and their perceived importance related to a short-term study abroad experience. The findings from this research will provide valuable insight to utilize in the continued and future planning of study abroad programs. The specific research objectives were to:

1. Explore student participants' motivations to participate in a short-term study abroad program.
2. Understand the participants' perceived importance of international experiences to be gained.

Methods/Procedures

Population and Sample

North Carolina State University College of Agricultural and Life Sciences Agribusiness 2014 Short-Term Study Abroad Program in the United Kingdom was the focus of this study. This short-term study abroad program was started in 2011, with the desire to give students the opportunity to compare agribusiness techniques in the United States with the methods used in other countries, such as the United Kingdom, and with the desire to create more international opportunities for the faculty and students at North Carolina State University. Since the creation of the program, 90 undergraduate students have participated in the international experience.

This study used purposive sampling. The population for this study consisted of all of the student participants of the 2014 College of Agricultural and Life Sciences Agribusiness Short-Term Study Abroad Program to the United Kingdom (N = 24). A study was conducted with a final n = 23 as the accessible population. Each of the program participants were enrolled in the undergraduate North Carolina State University International Learning Experience course ARE 494 (Agricultural Economics) or AGI 194 (Agricultural Institute) and received three credit hours. In order to protect the rights and welfare of the human participants of this study, the Institutional Review Board (IRB) of North Carolina State University reviewed the protocol, consent form, questionnaires, and focus group questions for this study.

Data Collection

Due to the importance of the context related to this research study, combined with the unique nature of the study abroad program and participants, a case study method was selected. This descriptive qualitative study utilized observational case study research. A case study is considered a bounded system and is viewed as an object instead of a process (Stake, 1995; Creswell, 1998; Merriam, 1998). A benefit of case study research is that it allows researchers to preserve the significant and holistic characteristics of real-life experiences (Merriam, 1998; Yin, 2013).

During the first class meeting of the ARE 494/AGI 194 course during the spring 2014 semester, the students (n = 23) consented to participate in the study. On the same day, the participants completed the first written questionnaire in class, which was distributed by the researcher. This questionnaire required approximately 20 minutes to complete. Throughout the semester before their time abroad, students answered other short writing prompts during class. Two weeks prior to the students' international experience, focus groups were held. Focus groups allow for interactions in groups generating rich data and information about a specific phenomenon (Creswell, 2005; Morgan, 1997; Patton, 1990). Focus groups promote an environment allowing for discussion "designed to obtain perceptions on a defined area of interest in a permissive and non-threatening environment" (Krueger, 1988, p. 18).

The focus groups took place on-campus during the ARE 494/AGI 194 class time. The class was randomly divided into two groups, with one focus group having eleven participants and another having twelve, which followed Krueger's (1994) suggestion of having focus groups range from four to twelve participants per group in order to allow for participant discussion and proper management. One focus group was led by the researcher and one by the class professor. A second round of focus groups was held the week after the students returned from their travel. The second round of focus groups contained the same number of participants in each group but did not include all of the same students together in each one. This was done purposely to ensure there no was no bias within the group placements from the first round of focus groups and in hopes all participants would have a fair chance at participating in the focus group discussions. The researcher recorded the focus groups using voice recorders. The researcher and course professor also took notes to record the participants' statements. The voice recordings were saved onto the researcher's computer and were transcribed verbatim.

As a requirement of the ARE 494/AGI 194 course, the students maintained a journal about their experiences while abroad and their reflections upon return. Studies have proven journaling strengthens, deepens, and enhances student learning (Brockbank & McGill, 1998; Zhao, 2003; Gouldthorpe et al., 2012). The researcher also had access to the student participants' applications to the study abroad program. The researcher highlighted key points relating to the study objectives in the journals and applications and recorded them in an Excel file. The responses from the journals and applications were stored anonymously.

Instrumentation

The first instrument used for this study was a questionnaire administered at the beginning of the semester to the ARE 494/AGI 194 students during designated class time. This questionnaire was created by the researcher and designed specifically for this study and its participants. It contained twelve open-ended questions regarding the student participants' demographic information, professional goals, travel experiences, agricultural background, interest in studying abroad, and expectations of the study abroad program.

Throughout the following weeks of the semester, several preflective activities were facilitated to inquire about interest in studying abroad, interests in this specific program, and motivations for studying abroad. Preflection occurs a period of time before the international experience occurs (Jones & Bjelland, 2004). At the beginning of class every other week, students were asked to respond to one to three open-ended questions. These questions utilized both verbal and written formats.

Two weeks prior to the students' international experience, focus groups were held on-campus during the ARE 494/AGI 194 class time. The class was split into two groups; one focus group was led by the researcher and one by the class professor. The planned focus group questions were open-ended and related to their interests in studying abroad and their expectations. After returning from their time abroad, another round of in-class focus groups were held where students reflected on their experiences abroad.

Data Analysis

The responses to the open-ended questions were analyzed by a coding process. Based on the recommendations of Merriam (2009) the coding was broken down to categorize segments of data into broader themes. These themes assisted in making meaning and answering the research questions pertinent to the study. The researcher searched for common themes related to the participants' motivations for studying abroad and their perceived importance of study abroad. Subthemes were identified within the common themes in order to describe the findings in more detail.

Trustworthiness Criteria

Lincoln and Guba (1985) asserted qualitative research can be evaluated through credibility, transferability, dependability, and confirmability. Confirmability was addressed in this study by including excerpts of the raw data which illustrate the findings and conclusions. Confirmability and dependability were also met by the audit trail of the researcher, which included audio recordings, field notes, and questionnaire results, which were appropriate for improving the trustworthiness of the data (Dooley, 2007; Merriam, 2009).

Triangulation is a common method in qualitative research, which is the use of multiple methods of data collection to ensure the meaning of the data is clear and valid (Creswell & Miller, 2000). To increase the trustworthiness of the study, triangulation was used by having a variety of data collection methods: written questionnaires, oral questionnaires, focus groups, applications, and journal entries. Yin (2003) and Creswell (1998) view having multiple sources of evidence as the most crucial point for case study methodology because any finding in a case study that is based upon more than one source has higher credibility.

Results

Characteristics of the Population

The population of the 2014 North Carolina State University College of Agricultural and Life Sciences Agribusiness Short-Term Study Abroad Program was made up of 48% (n = 11) male student participants and 52% (n = 12) female student participants. Student participants ranged from ages 18 to 39 with a mean age of 21. All participants were enrolled in North Carolina State University as an undergraduate four-year student or as a North Carolina State University two-year student. Four of the student participants were enrolled in the Agricultural Institute seeking an Associate of Applied Science degree, three in the first year of their degree and one in their second year. The remaining students were enrolled as undergraduate students earning a Bachelor of Science degree and included four freshmen, five sophomores, eight juniors, and two seniors from the undergraduate program. A variety of majors were represented. The most common major was Agribusiness Management (n = 9). There were four Animal Science majors, three Poultry Science majors, two Livestock and Poultry Management majors, and one student in each of the following majors: Plant and Soil Science, Genetics, Agricultural Education, Agricultural Science, and Food Science.

Findings

Findings Related to Objective One

Objective one of this study was to explore student participants' motivations to participate in a short-term study abroad program. This exploration of their motivations was completed prior to the students' time abroad through preflective activities such as questionnaires, focus groups, and analysis of the participants' study abroad applications. The common themes that emerged included the short-term length aspect, completion of course credits, promotion through personal interactions, and experiences.

Theme One: A Short-Term Length Aspect

The first major theme to emerge from the participants' motivations to participate in a short-term study abroad program was the short-term length aspect of the program. Several subthemes emerged specific to the motivation from the short-term length. One of the subthemes mentioned described how the discovery of a ten day short-term program generated interest in studying abroad.

> I can honestly say that freshman year I made my mind up not to study abroad because I thought all of the programs were for a whole semester and I didn't like being gone that long. But, when I learned it was only ten days I got a little more accustomed to the idea and I thought that it would be fun to see another place in the world.

Another subtheme identified this particular study abroad experience as a foundation leading to future, long-term trips abroad. One participant stated, "Short-term programs have more structure. I am thinking about doing a long term study abroad program later but first I wanted to do this because there is a lot more structure in short-term programs."

The third subtheme noted was a lack of desire to stay away from home for a long period of time. Several students echoed the sentiment, "I do not [like] being away from home for long periods of time." Another student mentioned their time commitment associated with their duties at home, "Because of obligations I have back on the family farm I would be unable to go on a [study abroad trip for the] entire semester. This short trip works perfectly with my schedule."

The fourth subtheme observed was the perception of a diminished risk associated with short-term study abroad programs. The short duration of the experience contributed to these perceptions, evident in the following participant's statement, "I feel like there is less risk involved. I am kind of scared to leave somewhere for an entire semester and go somewhere new." Another supporting statement was, "Going somewhere for ten days isn't intimidating. If you get over there and didn't like it, it's only ten days till you're back at home."

Theme Two: Completion of Course Credits

The second theme that emerged when examining student participants' motivations to participate in a short-term study abroad program was the completion of course credits. An emerging subtheme was how the short-term study abroad program fit into their degree plan. Two students had similar responses of, "It's the only [study abroad program] available to me" and "It was the only [study abroad program] that my degree program would allow me to do."

Another subtheme emerged related to the timing of the program. Students noted they favored the program being offered over spring break through statements such as, "I like the fact that they are over spring break and you don't miss any classes that way" and "I chose this program in general because I like the fact that it is only in spring break. Normally I don't do anything in spring break but work so it is something fun to do."

Theme Three: Promotion through Personal Interactions

The third emerging theme was the importance of personal interactions in encouraging students to participate in the short-term study abroad program. Two types of interactions were deemed as important: student-to-student and student-to-faculty. The first subtheme under promotion through personal interactions was specific to the interactions between students. Many participants stated they chose to study abroad in this program because of comments from past participants. One student stated, "I had heard a lot of people that had went through the program in the past say it was the best experience and that they would go back right now if they could." Another student expanded "I'd heard about the trip from people that went in the past and they said it was great. I always wanted to go to Europe anyways so I figured this would be my best and only opportunity to go."

Some students noted the importance of faculty which motivated them to participate in the program, which is contributed to the development of the second subtheme. One student noted, "I was talking with my professor and he said I should go for it." Another student expanded,

> I chose to study abroad because of Dr. Campbell. I had first met Dr. Campbell in his Agricultural Law that he offered this fall. He has impressed upon all of us how very great an opportunity this trip is for us and how easily obtainable the costs are. I had never planned to study abroad for fear of the costs but he broke down the different ways that you may be funded and I was more at ease with the idea of paying for the trip. I have always wanted to see other areas of the world and now I am really excited that I am able to with my N.C. agricultural peers.

Theme Four: An Experiences Aspect

The fourth theme that emerged when examining the student participants' motivations to participate in a short-term study abroad program identified opportunities to engage in different experiences. One subtheme noted was travel and cultures. One student elaborated on travel through the statement, "Short-term study abroad allows a taste of a different country. It inspires but does not overwhelm the traveler." An additional comment was,

> I have chosen to study abroad because I come from a very small and rural community. I have grown up seeing people who have never even really been out of the state and I decided a while ago that I am not that type of person. I want to see the world even if it is just this one trip.

Another subtheme that emerged was that of content based experiences, such as agricultural or agribusiness experiences. One student offered the following response when asked about their motivations to participate in the short-term program:

> When I first came to N.C. State and heard about traveling abroad, I never saw myself as going that far away from my hometown in Johnston County. That all changed when I

found out about the amazing opportunities to visit and explore another place's agriculture. I also hope that I get a chance to learn something that I could bring back to my own farming operation that would be beneficial to our resources.

Findings Related to Objective Two

Objective two of this study was to understand the participants' perceived importance of international experiences to be gained. Common themes emerging from this objective were cultural appreciation, future employment, agricultural and agribusiness content knowledge, gaining new experiences, and social aspects.

<u>Theme One: Cultural Appreciation</u>

The first emerging theme related to the participants' perceived importance of international experiences was cultural appreciation. One participant said, "This [international experience] will allow me to be more open to cultures around the world as well as grow as a person and give me a better perspective on life." One student mentioned American culture when stating, "It will give an outlook on another culture and a group of people to compare to our own."

<u>Theme Two: Future Employment</u>

The second emerging theme was specific to future employment. The first subtheme was related to being more employable. One student stated, "I feel that it cultures me to a more globally connected student which makes me more employable." Another student said, "I feel like it will make me a well-rounded person, will be an experience not many people have had the opportunity to do and will give me an advantage in my work field."

Two other students mentioned the second subtheme, interview skills, when stating, "The experience will give me something to talk about in future interviews" and "I think any international experience will only help out careers in the future. I think companies will look highly to it and could help make for interview discussion."

A third subtheme, resume building, was also mentioned by participants in ways such as, "I believe this trip will improve my resume by allowing potential bosses [to] see that I am knowledgeable and diverse. This will also help my professional goals by giving me alternative ways of thinking when problem solving."

Some participants discussed contributions to future employment, which was identified as a fourth subtheme. One student stated, "This experience will give me stories to tell my future students while I am teaching."

<u>Theme Three: Content Knowledge</u>

Content knowledge was the third theme that developed specific to participants' perceived importance of international experiences. Agricultural knowledge was one commonly discussed subtheme. Some participants' comments indicated a hope to learn something agricultural related to bring back to North Carolina. For example, one participant explained "Looking at how agriculture is different here than the United Kingdom will be neat. By seeing their different methods and technologies maybe I can learn from that and I can bring that home and make my farming better" and another stated "It may be beneficial to view the efficiency of their agricultural practices and integrate some of their ideas into ours."

Other students discussed the acquisition of different viewpoints, like shown in this statement, "It allows me to see agriculture from a different viewpoint than the U.S., and will add to my food science education by seeing it from a European standpoint." Another student said,

> I hope to gain a wider view of agriculture there. A guest speaker we had in class said that here in the U.S. we have a higher percentage of people involved in farming so it will be interesting to learn about agriculture there because they have a different perspective of agriculture.

Another one stated, "I am interested in the production agriculture view. I am interested in looking at problems we have in North Carolina versus problems they have with crop issues and how the governments deal with them and the farmer support available."

Agricultural business content knowledge was the second related subtheme. Many students expected to learn more about agricultural business through their international experience, like the student who responded, "I expect to learn about international agricultural business, as well as culture and values that are prevalent in other countries." Two students wanted to learn about agribusiness strategies and procedures so they could compare them to the system in the United States, which was evident in their responses of, "I expect to learn more about business tactics used abroad so I can compare them to strategies here in the United States" and "I hope to gain a better understanding of agbusinesses and procedures in a foreign country and an ability to develop pros and cons of those practices compared to ours."

<u>Theme Four: Gaining New Experiences</u>

The chance to participate in new experiences was the fourth emerging subtheme. One student said, "It is a very different, hand-on experience that I do not feel could be duplicated in a classroom alone." Another student stated,

> I hope it will give me a different perspective. Here at N.C. State we are supposed to embrace diversity, but look at us. We here are all in agriculture and are mostly all from North Carolina. This is making us step out of our comfort zones to see a different culture and way of life. Most people do not get a chance like this. To have this opportunity is something we can really brag on N.C. State about.

Participants also made the following comments, "I think it diversifies my outlook. It also gives me experience in new places with new people" and "We may be exposed to more international travel later on and with it we can gain a different perspective, which will even help when working with people from across the country. It will give us different perspectives and respect."

<u>Theme Five: Social Aspects</u>

The social aspect of a study abroad experience was identified as a fifth theme. The statement, "I hope to gain friends, a new relationship with my advisor, and learn about history" is an example for what students expected to gain socially from an international experience. Students also reported, "I would like to gain a new experience studying with my peers" and "I hope to learn background and history for the host culture and to understand the daily life as lived by the people in the U.K."

Conclusions

Conclusions Based on Objective One

Students were attracted to this short-term study abroad program because of the length of the program. Students found the short duration of ten days appealing. This study abroad program was also seen as attractive since it was over spring break and students did not have to miss class. These findings supported prior research reported by Zhai and Scheer (2002) and Bruening and Frick (2004). Students that do not wish to stay away from home for an extended period of time considered short-term study abroad programs to be an ideal opportunity. Short-term study abroad programs are an attractive option for students who have too many obligations at home to leave home for a long period of time. Students were also motivated to participate in this short-term study abroad program because they viewed it as a chance to see if they might possibly enjoy a long-term stay abroad. Students viewed short-term study abroad programs having less risk than long-term study abroad programs because there was less time invested abroad and away from home.

Some students were encouraged to participate in this study abroad program through interactions with others. Several positive interactions, like the conversations held with peers who had previously participated in the program, served as a motivator for current students. This is similar to previous findings by Zhai and Scheer (2002). Past participants enjoyed their study abroad experience and shared that enjoyment with potential program participants, which is related to Herzberg's (1959) Two Factor Theory when discussing how personal growth leads to motivation and satisfaction. As stated in Ajzen's Theory of Planned Behavior, the more positive discussion of the program leads to a stronger desire to participate in the program (Ajzen, 2006). Professors also motivated students to participate in this short term study abroad program. This encouragement from the professors could be viewed as expectations from others, which would be considered a normative belief (Ajzen, 2006).

When agriculture majors at North Carolina State University are contemplating a study abroad program, there are not many options that help fulfill their degree requirements. Brooks, Frick, and Bruening (2006) discovered similar findings with other agriculture majors at a different institution. One reason participants were motivated in this particular study abroad program was the chance to complete course credits which are under the required category of General Education Global Knowledge courses. This program was the only study abroad option to help meet the curricular hour needs of students. Having a short-term program containing three hours of course credit was appealing to students, which is supported by Herzberg's Two Factor Theory (1959).

Conclusions Based on Objective Two

Students viewed short-term study abroad programs as an educational opportunity promoting cultural awareness, which Jarvis and Peel (2008) also reported. Participants viewed studying abroad as a better way to learn compared to in the classroom and reading in books, supporting research conducted by Tritz (1997). Students hoped to gain agricultural knowledge while abroad that they could apply back at home to improve their practices. Students saw study abroad as a tool that would make them more marketable in the industry and job market. Shinn et al. (2008) and Bruening and Frick (2004b) reported comparable findings. Like Jarvis and Peel

(2008) concluded, this study found students pictured study abroad as an opportunity to gain new friends. All of these views of perceived importance were seen as motivational factors according to Herzberg (1959).

Recommendations/Implications

Recommendations for Future Practice

With the noted importance of personal interaction, past program participants should be recruited to talk to potential student participants about the study abroad program as a way to influence and motivate more students to participate in the program. A study abroad peer presenters program should be formed in colleges of agriculture. All of the peer presenters could be utilized to promote study abroad opportunities through informational presentations to classes and students specifically in the college. This ambassador-type program will also provide the peer presenters with leadership and public speaking skills. Professors should also take the time to identify and encourage students who would be good candidates for a study abroad experience.

Universities need to encourage and provide opportunities in regards to course release or funding to encourage faculty to participate in global opportunities. Having faculty who support and encourage study abroad opportunities is important. Faculty in colleges of agriculture should become more involved in the study abroad opportunities, either through their own participation or encouraging students and/or advisees to seek out global programs.

More short-term study abroad programs with an emphasis on agriculture should be developed and offered. This Agribusiness Short-Term Study Abroad Program could serve as a model for these future study abroad programs. Since students placed importance on having a study abroad program relating to their majors and fields of study, the development of additional short-term study abroad programs should occur in colleges of agriculture.

As new programs are developed, faculty should be made aware of the various study abroad opportunities so promotion for degree-related short-term study abroad programs could occur through the departments within colleges of agriculture. Undergraduate coordinators play an important and active role in informing the faculty of their departments about the available agriculturally related study abroad opportunities and how they fit into students' degree plans. Undergraduate coordinators should also understand how to substitute courses from institutions abroad for required classes at their university.

Since participants noted the importance of fulfilling course credits, new degree-related short-term study abroad programs could be created to fit curricula within colleges of agriculture. Faculty advisors throughout colleges of agriculture should be given displays or brochures with detailed information about how their advisees can study abroad while fulfilling their degree-related required courses at the same time. Underclassmen, especially freshmen, should be informed early in their academic career about the short-term study abroad options available so they can plan in advance for future study abroad programs. Additionally, participants noted possible interest in participating in a longer-term study abroad program in the future. Some younger students may have a similar interest. By becoming aware of the different options for long-term and short-term study abroad programs, students could possibly have the chance to participate in both over the course of a college career. Participants also noted the ideal timing for this study abroad trip. As a result, short-term programs during spring break should be continued to be held because they reach students who cannot be away from home for an extended amount of time.

Recommendations for Research

A multitude of opportunities exist for future research. Pre-trip and post-trip focus groups should be held for the future short-term study abroad programs as a way to understand the participants' motivations, experiences, and perceived importance of the international experience. A five and ten year follow up study could be conducted with these same participants from this study to see how this short-term study abroad program influenced their remaining school experiences and career interests/goals. A similar study should be carried out with the future participants of this same program each year to see if the same motivations and expectations arise.

Additional research should be conducted to examine how location of an agriculturally related short-term study abroad program encourages or discourages student participation. Additional research could also involve comparable agricultural short-term study abroad programs at North Carolina State University to see if participants share similar motivations and expectations. A similar study could also be conducted with short-term programs offered through colleges of agriculture at other universities.

Students' motivations and perceived importance could also be examined during the completion of study abroad programs with different lengths and/or objectives. For example, research could be conducted with students who elect to participate in a long-term study abroad program or a program with a service-based focus. Finally, future research with business and industry would be important to assist in the development of competencies that are important to be gained during study abroad.

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Methods and Outcomes of Reflection in an Agricultural Leadership Program: A Constructivist Grounded Theory

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Abstract

The purpose of the study was to examine the methods and outcomes of reflection within an agricultural leadership program. Data were collected from participants of a two-year leadership development program to examine how participants reflected, what was reflected upon and the level of reflection achieved. Findings indicated that participants utilized reflection-on-action more than reflection-in-action in both individual and group reflections. In both individual and group reflections, participants reflected at the levels of introspection, content reflection and process reflection. Group reflections also showed evidence of premise reflection. Themes from experiences were similar among individual and group reflection with personal growth being an additional theme within group reflection. The study provided a constructivist grounded theory of reflection within agricultural leadership programs as well as recommendations for practice and research.

Introduction

Though agriculture remains an important stabilizing force of the economy, its place has changed dramatically in the past century (Dimitri, Effland & Conklin, 2005). Changes indicate that agriculture is a smaller player in national and rural economies, is becoming more broadly defined, and employs a smaller percentage of the labor force (Telg & Irani, 2012). As a result, "many people do not understand agriculture industries and how these industries impact people's everyday lives" (p. 3). In addition to the disconnect between producer and consumer, agricultural producers face numerous issues related to "commodity markets, regulatory requirements, changing demographics, agricultural illiteracy, natural resource depletion, and economic survival" (Kaufman, et al., 2010, p. 124). To confront the growing number of concerns, agriculture depends upon informed leadership to lead the industry in confronting today's issues (Wibberley, 2005). Businesses and communities alike have committed to facing the challenge of cultivating leadership qualities and skills in individuals to meet this task (Fredricks, 1998). In the 1960s, the W. K. Kellogg Foundation recognized the need for leadership in the industry, and the agricultural leadership program was cultivated (Miller, 1976).

Agricultural Leadership Programs (ALPs) were first established in 1965 in response to a growing need for leadership to bridge the gap between the industry and its consumer (Miller, 1976). Programs develop leaders for communities and industry (Kaufman & Carter, 2005) through skill development and issue awareness (Howell, et al., 1979). Though programs have been successfully implemented in over 40 states, provinces and countries (Lindquist, 2012), there has been a lack of published research on these programs (Kaufman & Rudd, 2006). Most research has examined program impacts at participant, community, and industry levels. Through multiple evaluation studies on ALPs (Abington-Cooper, 2005; Black, 2006; Carter & Rudd, 2000; Diem & Nikola, 2005; Dhanakumar, Rossing, & Campbell, 1996; Hejny, 2010; Kelsey & Wall, 2003;

Strickland, 2011; Whent & Leising, 1992), positive outcomes were indicated through participation; however, how programs achieved these outcomes was not determined. Experiential learning and reflection were used as a model for learning in ALPs (Strickland, 2011), but the processes guiding their use and overall effectiveness have not been assessed. By examining evidence of program effectiveness through approaches such as experiential learning and reflection, ALPs can understand and model successful practices. The purpose of this study was to examine the use of reflection within an ALP. Guided by the theories of experiential learning, reflection, constructivism and social constructionism, a constructivist grounded theory was proposed.

This study addressed two objectives of the National Research Agenda for Agricultural Education 2011-2015 (Doerfert, 2011). "Meaningful Engaged Learning in All Environments" is addressed by increasing understanding of teaching and learning processes and by examining the role of reflection processes in the context of adult learning in ALPs. "Vibrant, Resilient Communities" was also addressed as this study assessed the effectiveness of adult educational programs encouraging positive community change.

Theoretical Perspective

Zaleznik (1993) concluded that experience is the best teacher of leadership. In a synthesis of theories and models by Dewey, Joplin, and Kolb; Roberts (2006) proposed the Model of the Experiential Learning Process. As participants in the process of experiential learning, learners construct meaning from their experiences as they move through the three parts of the cycle: initial experience, reflection, and generalization. Strickland (2011) indicated the importance of outside influences and demographic variables on the experiential learning cycle. These are often brought forth in the reflective process of the cycle of learning. Reflection holds as much weight as the experience as reflection allows participants to develop an understanding of themselves and the experience (Roberts, 2006). Reflection is an important component of the leadership program experience (Van de Valk, 2010). It is recommended that program design should incorporate reflection as it allows for participants to learn from their experience and encourages lifelong learning though the practice of ongoing reflection.

Schön (1983) claimed that reflection is bound with action (Hatton & Smith, 1995). Both practices of reflection-in-action and reflection-on-action involve processes in making judgments and decisions on how to act or proceed on a problem or thought. Schön advocated for a model in professional education that equipped leaders to reflect in order to deal with complex problems and issues. Reflection-on-Action occurs when an individual reflects on an action that has already taken place. Reflection-in-Action takes place during the action.

In his study of reflection and transformative learning, Mezirow (1991) proposed six different stages of critical reflection: habitual action, thoughtful action, introspection, content reflection, process reflection, and premise reflection. In these six stages, differences are presented between reflective and non-reflective action, where non-reflective action seeks out theories, objects or explanations, and critical reflection occurs when one critiques what they perceive, think, judge and feel (Mezirow, 1991). Critically reflective learners are sensitive to why things are done in a certain way, values reflected in actions, discrepancies between what is being said and done, and the way influences of an organization shape outcomes (Marsick, 1988).

Theoretical perspectives of constructivism and social constructionism, both under the epistemology of constructionism, were utilized. Constructivism is "meaning making and constructing of social and psychological worlds within the individual through cognitive processes" (Young & Collin, 2004, p. 375). Learning occurs through a negotiation between the learner and their environment and meaning is based on the socially defined nature of knowledge obtained (Doolittle & Camp, 1999). In learning and the construction of knowledge, reality is an individual experience (Merriam & Caffarella, 1999). Constructivism aligns itself with social constructionism as knowledge is not discovered but is constructed or created (Denzin & Lincoln, 2000).

Though the definitions describing constructivism utilize the social world, meaning is made in the mind as opposed to social constructionism in which meaning is a product of social consensus. Social constructionism "emphasizes meaning making and knowledge production processes that are guided by conventions of language and different forms of socialization" (Puig, Koro-Ljungberg, & Echevarria-Doan, 2008, p. 140). Social constructionism focuses on the social aspect, as opposed to individual cognitive processes, and adds the dimensions of historical or sociocultural dynamics (Denzin & Lincoln, 2000). Social constructionism is interested in interactions and rhetorical processes. Individuals do not make sense of the world as single beings, but by engaging in a world of meaning (Crotty, 2010) and do not construct knowledge just on "their own interpretations in isolation but against a backdrop of shared understandings, practices, and languages" (Denzin & Lincoln, 2003, p. 197).

Purpose and Objectives of the Study

The purpose of this study was to develop a constructivist grounded theory through the exploration of how an agricultural leadership program utilizes reflection methods and to determine how specific reflection methods, at individual and group levels, influence the development of critical reflection. The objectives for this study were to: (1) Identify how program participants reflect on program experiences, (2) Determine the themes and concepts from program experiences that participants reflect upon and (3) Identify if, or to what extent, reflection methods utilized by the program lead to critical reflection by participants.

Methodology

Research Design

Constructivist Grounded Theory (Charmaz, 2006) was selected as the approach for this study. The theory emerged from symbolic interaction, which examines an individual in society and the individual's perceptions and actions (Annells, 1996). The individual and his or her perceptions do not exist until the person interacts with the world. Constructivist grounded theory is the most contemporary grounded theory approach as it contends that as the researcher collects data and reconstructs experience and meaning, reality is defined in the study. In her approach, Charmaz (2005) relies on using a constructionist epistemology to interpret data. Researchers seek meanings for not only what was said or written, but also question the values and beliefs that underlie the participant's statements. The interaction between the researcher and participants "produces the data, and therefore the meanings that the researcher observes and defines" (Charmaz, 1995, p. 35). As the researcher, I was the co-creator of knowledge and in that, the description of the situation and interaction effect how reflection activities were reported.

Context of the Study

In this study, one agricultural leadership program in a southern state was examined. The program was established to aid in the development of leaders in the states agriculture, food and natural resource industries (WLIANR, 2011). Its mission is to provide training and development to potential leaders within Florida's agriculture and natural resource industries and local communities. Issues discussed in the program fall into social, political, cultural, economic, and agricultural contexts and are examined and discussed on local, state, national and international levels. Program objectives include; preparing potential leaders to assume leadership roles; establishing networks; analyzing complex issues facing individuals in agriculture and natural resources; and developing interpersonal skills to foster understanding (WLIANR, 2011).

Purposeful sampling was used to identify participants who were members of Class VIII of the Wedgworth Leadership Institute for Agriculture and Natural Resources. Participants ($N = 30$) of the study consisted of 18 males and 12 females ranging from 26 to 52 years of age representing a cross section of the state's agriculture and natural resource industries (WLIANR, 2011). Upon class selection, participants attended eleven seminars over a two-year period to examine issues on local, state, national and international levels. Participants in the study were part of one class, which began in November 2010 and concluded in August 2012. As part of the structured curriculum, participants take part in reflection activities during each seminar. These activities were done at both individual and group levels.

Reflexivity

A reflexivity statement allows me to display my experiences that influence the lens I use to view ALPs. Throughout my career, I have worked with two ALPs and was tasked with program and curriculum design, recruitment and class selection. I also have taken opportunity to familiarize myself with other programs around the world.

While I realize full objectivity is impossible, I do not want to distort what the participants shared. Charmaz (2006) indicated that both researcher reflexivity and prior knowledge of the field influence the researcher. Therefore, the researcher is an instrument in data collection. I experienced the leadership development program alongside the participants so during memo-ing and analysis, I tried to separate myself from the data. Several months commenced between time of collection and transcription to increase my objectivity and decrease my familiarity with the data so I could examine it with fresh insights. With that, it cannot be negated that my experiences played a role in the analysis as during the data analysis I recalled my own construction of the experience.

Data Collection

Data collection began at the first seminar of the class experience following Institutional Review Board approval for the study. Data included participant and facilitator guided group reflections that were transcribed by the researcher, questionnaires on topics from specific seminars, letters and photo journals. Field notes also supplemented the data. Each instrument was designed by the researcher and a panel of experts at the University of Florida. For the purpose of design and analysis, data collection was grouped into the categories of group reflection and individual reflection to correspond with the two theoretical perspectives of constructivism (individual) and social constructionism (group). Both types of data were collected throughout the 11 seminars of the class curriculum. To preface the study, during seminar one, the researcher presented to the class the objectives of the research and asked consent to collect data for the study from each participant. Participants were also briefed on the practice of reflection and its underlying theory.

Data Analysis

Once data collection was complete individual and group reflections were coded independently. Each data source was coded using initial and focused coding procedures. Open coding commenced chronologically as each reflection activity was coded separately in the order in which they were collected. This played a role on how codes were formed. Through a constant comparative analysis, codes grew and evolved as each reflection transcription was added to the analysis. In-vivo codes were used to represent the statements of the participants. In initial coding, line-by-line coding was utilized. The categories that formed as a result of the focused codes were either classified as themes of reflection (objective two) or processes of reflection (objectives one and three). After initial coding, all data were reviewed to confirm saturation. Following coding, index systems were reviewed and models were created for the core analysis and reviewed by experts at the University of Florida. Outcomes were assessed to ensure saturation.

Following theoretical sampling, theoretical codes were developed. The development of the theoretical categories carried the weight of the analysis (Charmaz, 2006). Theoretical coding followed the focused coding process and by-passed the need for axial coding. Theoretical codes were introduced by Glaser (1998) and allowed researchers to conceptualize “how the substantive codes may relate to each other as hypotheses to be integrated into a theory” (p. 63). These codes specified relationships between the focused codes. Theoretical codes for this study were selected from the series of 26 coding families based on causes, strategy, assumptions, and basic psychological processes.

Building Quality into the Study

To achieve quality in the study, I employed Tracy’s (2010) eight “big-tent” criteria for a quality study; worthy topic, rich rigor, sincerity, resonance, significant contribution, ethics, meaningful coherence, and credibility. Topics can be influenced by previous literature and concepts or by societal events. As agricultural programs have been examined for individual and community level outcomes, a study in learning methods and particularly reflection is a worthy topic that is relevant and timely and significant in the research field of ALPs. The study can build on prior outcome studies and provide knowledge on how these outcomes can be achieved through learning methods. Rigor was established by using multiple theoretical constructs and through extensive time spent in the field and in data analysis. Sincerity was achieved through researcher reflexivity and through transparency throughout the collection and data analysis. Resonance was achieved through increasing reaction and understanding in the reader by using naturalistic generalizations and transferability of the study's findings. The study made a significant contribution to the field by contributing to the theory, method, practice and future research of experiential learning, adult learning, reflection, ALPs and adult leadership programming. I followed ethical procedures throughout data collection and analysis by staying true to participants' observations. Research that is gauged on its meaningful coherence is examined to insure ties between the research problem and theoretical framework. This was established through the researcher tying the proposed grounded theory to the data and to previous literature (Tracy, 2010).

The final measure for quality proposed by Tracy (2010) is credibility. Credibility is established through the trustworthiness of the study and dependability of its findings that was provided by thick description that gave context to each reported findings. Crystallization was chosen as a measure of credibility as it fits within the interpretive paradigm and social constructionism (Aguinaldo, 2004; Tracy, 2010). Crystallization was utilized through gathering data through various methods and frameworks to bring about truth of a larger picture. As data came together and surrounded a central theme, the quality of the research increased (Denzin & Lincoln, 2005). Through the use of field notes, data sources, and past research, multiple accounts of the same story were given.

Findings

Findings are broken down by the objectives of the study. Within objectives one and three, 225 initial codes within individual reflection and 206 initial codes within group reflections emerged from the data. Within objective two, 332 initial codes within individual reflection and 351 initial codes within the group reflection emerged from the data. To conclude the process, focused codes were placed into the proposed theoretical codes. Theoretical codes are introduced within theory construction.

For objective one, the researcher examined the use of reflection-in-action and reflection-on-action strategies offered by Schön (1983) to reflect on program experiences. Evidence of both reflection-in-action and reflection-on-action were discovered at both levels of reflection. The practice of reflection-in-action was not common in the data, but was evident in both individual and group reflections. On the individual level, participants drew on experiences and their own knowledge to reflect. Reflections gave indication of constructivism in that the participant was negotiating with his or her environment and making sense of how the person saw the world (Crotty, 2010). Group reflections drew on socially defined meanings and socially shared stories. When using personal experiences, participants implied lessons or roles that each take within leadership. Reflection-on-action was evident in both individual and group reflections and was a much larger practice than reflection-in-action. The codes were larger, but the processes were similar to the number of codes in reflection-in-action, meaning that participants reflected using a similar number of processes throughout the two years. When individuals reflected on their own experiences they acknowledged personal feelings and growth whereas in the group reflection it was indicated that the reflection was intended for and connected to the 29 other individuals in the room. Additionally, the benefit of offering the reflection was of mutual agreement and understanding (Crotty, 2010). Feelings about the action were shared in the individual reflection whereas feelings about the action are assumed in the group reflection.

A significant finding was found when participants reflected-in-action at the individual level. Participants tended to use others' experiences to convey an observation rather than their own experiences. This did not happen in group reflections. When reflecting in action at the group level, participants used their own experiences to reflect what was learned. Using others experiences and using personal experiences confirms Schön's (1983) suggestion that participants frame their situations "metaphorically" to interpret and "make adjustments based on feedback" (p. 210). The use of others experiences provided examples for the participant reflecting-in-action to use others to help understand, construct knowledge and examine his or her own obligations. When participants framed their situations using the experiences of others, they were able to understand better their own obligations and responsibilities.

For the second objective, themes reflected on by participants were examined. Within group reflection, participants reflected on an additional major theme than in individual reflections. Themes for individual reflection were increasing understanding, relationships and networking, application of program concepts, and the responsibility of leadership. Themes that emerged in the group reflection were personal growth, leader characteristics, application of program concepts, value in understanding, and relationships and networking. In addition to the personal growth theme and the differing subthemes, individual and group reflection differed in the order in which themes were discussed in the program and therefore surfaced in the data. Themes were an integral part of the study as they provided close connection to the theoretical codes for the grounded theory.

For the third objective, data were categorized into Mezirow's (1991) levels of reflection. Findings suggest that participants reflected at four of the six levels of reflection; introspection, content reflection, process reflection and premise reflection. Within individual activities, participants reflected at the introspection, content and process levels. Within group reflection activities, participants also reflected at the introspection, content and process levels, but also reached the premise reflection level which is an indicator of critical reflection (Mezirow, 1991). Differences could be found in the type of reflection and the questions in which participants reflected upon. Participants used multiple processes while reflecting on experiences but when critically reflecting, participants indicated how individuals or organizations can change, and why those changes took place. In both individual and group reflection processes that were used to achieve reflection action were numerous. The large array of processes used in reflective action could indicate that reflective action and critical reflection can be achieved through multiple processes.

Discussion

The theory presented comprises of categories in relation to each other to help explain the processes of reflection within an agricultural leadership program. The processes and themes were grounded in the data and through coding, review and memo-ing, I reached abstraction to fit the focused codes from the study's objectives into the theoretical codes of *conceptualizing, strategy, becoming, and social interaction*. Each code was explained by providing the researchers definition of the code, its properties and evidence in the data. The model proposed displays separate concepts, but as data could be related to multiple codes, overlap occurred. The process of reflection-in-action and reflection-on-action were used interchangeably throughout the program processes and themes, therefore, are used throughout the four themes. By encouraging participants to reflect within situations, actions and courses can be altered to change outcomes. However, there is also benefit to learn lessons in retrospect. Both processes are seen as valuable and can be used in the reflection process throughout the four theoretical codes. Distinguishing traits or processes between individual and group processes were discussed and finally, the researcher provided recommendation to achieve reflective action or critical reflection using these processes.

Theoretical Codes

Core Concept- Conceptualizing. The first pattern indicated in the transcript data was *conceptualizing*. *Conceptualizing* encompasses participants' understanding of concepts and issues gained within the program. Participants recognized the need to learn about issues and themselves. Properties of the theoretical code included increased understanding of others, self-assessment, and changing perceptions. As participants increased their understanding, they conveyed how they learned or understood new concepts and reported changes in their mindsets. Data showed participants changing or building upon previously held perceptions, through strengthening perceptions by applying them to a given situation, gaining understanding through context or location, or by the ability to relate one issue to another.

The current study and the theoretical code connect to previous literature within ALPs. Within these programs; understanding and conceptualizing were identified as key outcomes. Research indicates that these programs raise issue awareness and understanding (Abington-Cooper, 2005; Carter & Rudd, 2000) and can increase awareness of issues by participants (Carter & Rudd, 2000).

Core Concept- Strategy. *Strategy* consists of the processes used to reflect in addition to the skill development acquired from the program. ALPs offer information on issues to increase understanding and also provide skill development and training. There is a strong connection between *conceptualization* (understanding) and *strategy* (skill). Processes identified in the study include using personal and others experiences to reflect, disclosing goals, conveying an opinion, personal responsibility and obligation, self-observation, lessons learned through experience, reflection on change and transformation, connecting experiences, direct observation and conveying future action. Skills acquired to improve leadership were also acknowledged in the data. These included reflection, problem solving, decision-making, adaptability and responsibility.

Strategies were also identified as key to leadership development within the literature. One of the original objectives of ALPs was to develop leaders' competencies in speaking, logical inquiry, and critical thinking (Miller, 1976). Additionally, programs use a variety of learning processes and cover a range of topics. The theoretical code of strategy builds upon frameworks established by Van de Valk (2010). Program impacts on the individual level included increased skill development (Howell, et al., 1979).

Core Concept- Becoming. *Becoming* is the theoretical code used to describe the reflection by participants on self-identifying and developing as a leader. In reflecting on personal growth, participants reported how they saw themselves change as a result of experiences and how they could foresee improvement in the future. Participants also acknowledged that as individuals get stronger, the unit gains strength. This indicated a shared meaning and value not only on personal growth but value placed on the industry and community. The act of becoming is internal and individual to the participant, continued personal growth and opinion leadership are personal decisions. However, the expectation to become better leaders and adopt the characteristics is socially constructed (Crotty, 2010).

The conceptual understanding behind the theme of *becoming* was also a core concept identified within agricultural leadership literature. In ALPs, adult leaders study issues facing their industries (*conceptualizing*) and prepare themselves for leadership roles (Diem &Nikola, 2005). One of the main objectives of these programs is to establish effective leadership by developing leaders through issue awareness, the development of skills and increased confidence to become involved in leadership roles (Diem & Nikola, 2005; Howell, et al., 1979).

Core Concept- Social Interaction. The importance of *social interaction* was evident by the number of focused codes classified within this theoretical code. The code is used to describe reflection by participants on interacting with others and relationships. Relationships were the largest code in both individual and group reflection and many processes dealt with interacting with others or learning from others. Properties of the code included; the importance of relationships, advocacy, and recognizing and understanding differences and similarities among groups.

Social interaction is confirmed as a viable theoretical code by past research on ALPs. One of the main objectives of the program is to develop leaders for service to their communities and industries (Kaufman & Carter, 2005). Additionally, studies found outcomes of these programs include increased networking and team building skills (Carter & Rudd, 2000; Diem & Nikola, 2005; Whent & Leising, 1992), advocacy through participants educating others about agriculture and natural resource issues (Strickland, 2011) and participants' increased involvement in community affairs (Howell, et al., 1979).

The theoretical codes are interesting as isolated concepts, but as part of a larger picture and arranged in relationship, each concept gains power. It was evident in the data that reflections often encompassed two or more theoretical codes. For example, *social interaction* can be tied to the theoretical code of *conceptualization* as the interaction with others can contribute to learning and understanding. This is displayed through a reflection offered by a participant discussing how he had transformed as a result of meeting on individual. The participant reflected how it had changed his view of business (conceptualization), the importance of reflecting on an issue (strategy) and the importance of understanding others' stories.

> The a-ha moment came to me in the last trip in Apalachicola… and the owner was there talking about what happened with his company and he started breaking

> down and got really, really personal and how it really affected his family and how it is affected its potentially affected his businesses. And it was like, “I get it now.” … this really allowed me to get a better understanding of sitting back and saying okay, now what is the issue? Why do I need to think this way or why can’t you accept my way? It’s no longer that way, you’ve really got to open a box and make a better decision. And I think that’s really ingrained with Wedgworth.

Constructivist Grounded Theory

Conceptual modeling was used to exhibit the processes of reflection within an agricultural leadership program, which displays the process utilizing the four theoretical codes of *conceptualizing, strategy, becoming*, and *social interaction*. There is mutual support among the terms grounded in the data and confirmed in previous literature. The properties and literature allow the four theoretical codes to fit together within the contexts of individual and group reflection, ALPs using the experiential learning framework and within a given context such as industry. The theory of reflection within an agricultural leadership program is displayed in Figure 1. The model starts out by assuming that participants are enrolled in the program and understand its objectives. Participants are open to learning and disclosure. They hold knowledge as a result of prior experience and program experiences. Participants take part in individual and group reflections.

As participants move through the four theoretical codes, they begin by conceptualizing material learned in the program. This can be similar to the initial experience within the experiential learning process (Roberts, 2006). Participants reflect through the series of processes found in strategy. In this, concepts learned can be built upon by using strategies of reflection or skills taught in programs. Through becoming, participants gain leadership skills within the program setting that can be applied in future leadership roles. As understanding is increased, skills are developed, and the leadership program progresses through the two-year experience, participants begin to identify as a leader within industry and community, which is evident in the code of becoming. Finally, leadership becomes contextualized and practiced by applying skills and knowledge to problems and environments. Contexts can include personal, work, industry or those environments in which one interacts. As the last stage of experiential learning is to apply information, reflection can be deepened by applying information and the participants’ identity into context in this model as well. Effective leadership within an environment requires a leader to understand the environment and the people of interest. Critical reflection can be achieved by examining issues in context, reframing problems, and acknowledging change. In acknowledging change, the participant can question assumptions, approach problems differently, and assess their own change and growth in understanding (Mezirow, 1991).

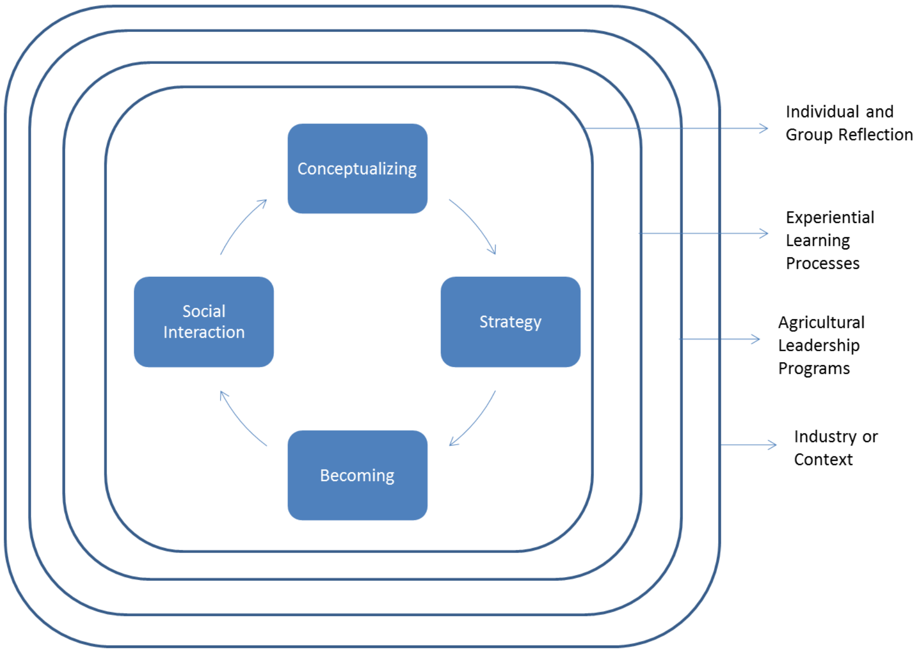

Figure 1. The use of reflection within an agricultural leadership program

Each concept can overlap and relate to one another. However, in moving through the four steps, one can reach critical reflection by identifying a problem (content reflection), finding a way to think about it and the skills to solve it (process reflection), identify their place within the problem and understand the given context (premise reflection) (Mezirow, 1991). Reflection-in-action and reflection-on-action can play a role in encouraging participants to reflect during the action or experience and also be able continue to learn from past experiences (Schön, 1983).

Reflection within an agricultural leadership program can become more effective by administrators laying out the groundwork and preparing participants before they reflect. Opportunities should be available for participants to reflect within group and individual settings, as theoretical concepts emerge within each setting. This makes up the primary environment for reflection and application of the four theoretical codes. Understanding can be increased though social constructionism which can then be translated to individual knowledge. This provides more understanding to the facilitator on where participants progression in leadership. In addition to this negotiation of learning between individual and group, individual activities can play a role in gaining understanding to specific questions and providing participants to reflect on their own. This provides the allowance of personal feelings to incorporate into the concept of cognition that brings about transformative learning where the individual can act upon his or her feelings (Mezirow, 1991).

The experiential learning process (Roberts, 2006) provides structure for the processes of reflection and the learning processes within an agricultural leadership program (Strickland, 2011). Reflection should not only be encompassed by group and individual reflection activities but as part of an entire learning experience within a specific structure. Reflection provides the opportunity to enable one to make inferences, evaluate and potentially change beliefs and establish new conceptualizations (Mezirow, 1991) within a structured environment and a context in which conceptualizations, skills, and identity can be applied within context. Context within ALPs is encompassed as industry.

Implications and Recommendations

Participants reflected on the same topics within individual and group reflections that were directly tied to the program curriculum. Participants achieved reflective action (content, process and premise) in most of their reflections, which indicates the program experiences are to be reflected on and applied by participants. Even if participants were reflecting on personal experiences, program knowledge was still applied.

Within the individual reflections it was important to note that participants were still communicating with me as the researcher. Though learning was identified as constructivist in nature, it is important to note meaning making took place among the backdrops of the leadership program and the self-identification of participants as leaders. This provides evidence of transformational dialogue (Puig, Koro-Ljungberg, & Echevarria-Doan, 2008). These exchanges could transform individuals and the negotiation of meaning led to stronger relationships and richer communication between participants and the program.

Recommendations are offered for both practice and research. Recommendations for practice include having program facilitators knowledgeable on the concepts of reflection and experiential learning. To achieve more in depth reflections facilitators should encourage more interaction with ample time, reflections should be placed throughout the seminar as opposed to the common practice of concluding the seminar with reflection. Future research should continue to develop the constructivist grounded theory through further theoretical sampling of other populations. Such as, adult leadership programs using the processes of experiential learning and reflection can utilize the theory. It can be used in programs already implementing reflection and also serve as a framework for those wanting to implement the practice.

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Utilizing two-way communication to break down the barriers of Farm to School

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Abstract

Childhood obesity is one of the leading problems facing Americans today. As children continue to struggle with obesity, many parents and doctors look to schools to be responsible for providing healthy meals and setting the foundation for life-long eating habits. Established in 2009, the National Farm to School program aims to bring fresh, local produce into cafeterias. After five years of implementation in Florida, researchers used the two-way communication model to better understand the experiences of producers and food service directors involved in the program. Through semi-structured interviews with producers and food service directors, researchers were able to discuss the barriers identified with the program as well as potential program enhancements for producers and food service directors alike. Producers and food service directors identified barriers such as difficulties with distribution, high food safety requirements, lack of communication, and lack of central processing centers. Potential opportunity for program enhancements include local farmers working as cooperatives, improving communication lines between schools and producers, and increasing producer's presence in schools. In the future, the Farm to School program can continue being successful by increasing interaction between farmers and schools, developing common communication platforms for program participants, and increasing funding for the program.
Keywords: Farm to School, producer, food service directors, communication, barriers, enhancement.

Introduction

Currently, 23.9 million children in the United States are considered overweight and/or obese (Go et al., 2013). The adolescent obesity epidemic continues to grow exponentially due to malnutrition and lack of activity (Go et al., 2013). Despite children's growing waistlines, concerns surrounding food insecurity and hunger have become major threats to children's health in the United States. Coleman-Jensen, Nord, Andrews, and Carlson (2012) found that in 2011, 50.1 million Americans lived in food-insecure households including 16.7 million children. Food insecurity in households with children is more prominent than in households without children.

To combat both the obesity and food security epidemics, the United States Department of Agriculture (USDA) established the national Farm to School (F2S) program in 2009 to empower children and their families to make informed food choices (USDA Office of Communication, 2014). In addition to fighting these epidemics, the F2S program has sought to strengthen local economies by developing communities through the introduction of local food in cafeterias as well as educational programs (National Farm to School Network, 2014a). To help strengthen local communities, schools that participate in F2S purchase produce from local farms, as well as provide agricultural education opportunities through school gardens, cooking lessons, and farm field trips (National Farm to School Network, 2014b).

Not only has the F2S program been beneficial to school-aged children, but the program has also provided a potential market for local farmers (Izumi, Wright, & Hamm, 2010; Vallianatos, Gottieb, & Haase, 2004). In 1997, USDA started making efforts to connect schools with local small farmers (USDA Farm to School, 2010). By the 2011-2012 school year, more than 385 million dollars of local food was procured and served to schools nationally (National Farm to School Network, 2014c).

The F2S program is now present in more than 38,000 schools in all 50 states and Washington D.C.; however, the F2S program has differed by state and school district, as well as from one food service director to another (USDA Office of Communication, 2014). Each F2S program has included one or more of the following components: a) local food procurement, b) education on agriculture, and c) school gardens (National Farm to School Network, 2014b). Schools that procure local food have used local food for cafeteria meals, snacks, or taste-tests (National Farm to School Network, 2014b). Previous literature has suggested that food service directors are motivated to participate in F2S for two reasons: the F2S program provides economic support for the local economy, and a healthier alternative when feeding school-aged children (Izumi et al., 2010).

Even though advocates of F2S argue the benefits for farmers, previous literature has indicated that food sales to schools provide a minimal or negligible economic benefit for farmers (Izumi et al., 2010; Joshi, Azuma, & Feenstra, 2008). Joshi et al. (2008) suggested that farmers and producers looked for the sociological benefits of teaching school children about agriculture and provided more nutritious meals as a mental benefit, rather than a purely economic gain.

At the same time, previous literature suggested local food was often more costly than canned, processed, or frozen food delivered by distributors; however, in this F2S program, food service directors found that the food was cheaper when bought straight from the farmer as opposed to buying local food through a distributor (Izumi et al., 2010). Izumi et al. (2010) also suggested F2S might be more profitable if cooperative facilities were developed. These facilities would allow farmers to work collaboratively to sell larger amounts of produce instead of each individual farmer selling smaller amounts to schools.

Florida is an ideal place to implement F2S programs as Florida's climate provides a longer growing season, which enables a variety of nutritious fruits and vegetables to students for the entire school year (Florida Department of Agriculture, 2013). In 2013, there were 47,500 commercial farms in Florida, which led the nation in the production of many edible commodities such as oranges, grapefruits, snap beans, sweet corn, squash, and watermelon (Florida Department of Agriculture, 2013). However, it is not clear to what degree F2S is integrated in schools not only in Florida, but also nationwide (Izumi et al., 2010). Therefore, it is necessary to understand the perspective of those who have participated in F2S programs. This study sought to identify the perceived barriers and potential enhancement of the F2S program from the view of producers and school food service directors.

Theoretical Framework

Clear communication strategies are necessary for both parties, producers and food service directors, to effectively work together. The two-way symmetrical model of communication provides a theoretical framework to guide the development of communication strategies.

The two-way symmetrical model of communication is a public relations model introduced by Grunig and Hunt (1984). It relies on an open two-way communication model, focusing on mutual respect and negotiation by the message sender and receiver, rather than one-way persuasive model to achieve mutual understanding (Grunig & Hunt, 1984). Culbertson (1989) indicated that the two-way symmetrical model appeared to be involved with the diachronic mode introduced by Thayer (1968). The diachronic mode discussed the behaviors that pertain mutual communication such as exchanging knowledge, opinions and willingness to adjust objectives, beliefs and behaviors on account of the partners' opinions and situations (Thayer, 1968). Entities performing two-way symmetrical communication use bargaining, negotiating, and strategies of conflict resolution to bring about symbiotic changes in the ideas, attitudes, and behaviors of both an organization and its publics (Grunig, Grunig, Sriramesh, Huang, & Lyra, 1995).

The two-way symmetrical communication model is a principle of risk communication (Bradbury, 1994). Risk communication is relevant to many issues and topics, including food issues. A number of national and international organizations such as the World Health Organization (WHO), the U.S. Food and Drug Administration (FDA), and the Food and Agriculture Organization of the United Nations (FAO) have provided risk communication handouts and reports informing practitioners to apply two-way communication (Food and Agriculture Organization of the United Nations, 1999; Lang, Fewtrell, & Bartram, n.d.; Stuart & Achterberg, 1997). A report issued by FAO recognized two-way communication as one of the principles when communicating about food and medical issues (Food and Agriculture Organization of the United Nations, 1999). An FDA report (Zwanziger, 2010) stated, "Communication is a two-way interaction and is most effective when communicators and audiences achieve a connection" (p. 209). Stuart and Achterberg (1997) indicated that a nutrition education and communication program evolved from a one-way flow of communication to a two-way process. A two-way communication process achieved "freely exchange knowledge, values, and practices on nutrition, food, and related areas" among participants in a nutrition program (para. 3). Stuart and Achterberg (1997) also stated that two-way communication in a nutrition program ensures active involvement of decision makers, and motivates and provides participants with "easy access to nutrition-related information, resources, and services" (para. 3).

The two-way symmetrical model has been applied and recommended in agricultural and natural resources settings. Cooper (2009) compared two cases that applied different approaches to handle pressure from activists. The results showed that the two-way symmetrical model created a win-win situation when responding to activist publics about environmental issues as the model was used to communicate with activists turning criticism and misunderstanding into opportunities (Cooper, 2009).

The two-way symmetrical model applied in Cooperative Extension has also provided a dynamic exchange of information (Irani, Ruth, Telg, & Lundy, 2006). Florida Extension proposed a marketing campaign to foster two–way relationships between Extension and its stakeholders (Irani et al., 2006). This campaign created a slogan focusing on extension-clientele relationship and a two-way interactive website. Irani et al. (2006) found the dynamic website with changeable content was a usable information source for the users. Additionally, the changeable content motivated the audience to visit the site frequently for up to date information (Irani et al., 2006). This study also found mutual agreement of terminology, or user-friendly terminology, was of value when communicating with stakeholders, as these terms were mutually meaningful to the stakeholders as well as the organization (Irani et al., 2006).

Studies have shown that major barriers to the success of F2S programs included a lack of communication between farmers and food service directors, awareness of the opportunities offered by F2S among farmers, and experience among school food service directors purchasing produce directly from local farmers (Gibson et al., 2011; Rosanburg & Leib, 2011). Therefore, the two-way symmetrical model of communication was used to guide this research and achieve the purpose of developing improved communication strategies. This study aimed to contribute to the national research agenda by gaining insight on more efficient and effective agricultural education and communication programs (Doerfert, 2011).

Research Questions

This study sought to identify the perceived barriers and suggested opportunities for enhancement of the F2S program from the view of producers and school food service directors. After the identification of existing barriers and potential opportunities, communication and educational strategies should be developed to guide the future of F2S in Florida. The research questions were as follows:

RQ_1: What are the producers' perceived barriers to participating in F2S?
RQ_2: What are the producers' suggested opportunities for enhancements of F2S?
RQ_3: What are the food service directors' perceived barriers to participating in F2S?
RQ_4: What are the food service directors' suggested opportunities for enhancements of F2S?

Methods

To gain insight of the barriers faced by producers and food service directors participating or hoping to participate in the F2S program, face-to-face semi-structured interviews were used to collect data. This qualitative approach was used to interview five producers and seven school food service directors throughout Florida. Qualitative research was chosen due to its ability to guide the researchers in understanding the producers' and food service directors' perceptions of the F2S program as well as its ability to show how these perceptions relate to one another (Ary, Jacobs, & Sorenson, 2010; Denzin & Lincoln, 2011).

Semi-structured interviews are a form of qualitative research that is used to provide a descriptive narrative of the data (Ary et al., 2010; Denzin & Lincoln, 2011). According to recommendations by Dooley (2007), a sample was selected based on the specific criterion of the population. In this case, the researchers selected 1) producers and school food service directors involved in the F2S program and 2) producers and school food service directors interested but not involved in the F2S program in varying geographic locations throughout Florida. In this study, participants were selected through snowball sampling. Snowball sampling occurs when the researcher asks each participant to name additional participants within the selection criteria (Dooley, 2007). Additional selection criteria guided researchers to select participants from multiple geographic locations: producers were chosen based on their location and the various types of crops grown across Florida, and school food service directors were chosen for the variety of size and demographic difference found in school districts in Florida.

While developing the interview guide, the researchers used recommendations from the literature (Birks, Chapman, & Francis, 2007; Erlandson et al, 1993; Gaskell & Bauer, 2000; Kreuger, 2002). Birks et al. (2007) suggested researchers gain prior knowledge of participants through the identification of the occupation and culture of the participants and stressed the importance of building rapport. Following these suggestions, the researchers gathered preliminary data on the occupations of the participants, (i.e. what they grew, the size of their school districts), and developed an interview guide with initial questions to build rapport discussing local food and the participants' occupation. Following the initial questions, the interview guide was developed to gather information needed to meet the objectives of the study (Gaskell & Bauer, 2000). The interview guide focused on participants' perceptions of the benefits and barriers of the program, what could be done to improve the program, and what role each of the participants played in the F2S program. The semi-structured interview provided the interviewer with basic questions and topics; however, the interviewer had the freedom to diverge from the questions creating a "framework for discussion," that allowed a more comfortable and free flowing discussion about the topic of F2S (p. 40). At the end of the interview, the conversation was summarized by the interviewer, and the interviewee was asked confirm and verify the summary through member checking (Erlandson, Harris, Skipper, & Allen, 1993; Kreuger, 2002).

Data collection took place between September 2013 and May 2014. Researchers conducted the interviews and took handwritten notes. All interviews were audio recorded, and an external researcher transcribed the narrative response for each question (Guest, Bunce, & Johnson, 2006). Throughout the studythe interview data were compared among transcripts, handwritten notes, and audio recordings to ensure accuracy of the data. The principle researcher analyzed the transcripts and performed constant comparative analysis using the qualitative data analysis software Weft-QDA (Guest et al., 2006). The principal researcher created an audit trail, detailing the theme formation and definition, thus increasing confirmability and dependability of the results (MacQueen, McLellan, Kay, & Milstein, 1998). Afterwards, the principle researcher debriefed the audit trail and the final themes with a co-researcher for accuracy and trustworthiness (Creswell, 2007; Erlandson et al., 1993). To ensure credibility and depth of understanding, researchers achieved persistent observation by engaging themselves in several F2S activities such as F2S bus tours and an F2S day. Specifically, the F2S bus tour invited school food service directors to visit local farms to learn about the issues producers face and discuss collaboration ideas with farmers. The F2S day invited local farmers, who had previously participated, to share information about farming with school children and teachers. Pseudonyms were assigned for each participant for confidentiality. The primary and co-researchers were graduate students studying agricultural communications, who had previously been trained in qualitative data collection and analysis. The interviews analyzed in this study were conducted as part of a larger study, which included interviews with other stakeholders in the F2S program, observations during F2S activities, and gathering of documents. For this study, only the interviews of the producers and school food service directors were used.

Findings

This study sought to identify the perceived barriers and suggested opportunities of the F2S program from the view of producers and school food service directors to develop effective communication strategies. To fulfill the objectives, five producers and seven school food service directors from five school districts, were interviewed. Table 1 describes each participant's pseudonym, their geographic regional location within the state according to Florida Extension districts, if they were participating or considering participating in the F2S program, and percentage of students who qualify for free or reduced price school meal. Producer descriptions include what crops they produce, whereas food service director descriptions include the number of students in their school district.

Table 1
Description of Participants

Producers

Participant Pseudonym	*Location*	*Crops Grown*	*Program Status*
Joe	North East	Produce and Citrus	Participating
Tyler	North West	Satsuma Oranges	Participating
Melody	South Central	Blueberries and Peaches	Considering
Ethan	Central	Blueberries, Pomegranates, and Peaches	Participating
Phil	Central	Potato	Participating

Food service Directors

Participant Pseudonym	*Location*	*Students in District*	*Program Status*	*Students who qualify for free or reduced meal*
Janet	South Central	200,000	Participating	62%
Lulu	South Central	43,000	Participating	98%
Angie	North West	34,000	Participating	43%
Emma	North East	9,500	Participating	69%
Tiffany, Becky, and Haley	South	181,000	Participating	61%

RQ$_1$: What are the producers' perceived barriers to participating in F2S?

The producers were asked to identify the barriers they face when working with the F2S program. Following analysis, three major themes were identified: difficulties with distribution, limited amount of produce schools require and limited amount of produce small farmers can produce, and food safety requirements.

Difficulties with distribution. Producers described the process of delivering their produce to schools as expensive and labor intensive. Tyler explained how delivering food to multiple schools was not possible for him when he said, "I can't afford to go [to a] school and [another] school and say two boxes here, two boxes here. It's not feasible." While Joe indicated the intensity of labor was unexpected, "If we have warning about how labor intensive it is to deliver to all those schools, that might have helped….It can be overwhelming when you are responsible for delivery."

Limited amount of produce schools require and limited amount of produce small farmers can produce. Producers discussed that on one hand, compared to retailers or overseas markets, the amount of produce schools request was limited. Therefore, selling their produce to schools was not the most profitable for some farmers. On the other hand, small-scale farmers had limited capacity of produce to sustain school needs. Even though schools have small-scale needs for fresh produce, they require a reliable and long-term supply from the farmers, which is difficult for small-scale producers to fulfill. Phil said, “It [the amount of produce schools require] doesn’t ever amount to anything. Like, they come to pick up 50 bags of potatoes. They pick up 50 bags next month… it’s not much [for producers to consider selling].” He also explained the challenges small-scale farmers faced,

> If I was a little farmer and I just had one little patch of collard greens or one patch of cabbage… it doesn’t work that way… If you’re going to grow cabbage and you’re going to grow five acres of cabbage over here for the F2S lunch program, what happens if your farm gets flooded out with rain? You lose your crop. They’re not going to have that cabbage for the school.

Moreover, limited amounts of produce did not interest distributors or brokers working with small farmers. Tyler explained how distributors or brokers wanted larger amounts of product to fill their trucks; therefore, small farmers struggled to find distributors willing to buy small amounts of product and deliver them to schools. Tyler described the barrier, “When we contact a broker or something [distributor] they want to know how many semi loads we have. Well, I probably have five, six semi loads. That’s not what they [distributors] are talking about. They are talking about 40, 50, 100, 200 semi loads.”

Food safety requirements. The theme of food safety appeared repeatedly among producers. Producers discussed that food safety requirements created a barrier for them to participate in the F2S program. Many of the producers expressed their discontent with the food safety inspection requirements for schools. Joe explained, “If my extension agent comes out here and knows that I am good agriculture practice that really should be enough [for my produce to qualify for school safety requirements].” While Phil discussed how food safety inspections were not a cost effective option for small farmers, “They [schools] require a tremendous amount of insurance and different things [safety requirements] that would not necessarily be cost effective for various producers.”

RQ$_2$: What are the producers’ suggested opportunities for enhancements of F2S?

Producers were asked what could be done to enhance the F2S program and what could be done to facilitate a positive transition for producers into the F2S program. Producers indicated four themes for enhancement opportunity: work as a cooperative, better communication and networking, getting into the school, and educating schools about farming.

a. **Work as a cooperative.** Producers shared their opinion that working as cooperatives allowed producers, especially small producers, to work collectively. It allows producers to share the responsibilities, which can be beneficial to multiple producers. For example, when one farm has crop failure, the other one in the cooperative can fill in. A cooperative can purchase supplies collectively, and thus lower the cost for small farmers. Additionally, a cooperative would allow for a larger amount of product to be sold to either school food services or distributors. When discussing the benefits of working as a cooperative, Tyler said,

b. The way to go is through co-ops…. In my opinion, we are losing out by not all combining and having a central location to carry our product to and let that location sell…the product for us…. We could also get into brokers if we were all

> combined like that because then we would have the number of semi loads to interest a broker.

Melody, who was considering participating in F2S said, "I know cooperatives can help on a lot of levels because usually in a co-op you can trade equipment and maybe even boxes.… I think that's a huge benefit of co-ops. It's just to work together so everybody wins."

Better communication between producers and schools. Producers consistently mentioned better communication as a way to enhance their experience of selling to schools. Better communication would establish mutual understanding of the concerns of both sides; it can also be helpful when there is an immediate opportunity for schools. Joe said, "[We need] definitely more communication with them [school districts]…. Sometimes you get in that situation where you got 'x' amount left and you just want it gone. That could be really good deal for both sides." Tyler explained how a middleman should connect the farmers to the schools, "What is missing is that person that knows the farmer and knows the school to be able to match them up."

c. **Getting into Schools.** Producers discussed initial contact with the schools as being the most difficult piece to getting started. Producers expressed it would be of great help if schools or someone else initiated contact with them. Producers explained that they did not have sufficient knowledge and resources to initiate conversation or contracts. Ethan believed the F2S was a good program, but he wanted food service directors to select farms and say, "'You are the selected farmers for the F2S program in Putnam County. We want this this and this, Yes or no' and that's it." Tyler stated similarly, "To help farmers to get into the schools is where the help is needed. Once I'm in there, you can leave me alone, we'll get along fine, but it's somebody to help us get into them."

d. **Educating schools about farming.** Producers discussed the limited knowledge schools had of producers' work. Educating schools about farming by hosting field trips or speaking in the classroom could build trust and understanding between schools and producers. Joe said, "It [Educating schools of producer's work] would help them have faith in what we do, you know, in that they're getting something healthy and safe." Ethan explained specifically,

> e. We would like [to] teach teachers as to what goes on, on the farms, how it's done. Not just go out and visit the cows, not go out and visit the blueberries, but how do blueberries grow, where do they come from? From the bees to the pollination and everything, it should be in the education system.

RQ3: What are the food service directors' perceived barriers to participating in F2S?

Food service directors were asked what barriers they have faced associated with the F2S program. Four major barriers were discussed, cost of local food, convenience of modern school food system, perishability of fresh produce, and lack of communication.

Cost of local food. Food service directors discussed the cost to purchase local fresh food was higher than other forms of food such as frozen or canned food. Janet indicated, "I have got to balance it with cost. Fresh green beans are about 32 cents a portion, my commodity frozen green beans are around nine cents." Becky stated similarly, "When we evaluate the cost of the fresh produce, it's much more expensive than a like item in the frozen, or if we were going to do canned… Cost is a huge barrier."

Convenience of modern school food system. The modern school food system has been set up to best serve in a quick and convenient manner, which includes pre-cut and pre-packaged food items. Food service directors described the difficulties they have faced to train school staff and plan the menu to adjust local procurement process. Angie discussed one barrier of F2S as training employees how to work with local fresh produce, "I really have a big training issue. I'm trying to train people because you can say it, say it, say it, but I've got to put them in different context where they realize I really mean what I'm saying." Emma discussed that she couldn't have multiple menus, "We write one menu, can't have different. [I] got nine elementary schools, they're all on the same menu. I'm not going to have four different menus."

Perishability of fresh produce. Food service directors mentioned fresh food was more perishable than frozen and canned food, which made it difficult for storage and distribution. Fresh food distribution requires storage at a certain temperature, and also faster and more sophisticated processing, while canned and frozen foods do not need all of these special arrangements. Tiffany explained the short shelf life of fresh produce was a barrier, "[The] shelf life [for fresh food is short], obviously. If you are looking at frozen you can keep that, you can store that for a long time. Fresh you can't, but there are so many benefits to the fresh." Lulu discussed how fresh produce needs to be used immediately or it spoils, "When you're dealing with produce, the big challenge is you've got to get it and you've got to get it out to the schools in a timely manner, or it's rotten"

Lack of communication. Food service directors repeatedly identified a lack of communication between schools and farmers and other stakeholders. Lulu indicated making contact with local farmers was difficult, "It's making contact with the local farmers, which is not so easy because the local farmers don't know how we do business. We don't know who they are. What we did is we put out media, press releases." Haley mentioned, as food service staff, they had to repeatedly clarify their responsibilities and capabilities with the stakeholders because of misunderstanding of how school business work.

> But the relationships with that [stakeholders] was through meetings and conversations and discussion and sometimes even clarifying our responsibilities, and our capabilities because sometimes other stakeholders may think, oh, they're just not participatory of this process, but they don't understand our business.

RQ4: What are the food service directors' suggested opportunities for enhancements of F2S?

Food service directors were asked what could be done to enhance the F2S program, what incentives should be developed, and what could be done to facilitate a better transition to the F2S program. The themes rising from this discussion were: increasing support from local distributors, improving communication with stakeholders, and educating farmers about school business.

Increasing support from local distributors. Food service directors talked about their hope of having more distributors in the school food business. Janet explained how the perceptions of producer vendors were a barrier; "I wish more of the produce vendors would see us a viable business segment that they want to compete for and that it is something that could be steady business for them."

Improving communication with stakeholders. Food service directors repeatedly mentioned that designating a "middleman" who understood school business, farmers, and the distribution process could improve the communication and thus enhance the program. A middleman could be a distributor who communicates between food service directors and producers, or a middleman who could communicate between food service directors, producers, and distributors. Angie said, "It's important not to leave [distributor] out because he's the middleman here… I don't want to deal really directly with the farmers, so he's the one to make sure that the produce has been grown properly and been handled properly." Lulu discussed a middleman as an opportunity for the program, "Perhaps, if it wasn't me, someone else, doing one-on-one [conversation] with the distributor that I'm using for produce [it would be helpful.]"

Educate farmers on school businesses. A number of food service directors discussed farmers needed to be educated about how school businesses work to enhance the F2S program. Lulu said, "[We need to be] putting together F2S meetings and inviting local growers to educate them on how we do business and how we need them to do business." Another food service director shared a similar thought,

> I think education to the farmers and in different terms of how school business works [would be helpful]. Because when they fill out a bid, they're afraid that they're going to be held to that bid and if their product doesn't produce the way that they think it's going to, they feel like they're going to be penalized. And so I think getting them familiarized with how school business works and how the contracts are set up would be helpful, too.

Conclusions

These findings identified the main barriers producers and school food service directors face when working with the F2S program to understand where communication strategies could be developed to make the program more efficient. The narrative detailed many similarities in both perceived barriers and opportunities for program enhancement.

Producers and food service directors identified cost as a main barrier prohibiting them to work in the F2S program. For producers, the cost of food safety requirements required by schools prohibited them from participating in the program. With the additional cost of providing extra food safety requirements, the producers believed their profits would be minimal. This finding is consistent with previous literature indicating food sales provide a minimal or negligible economic gain for producers (Joshi et al., 2008); however, this finding was not consistent with literature suggesting F2S provided a reliable market for producers (Izumi et al., 2010). Additionally, the findings were consistent with previous literature that found producers perceived lack of profit to be a barrier to participating in F2S (Izumi et al., 2010). Cost was also a barrier for food service directors who discussed the high cost of a perishable local product (Izumi et al., 2010). In addition to the barrier of cost perceived by both parties, it was discussed that it was difficult for the small to mid-size producers to sustain the amount of produce required for schools on a day-to-day basis.

Further, previous literature suggested it was not clear to what degree local food is integrated in the food system (Izumi et al, 2010). The low degree of integration is consistent with the findings that suggested food service directors only requested small amounts food to be shipped into the schools. Producers explained the difficulties of managing the distributing foods to schools, which could cause a low degree of local food integration into schools.

The two-way communication model could provide a model improve communication as well as channel to achieve a mutual understanding of the cost barriers associated with implementing F2S. The previous literature suggested opportunities for communication improvement in the F2S program that were consistent with the findings of this study (Izumi et al, 2010). One potential opportunity is the development of improved two-way communication between food service directors and producers. These findings demonstrated a two-way communication model between producers and food service directors, similar to Cooper's (2009) study, could allow for the discussion of misunderstandings and the exchange of information. Using the two-way communication model, the exchange of knowledge and opinions of the F2S program could be developed in non-formal education programs for both food service directors and producers as well as dynamic informational websites (Thayer, 1968).

Recommendations and Implications

To develop effective communication strategies for the F2S program, effective two-way communication between schools and producers should be developed. Using non-formal education as a means to promote knowledge and opinion exchange, farmers should be invited to schools and school food service should be invited to farms. By bringing the two parties together, an exchange of information about current systems of procurement, business procedures, and perceptions could be discussed in detail to arrive at a mutual understanding. Additionally state representatives, such as Extension faculty, should work as middlemen to connect producers and schools together as well as to communicate opportunities.

To facilitate a two-way communication, agricultural communicators should develop a dynamic website where knowledge about the program can be obtained by producers and food service directors. Using the model developed by Irani et al. (2006), information should describe different terminology and the operational structure of the F2S procurement process used by producers and food service directors. Not only would these definitions clear up confusion of terminology, but both producers and food service directors could have an understanding of the dynamic needs and wants of the program through changeable up to date content. This website could also use suggestions provided by Cooper (2009) to provide a platform where producers post products available on their farm, while food service directors may post what products are on their menu. This website could provide real time supply and demand information to create a win-win situation for the producers and food service directors as they could effectively communicate and work with each other to negotiate the exchange of the local food product. While a stagnant website would only provide a description of terminology and practices, the dynamic website provides a platform for communication and idea exchange between the two parties.

Future research should examine the barriers and suggested opportunities for enhancement from the perspective of distributors, extension agents, and others who have been involved in the F2S program to have a holistic view of the barriers and opportunities of the F2S program. Case studies of successful F2S programs should be conducted to provide lessons and experiences about how specific F2S programs successfully manage their communication practices and strategies to their stakeholders, such as a certain school district or producer-school relationship. It is also necessary to evaluate the roles of each segment of the F2S chain to evaluate the effectiveness of each role in the facilitation of the F2S program.

The qualitative nature of purposive sampling and small sample size limited the generalizability of this study (Maxwell, 2005). This study addresses the F2S situation in Florida. Other programs or F2S in other states should refer to this study based on their unique realities of situation.

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Influences on Undergraduate Students' Opinions Toward Genetically Modified Food

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Even though science says genetically modified (GM) foods are safe, many consumers remain skeptical of the technology. Additionally, the scientific community has trouble communicating to the public, causing consumers to make uninformed decisions. The Millennial Generation will have more buying power than any other generation before them, and more research needs to be done examining what factors influence their attitudes toward GM food. Guided by the elaboration likelihood model, the purpose of this study was to investigate the influences on undergraduate students' attitude formation after receiving persuasive communication about GM food. A convergent mixed methods design was used to collect data. This study found that message sources had limited influence on students' attitudes toward GM food, but risk perception, knowledge, and source credibility were significant predictors of their change in attitude. Participants also expressed wanting to learn more about the technology. Recommendations were to increase knowledge of GM food by university students to promote use of the central processing route and to further investigate influences on students' change in attitude.

Introduction

In 1988, the process of genetic modification was first used to insert glyphosate (herbicide) tolerant genes into soybean plants (Hinchee et al., 1988). Today, over 70% of soybeans in the world have been genetically modified, and along with other genetically modified (GM) crops, have been planted on over a billion acres worldwide (Fernandez- Cornejo, 2012). An estimated 70% of processed foods sold in grocery stores contain GM food ingredients (Chrispeels, 2014). The United States Department of Agriculture (USDA) (2014) lists a number of benefits GM food offers, including increased crop quality and nutrition, as well as drought, pest, and weed resistance. The World Health Organization (2015) endorsed GM food as safe for consumption after seeing no scientific evidence to support otherwise. Despite numerous scientific findings, consumer concern has caused government regulators to develop separate regulations for GM foods (Chassy, 2007; National Academy of Science, 1987; National Research Council, 1989). Some concerns about genetically modified crops center on the ecological impacts involving the development of herbicide resistant plants, or direct harm to humans (Losey & Raynor, 1999; Ma, Drake, & Christou, 2003; Phillips, 2008). Despite extensive regulation and numerous peer-reviewed studies showing no differences in nutritional value, consumers remain skeptical of GM food technology (Chassy, 2007; Lemaux, 2008; Zilberman, Kaplan, Kim, & Waterfield, 2013).

A study in Florida found that consumers reported they were uniformed about GM food and unsure about the advantages and disadvantages of the products (Anderson, Ruth, & Rumble, 2014). When facing a lack of information, consumers will often turn to the media; however, due to the complexity of the science and lack of credible sources, often only misinformation is found (Whitaker & Dyer, 2000; Zimbelman, Wilson, Bennett, & Curtis, 2005). Despite major advancements in genetic modification technology, media coverage remains largely negative, centering on the possible risks rather than science-supported benefits (Abbott, Lucht, Jensen, & Jordan-Conde, 2001). Additionally, information reported in the media often includes vague or biased data, causing consumers to make decisions with faulty information (Goodwin, 2013).

Consumer suspicion around GM foods is also affected by the consumer's perception of the companies involved in developing and selling this technology (Caffrey, 2014; Chaussee, 2014; Nichols, 2014). Folta (2012) proposed that the public has trouble separating their views of large agriculture companies from their feelings toward the science being sold by those same companies. Skepticism of large agriculture companies, coupled with a lack of information about both the science and agriculture has created a need to develop a better connection with the consumer and communicate more effectively (Telg & Irani, 2012).

Skepticism and distrust are commonalities among adults, and these traits are also inherent in Millennials (Taylor & Ketter, 2010). The Millennial Generation is defined as individuals who were born between 1980 and 2002 (Elmore, 2010; Howe & Strauss, 2007; Payment, 2008; Taylor, & Ketter, 2010). Millennials did not grow up in rural areas like much of the generations that have come before them (Taylor & Ketter, 2010). The Millennial Generation accounts for 23% of the United States' population (American Community Survey, 2014), and are estimated to have 11% more buying power than generations before them (Hais & Winograd, 2011). As Millennials become an even larger portion of the consumer population, communicators need to find more effective ways to inform and communicate with this group (Goodwin, 2013). Current college students were born between 1991 and 1996, and are categorized as Millennials. Opinions toward agricultural products are formed while students are in college, and develop into more grounded attitudes as they grow older (Sears, 1986), which makes this audience extremely important to study (Goodwin, 2013). This research can be used to help agricultural communicators to develop effective promotional strategies for GM food. The purpose of this study was to explore the influences on undergraduate students' attitude formation after receiving persuasive communication about GM food.

Theoretical Framework

The elaboration likelihood model (ELM) was used to guide this study. The ELM is commonly used to understand and explain attitude change as a result of persuasive communication. The ELM uses two different information-processing routes to display how attitudes can shift (Petty & Capaccio, 1986). Individuals who process information through the central processing route carefully consider the message presented, relate the communication to past experiences, and possess the motivation to process the information (Petty, Brinol, & Priester, 2009). If a change in cognitive structure occurs as a result of the processing, there will either be a positive or negative shift in attitude. Typically, attitudes formed via the central processing route are resistant to counter persuasion and predictive of behavior (Petty, Haugtvedt, & Smith, 1995). When the information is not relevant, there are distractions, or a person does not have the adequate knowledge to process the information, the peripheral process will be used. Attitude changes resulting from the peripheral route are often short-lived, easily changed, and reliant on peripheral cues (Petty et al., 2009). Peripheral cues include message sources (Petty et al., 2009) and can "affect attitude in the absence of argument processing" (Petty & Capaccio, 1986, p. 134). A source's perception has been linked to people's likeliness of elaboration resulting in an attitude change (Priester & Petty, 1995). Sources that are considered credible typically have at least one of the following qualities: expertise, trustworthiness, or goodwill (Perloff, 2008).

The ELM has been applied to a number of different studies pertaining to agriculture (Meyers, 2008; Goodwin, 2013; Frewer, Howard, Hedderley & Shepherd, 1997). Meyers (2008) looked at how persuasive communication influenced the media's coverage of agricultural biotechnology. The study found that prior attitudes had the greatest effect on attitudes associated with agricultural biotechnology (Meyers, 2008). Since pre-existing attitudes tended to be negative, the likelihood for elaboration was low (Meyers, 2008). Goodwin (2013) used the ELM to explore the impact of personal relevance and transparency on college students' trust and perception of the livestock industry. Overall conclusions presented that in absence of transparent communication, consumers were not as likely to exhibit a great deal of elaboration. Even though neither Meyers (2008) nor Goodwin (2013) identified the elaboration pathway used, both studies supported previous research indicating consumers used the peripheral pathway when making food-related decisions when no intervention was used (Frewer et al., 1997).

The ELM was also used by Frewer et al. (1997) to look at both the impact of prior attitudes and source credibility on consumer opinions of GM food. Previous opinions did have an effect, with respondents having negative attitudes and expressing a greater distrust for GM food (Frewer et al., 1997). The study's hypothesized "distrusted" source (a government agency) was viewed as more credible than the trusted source (a consumer organization) (Frewer et al., 1997). Also, prior attitude influenced the perception of source credibility, and source credibility influenced the final attitude toward GM food (Frewer et al., 1997).

Additionally, research shows that consumers often use the peripheral processing route when forming attitudes about agriculture because they do not possess the motivation to process agricultural messages (Frewer et al., 1997). Since the peripheral route relies on cues, such as message source, greater research should be conducted exploring the impact of different sources on final attitudes toward GM food to help agricultural communicators develop better communication strategies promoting the technology.

Purpose & Objectives

The purpose of this study was to explore the influences on undergraduate students' attitude formation after receiving persuasive communication about GM food. This research aligns with priority one of the national research agenda; informing the public of agricultural and natural resources (Doerfert, 2013). The objectives guiding this study were as follows:

1. Describe undergraduates' prior knowledge, prior attitudes, and prior risk perception regarding GM food.
2. Compare undergraduate students' change in attitude as a result of receiving a message delivered by Company 1, Company 2, FDA, or USDA.
3. Determine how message source, source credibility, prior knowledge, and prior risk perception of GM food predict undergraduate students' change in attitude toward GM food.
4. Explore undergraduates' perceptions of GM food.

5. Determine the amount of elaboration used by undergraduate students when presented with persuasive communication about GM food.

Methodology

Research Design and Methods

In order to gain a deeper understanding of how people view and process messages, this study was designed implementing the principles of mixed methods research (Creswell & Plano Clark, 2011; Plowright, 2011). Mixed methods research allows the investigator to gain a deep understanding of individuals' perspectives as well as examine a large number of people's response to different variables, providing a more complete understanding of a research problem (Creswell & Plano Clark, 2011). Mixed method designs have been used in recent years to answer Agricultural Education research questions (Epler, Drape, Broyles, & Rudd, 2013; Walker, 2010; Witt, Doerfert, Ulmer, Burris, & Lan, 2013).

There are many designs that can be used to conduct mixed methods research (Creswell & Plano Clark, 2011). A parallel convergent design is a type of mixed methods study which allows researcher to gather different, but corresponding, data on the same topic (Creswell & Plano Clark, 2011). This design was used for this study to allow for a more complete understanding of how undergraduate students use the elaboration framework to perceive the messages presented. Two methods were used to collect data: a quantitative questionnaire and structured qualitative interviews. As per the convergent sequential design, both quantitative and qualitative data were weighted equally, and integration occurred at the data analysis step (Creswell & Plano Clark, 2011). The population for this study was undergraduate students in five classes in the College of Agricultural and Life Sciences (CALS) at the University of Florida (UF)

Quantitative Component

The quantitative phase of this study used a questionnaire administered as a pretest- posttest experimental design in order to answer research objectives one through three. A threat associated with this design is *statistical regression*, where respondents who score high or low on the pretest will score closer to the mean on the posttest (Ary, Jacobs, & Sorensen, 2010). As part of the experimental design, one intervention was used with four different variations of the treatment. The intervention was the source attributed to a message describing GM food, which also represented a peripheral cue in the ELM (Petty et al., 2009). Four different groups were used; each variation presenting the same message about GM food. The message was as follows:

> Before genetically modified foods reach the market, crops from genetically modified seeds are studied extensively to make sure they are safe for people, animals and the environment. Today's genetically modified products are the most researched and tested agricultural products in history.

Two government agencies (USDA and the Food and Drug Administration [FDA]) and two agricultural biotechnology companies were selected to represent positive and negative sources respectively. Since government agencies have been identified as more credible by consumers (Frewer et al., 1997), and the USDA is directly associated with agriculture, the FDA was chosen as the control for the study. For the purpose of this paper, the companies have been given the pseudonyms, Company 1 and Company 2. Company 1 is a major agricultural biotechnology company, which has experienced major news coverage in recent years. Company 2 was a similar company, which has not received the same amount of media attention. Respondents were shown the real names of the companies during the study and told the message did not reflect the views of the organization or business after completing the survey.

The questionnaire adapted questions from previous studies to measure knowledge, prior attitudes, and prior risk perception of GM food, as well as source credibility (Frewer, Howard, Hedderley, & Shepherd, 1996; Frewer et al., 1997; Hallman & Metcalfe, 1994; Osgood, Suci, & Tannenbaum, 1971; Roe & Teisl, 2007; Rumble & Leal, 2013). Attitudes and risk perception of GM food were measured in the pre and post-test. Knowledge and risk perception were measured in this study to represent distraction (risk perception) and knowledge in the ELM to determine if respondents had the ability to process the information (Petty et al., 2009). Since the literature indicates people use the peripheral process when presented with communication about agriculture (Frewer et al., 1997), source credibility was measured to determine if the peripheral process was operating. The reliability of the instrument was established through use of a panel of experts and a pilot test (Ary et al., 2010). Additionally internal reliability was measured for each construct. A scale is considered reliable when the Cronbach's alpha is greater than .70 (Field, 2013).

Knowledge of GM food was measured through seven, 5-point Likert scale questions labeled *strongly disagree = 1*, *disagree = 2*, *neither agree nor disagree = 3*, *agree = 4*, and *strongly agree =5* (α = .82). The questions asked about respondents' understanding of general science and technology, food science and technology, and GM food science. The same scale used for knowledge was used to measure risk perception with six questions (α = .83); higher risk perceptions were assigned a *5,* and lower risk perceptions were assigned a *1*. Risk perception questions asked about threats GM food posed to people and the environment. Prior and final attitude toward GM food was measured using a bi-polar semantic differential scale with six questions (α = .93). Negative adjectives were assigned a *1,* and positive adjectives were assigned a *5*. Attitudes measured if respondents believed GM food to be safe, beneficial, artificial, necessary, healthy, and wholesome. Source credibility was determined using a five question, bipolar semantic differential scale (α = .90) measuring goodwill, expertise, and trust (Perloff, 2008). Positive attitudes were assigned a *5*, while negative attitudes were assigned a *1*. Indexes were created for each construct by calculating the overall average attitude for the scale. Additionally, respondents were asked to answer several demographic questions including age, gender, race, and class ranking. The questionnaire was created and administered using Qualtrics, an online survey development tool. Access to the Internet by the target population allowed for an online survey instrument to be used (Dillman, Smyth, & Christian, 2009). Survey data was collected following Dillman et al.'s (2009) tailored design method.

Respondents for the questionnaire were selected using a convenience sample of five courses offered to undergraduate students in the CALS at UF. An incentive of extra credit in the class was used to encourage participation. A convenience sample was deemed appropriate due to practical constraints, efficiency, and accessibility to students in CALS (McMillan & Schumacher, 2010). This type of sampling cannot be generalized to the general population; however, they can still provide insight into the relationships in the population of CALS students

(McMillan & Schumacher, 2010). A list of the students' names and email addresses enrolled in the courses were acquired from the instructors. From these lists, 718 (*N*= 718) students were contacted by email to take the survey. Five hundred and sixty-one students started the survey and 414 completed it, giving a response rate of 58% (*n* = 414). Table 1 shows the demographics of the respondents. The majority were white (79%), female (71%), and upperclassmen (64%).

Table 1

Demographics of Survey Respondents (n = 414)

Characteristic	*n*	%
Sex		
Female	294	71
Male	120	29
Hispanic Ethnicity	64	16
Race		
American Indian or Alaskan Native	5	1
Black or African American	31	8
Asian or Pacific Islander	53	13
White	328	79
Other	21	5
Class Rank		
Freshman	17	4
Sophomore	131	32
Junior	162	39
Senior	104	25
Age		
18-20	350	85
21-24	56	14
25+	8	2

Data were analyzed using SPSSv22 statistical software package for Windows. Descriptive statistics were used to describe the first objective. Objective two was answered by first calculating the difference in the final attitude from the prior attitude in each group to create a new *change in attitude* variable. Then, an ANOVA was run to determine if there was a difference in the change in attitude between the four groups. A multiple linear regression model was developed to answer objective three. The predictors for change in attitude were prior knowledge, prior risk perception, source credibility, and the source that respondent was exposed to. Source groups were dummy coded and the FDA was treated as a constant in the model.

Qualitative Component

The second method for data collection was structured interviews. The interviews were used to answer objectives four and five. The structured interviews asked 18 questions to investigate participants' perceptions of GM food for objective four. Questions were guided by the elaboration likelihood model (Petty & Capaccio, 1986). The interviews also asked each participant to use thought listing procedures to determine the amount of elaboration they used when presented with persuasive communication to answer objective five. This process can be used to understand an individual's cognitive process (Cacioppo, von Hippel, & Ernst, 1997). The method involves asking the participant to write down all thoughts related to a prompt. The prompt was the same persuasive communication the participant saw in the survey, along with the same source. Participants were asked to orally explain their thoughts, what about the message made them feel that way, and to categorize the thoughts as positive, negative, or neutral. (Cacioppo et al., 1997; Heimberg, Nyman, & O'Brien, 1987). While the interviews were intended to take about 30 minutes, they were shorter due to the lack of elaboration amongst participants. Each interview lasted between 12 and 30 minutes and was voice recorded for transcription purposes.

Data were analyzed using a priori coding to look at participants' responses pertaining to their perceptions of GM foods (Ryan & Bernard, 2003). Prior knowledge, attitudes, and risk perception were identified from the ELM and previous research as themes that should be investigated. The themes were analyzed using the computer software MAXQDA to develop codes. Objective five measured the amount of elaboration used through thought listing procedures, measuring the amount and types of thoughts elicited by the message. Elaboration was also identified by determining if participants used prior experiences to evaluate the message or identified a probable behavioral change as described in the ELM (Petty et al., 2009).

A convenience sample of self-selected volunteers was used for the interviews. Participants must have first completed the questionnaire. Each participant was offered a small monetary incentive to participate in the interviews. Twenty-four students volunteered for the interviews, participants were selected based on sex and assigned source from the survey. Some volunteers did not participate due to scheduling conflicts, and the researchers stopped recruiting interviewees after saturation had been reached in the interviews (Creswell, 2013). Twelve students total participated and were assigned pseudonyms to protect their identities during analysis. Eight (67%) of the participants were female and four (33%) were male. Only one participant was of Hispanic descent (8%), three (25%) were Asian or Pacific Islander, and nine (75%) were white. Most of the participants were juniors or seniors (n = 9, 75%), and three were sophomores (25%). The majority of the students were between the ages 18 and 20 (n = 7, 58%), three were between 21 and 24 (25%), and two (17%) were over the age of 25. One of these participants was in his 40s, but was still an undergraduate student.

Data from both the qualitative and the quantitative components were analyzed at the conclusion of the study. The rationale for this approach is that the quantitative data and their analysis gives a general understanding, while the qualitative data explore the research question more in depth (Creswell & Clark, 2011). Data were finally combined to give a more in-depth understanding of undergraduates' interpretation of persuasive communication about GM food. There were several measures taken to ensure trustworthiness of the study (Lincoln & Guba, 1986). Credibility was established through data triangulation and member checking with interview participants. Confirmability was ensured through use of an audit trail detailing methodological decisions and processes. In order to aide in transferability, thick and rich descriptions were provided throughout.

Results

Objective 1. Describe Undergraduates' Prior knowledge, Prior Attitudes, and Prior Risk Perception Regarding GM food.

An index for the prior knowledge construct was created, and the average was 3.97 (SD = 0.59). The majority of the respondents reported they *agreed* that they were knowledgeable about GM food. The prior attitude toward GM food index was 2.67 (SD = 1.00). The respondents did not have polarized positive or negative attitude and were categorized as neutral. The risk perceptions of GM food index indicated respondents were unsure about the benefits or risks associated with the products, the average response being *neither agree nor disagree* (M = 3.07, SD =0.61).

Objective 2. Compare Undergraduate Students' Change in Attitude as a Result of Receiving a Message Delivered by Company 1, Company 2, FDA, or USDA

The average change in attitude was calculated for each treatment group by subtracting the mean of the prior attitude from the mean of the final attitude measurement. No major changes in attitude were observed, average change in means was 0.50 for Company 2, 0.60 for Company 1, 0.60 for the FDA, and 0.60 for the USDA. A one-way ANOVA test showed that there were no significant differences in attitudes between the treatment groups ($F(3,410) = 0.29$, $p = 0.83$).

Objective 3. Determine how Message Source, Source Credibility, Prior Knowledge, and Prior Risk Perception of GM Food Predict Undergraduate Students' Change in Attitude toward GM Food

A multiple linear regression model was created to examine if the message source, source credibility, prior knowledge, and prior risk perceptions toward GM food predicted the change in attitude toward GM food (Table 2). The model was significant (R^2 =.52, $F(6,407)$= 76.85, p < .01); prior risk perception (p < .01), prior knowledge (p < .01), and source credibility (p < .01) were identified as significant predictors of the change in attitude toward GM food after receiving persuasive communication. These results indicate that for every one unit increase in risk perception, change in attitude would increase by 1.02, and for each one unit increase in prior knowledge or risk perception, there was a .27 and .14 decrease in attitude change respectively.

Table 2
Predictors of Change in Attitude toward GM Food

Predictor	B	t	p	F	R^2
(Constant)	2.96	1.39	.02	76.85	.52
Company 1	.04	.40	.69		
Company 2	-.24	-.25	.81		
USDA	-.25	-.26	.80		
Prior Risk Perception*	1.02	14.43	.00		
Prior Knowledge*	-.27	-4.38	.00		
Source Credibility*	-.14	-2.88	.00		

* indicates significance at $p < 0.01$

Objective 4. Explore Undergraduates' Perceptions of GM food

Perceptions of GM food were explored during the qualitative interview portion of this study. Participants expressed limited knowledge of GM food, neutral attitudes, and an overall skepticism toward the technology.

Knowledge. During the interviews, participants expressed that they were not exactly sure what GM food was. Felicia said, "I don't know much about [GM food], but I think it's when basically food is scientifically grown." Even though the participants admitted to not fully understanding the technology, they did associate GM food with gene manipulation. Some participants, like Bella, were more knowledgeable, "Umm to my understanding, GM food is a food in which a certain gene characteristic trait has been modified, inserted, or removed to change the original genetic composition of it." Overall, participants admitted to not fully understanding GM food. For example, Annie said,

> I really don't know anything about [GM food]. What I think it is, is you modify the DNA or the genes [of the food] to make it either easier to grow or resistant to certain diseases and that's what my guess would be.

Attitudes. A number of participants indicated that they had neutral attitudes toward GM food as a result of their limited knowledge. Tiffany said, "I would put [my attitude as] neutral toward [GM food]," Some participants, like Alicia, reported slightly more negative attitudes, "I would say I view [GM food] as bad, but not bad enough to stop me [from purchasing], because in the media, they are sometimes portrayed as really bad." Overall, most of the participants had neutral attitudes though. Leah explained,

> I cannot really argue that [GM food] is good, and I cannot argue that it is bad if I am not that well informed about it. For me to take a side, I would say that I would extensively have to research about it.

Risk perception. During the course of the interview, participants explained their skepticism toward GM food. Leslie said, "I mean it is true that generally [GM foods] are very tested. I do think however that there are always consequences that you cannot always predict." Felicia explained she had similar concerns, "So we don't know the long term effects [of GM food] yet." Tiffany was also skeptical toward the safety of GM food,

> I think it [GM food] is just all very new and needs to be approached with caution. I think if we stay cautious and nothing seems to come up that is bad then, you know, we will see what happens after that.

Even though a number of participants expressed concerns regarding GM food, many did not see any major issues with the food. Lilly said, "I think [GM food] is safe, I have not heard too much about people having problems with eating GM foods." Others reported benefits they believed GM food offered like "mass production and feeding large populations", as explained by Felicia. Bella also said, "I think that for my reading the advantages that they focus on the most in writing about [GM food] is that they would enable people to be able to produce higher quantities of crops, and to potentially be able to help the growing population." While the participants did acknowledge the potential advantages of growing GM food, many still felt uncertain about the long-term effects of the products.

Objective 5. Determine the Amount of Elaboration used by Undergraduate Students when Presented with Persuasive Communication about GM food

During the thought listing procedures, participants listed anywhere from one to five thoughts. For most of the thought lists, participants presented more negative or neutral thoughts than positive thoughts. The participants who displayed the most elaboration throughout the interviews had the most negative attitudes to begin with. Participants who expressed more negative attitudes in the interviews spoke the longest, but a lot of the knowledge they were using to assess the message did not align with the science of the technology. The majority of the time, participants regurgitated the message as part of their thoughts, not drawing upon any past experiences. For example, Annie said,

> So I looked at the statement and I saw their initial statement is how they are studied extensively. And that made me feel better because if they are studied a lot you know they have a pretty good understanding for how this could affect people and things like that.

Ken simply wrote down "I agree [with the statement]." David had a similar thought when reading the message, "So I read it as [saying] 'highly regulated and it's the safest in history', so it makes you think [GM foods] are safe." Some participants did try to use past experiences and knowledge to assess the message, especially when looking at the source. Jim recalled,

> Company 2 is a very old company who has engaged in a lot of petro chemical work and a lot of their history, if you look at it, it's not necessarily good for people or the environment, it's good for them making a lot of money. So I guess I am inherently biased against Company 2.

Many participants took notice of the sources when they first read the message. Ken said, "Well it is the United States, it is the USDA that puts it out. I feel like those are the main people you should trust." Alicia shared similar thoughts for the FDA, "The FDA is supposed to be one that keeps us safe and food safe. I mean everyone understands that there is interest behind everything but I would say the FDA is pretty trustworthy." Participants who saw industry sources had different opinions though. Leslie said, "I think I would say I trust Company 2 a little bit, but I would not say I trust it completely. Everyone has always got an agenda." Leon had a stronger opinion toward Company 1 saying, "Honestly anybody who makes a claim like that deserves to be examined".

Participants unanimously agreed that the message had little to no impact on their future behaviors regarding GM food. Felicia said, "It might cross my mind but I don't think my buying habits ultimately will change." Annie agreed and explained,

> I do not think it [the message] will affect my food purchases too much. I might look at the labels more but I do not think I will go out of my way to not or to buy GM food.

Even though participants did not indicate a behavioral change, many were curious to learn more about GM foods. Annie expressed her feelings, "Yeah I just do not want to say they are awful if I do not know. I feel like I should probably know more about it." Jim agreed that he was interested in learning more as well, "[I want to learn more about my] criticisms so I can have actual facts to support my arguments." Many participants also indicated they did not believe the information about GM food was easily accessible. Lilly explained,

> I think I would like to learn more about [GM food]. I do not think I see enough in the news. A lot of our foods are genetically modified, so I would like to learn more information before making purchases.

Discussion

Understanding how undergraduate students form opinions toward GM food after seeing a message is essential for agricultural communicators to develop effective communication and message strategies. The interview portion of this study found that participants appeared to possess limited knowledge of GM food, but were able to admit to this lack of knowledge. These results conflict with the survey findings, where the majority of respondents agreed that they had knowledge of GM food technology. The survey results may be due to students feeling they had read enough about the technology to understand it. Additionally, since the survey results were self-reported, the respondents may not have had accurate knowledge concerning GM food. The survey findings conflict previous research indicating that that general consumers had limited knowledge of the technology (Anderson et al., 2014). During the interviews, many participants expressed wanting to have more information on the topic before forming any concrete attitudes toward GM food. This finding may explain why the majority of the survey respondents were unsure about risks of GM food and had neutral attitudes toward the product. These results support previous research showing consumers were unsure about the risks associated GM food (Anderson et al., 2014).

The survey indicated that the source, which served as a peripheral cue, used to present persuasive communication about GM food had no influence on attitude change exhibited by the respondents. However, many participants during the interviews did take notice to the source, but none of the students expressed a change in attitude. Industry sources did appear to evoke skepticism from participants when completing the thought listing portion of the interview. The government sources were more trusted among the participants, similar to other studies (Frewer et al., 1997), but did not lead to any further thought toward the information presented. These qualitative findings indicate that students may use more elaboration when information is present by an industry source rather than a government source since it made the participants consider the message more.

In the survey, source credibility, prior risk perceptions, and prior knowledge were significant predictors of change in attitude, which is consistent with previous research (Frewer et al., 1997; Meyers, 2008). As respondents' knowledge increased, the change in attitude decreased. Since knowledge was associated with the ability to process information, respondents with more knowledge may have not used peripheral processing, but experienced less of an attitude change (Petty et al., 2009). Risk perception was identified as a distraction in the ELM under the ability to process information. The greatest change in attitude was associated with higher perceptions of risk; however, the results do not indicate if the change in attitude was positive or negative. Source credibility was used to explain if the peripheral process was operating in the ELM, and the results showed that as credibility increased, change in attitude decreased, and the decrease was relatively small. This may be because the peripheral process was not influencing attitude change. This is supported by the ANOVA analysis and the thought listing procedures.

The qualitative data in this study concluded that participants used minimal elaboration when they assessed the message about GM food (Cacioppo et al., 1997), which aligns with previous agricultural research using the ELM (Frewer et al., 1997; Goodwin, 2013; Meyers, 2008). Similar to the survey, neither attitude nor intent of behavioral change was reported by any of the participants; these characteristics would indicate use of the central processing route if present (Petty et al., 2009). Many of the participants initially noticed the message source and either talked about their immediate distrust or trust associated with it. This attention to the peripheral cues is indicative of the peripheral pathway (Petty et al., 2009). Participants who had higher risk perceptions at the beginning of the interview ended up expressing more negative final attitudes after reading the message. Overall, the participants did not appear to have the knowledge or the motivation necessary to evaluate the message, use the central processing route, and experience a cognitive change in attitude (Petty et al., 2009).

Recommendations

Students reported they had high knowledge concerning GM food, but the qualitative data showed they may not understand as much as they had originally reported. The students expressed wanting to learn more in order to make educated decisions about GM products, but did not know where to access the information. The agricultural industry needs to make the information more accessible to undergraduate students. Increasing the knowledge of GM food could help students use more elaboration when assessing persuasive communication, which would lead to lasting changes in attitude (Petty et al., 2009). Since students reported not knowing where to find the information on GM food, communicators need to develop more educational programs targeted toward undergraduate students. Working with agricultural educators and communicators, universities should develop *Question and Answer* seminars, bring in guest speakers, and develop educational workshops to teach students what foods are genetically modified and why. Working with the FDA or USDA may prove to be successful in adding trust to information presented to students. Agricultural communicators should be aware of how collaboration with industry sources could impact the interpretation of communication by undergraduate students.

Attitude formation needs to be further explored before communication recommendations can be made. The message source appeared to have little to no effect on students' attitude change regarding GM food; however, risk perception was associated with the greatest change in attitude. Additional research should be conducted to determine if greater perceptions of risk would create a more positive or negative final attitude toward GM food, as well as explore its interaction with elaboration. Measurements for motivation to learn about GM food and a more representative measurement of knowledge could strengthen the research. This study should be extended to Millennial consumers not in college, as well as general consumers to help develop future communication strategies. These findings and recommendations could be used for other food technologies like irradiated food, in-vitro meat, and other emerging food sciences. Other possible research could include message framing effects on elaboration, and the effect of the communication medium used, such as online, print, video, radio, etc., on students' elaboration.

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Preference and Behavior: A Case of Dissonance in the Produce Aisle

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Consumers have shown an increased interest for purchasing local products in recent years. Unfortunately, even with consumers having positive attitudes and a preference toward local food, they do not always buy locally due to a number of different barriers. This study sought to determine if consumers' purchasing behaviors of strawberries aligned with their preferences for Florida strawberries. Cognitive dissonance can occur when a person is presented with information that does not align with their previous knowledge and was used in the study to explain the attitude-behavior gap demonstrated by consumers when purchasing strawberries not grown in Florida due to lack of knowledge concerning the growing season. A mixed methods research design was used for this study. Focus groups found that consumers did prefer to purchase Florida-grown strawberries, but they did not always actively seek out those products. Additionally, the participants had limited knowledge of the strawberry season, believing they were in season year round. A survey was used to confirm these results and generalize them to Florida strawberry consumers. Agricultural communicators should use advertisements reinforcing positive attributes of state produce along with the growing season to help reduce cognitive dissonance and promote the sale of Florida strawberries.

Introduction

In recent years, there has been a substantial increase in consumers' demand for locally grown food (Conner, Colasanti, Ross, & Smalley, 2010). Some studies indicate this increase was driven by the perception that locally grown food was healthier (The Hartman Group, 2008). Consumers have viewed locally grown food as supporting the economy and having environmental benefits (Zepeda & Leviten-Reid, 2004). As consumers continue to seek high quality, healthy food (Verbeke, 2005), it has become necessary to continue the expansion of local markets (Zepeda & Li, 2006). Global competition has also contributed to the promotion of United States' products through state branding programs, such as Fresh from Florida (Zepeda & Li, 2009). These programs increased from 23 in 1995 to 48 in 2010 (Onken & Bernard, 2010) after $200 million was supplied by state and federal funds in 2001 (Patterson, 2006).

Though consumers indicate a preference for "local" food, they do not all have the same definition for the term (Conner et al., 2010). In fact, the United States has no standard definition for local food (Zepeda & Li, 2006). The ambiguous local definition has been interpreted differently by consumers depending on the product (Rumble & Roper, 2014). In most cases though, consumers prefer food to be produced as close to their location as possible (Rumble & Roper, 2014). A study in the United Kingdom by Chambers, Lobb, Butler, Harvey, and Traill (2007) determined consumers preferred local and national food over imports due to their belief that local and national foods were higher quality and fresher. However, higher price was identified as a barrier to purchasing local food (Chambers et al., 2007).

Unfortunately, studies have shown an attitude-behavior gap among consumers, meaning they do not always purchase local produce even though they prefer it (Chambers et al., 2007; Yue & Tong, 2009; Zepeda & Levitan-Reid, 2004). Chambers et al. (2007) found that even though consumers had positive perceptions of local food, they rarely purchased local products on a regular basis. Another study yielded similar results; consumers were excited about local food production, but did not put forth extra effort to search for it in the grocery stores (Chambers et al., 2007).

Florida has been largely impacted by local agricultural sales, contributing $8.3 billion dollars to the state's economy in 2011 (Hodges & Stevens, 2013). The state is home to over 47,000 farms and almost 300 different commodities (Florida Department of Agriculture and Consumer Services [FDACS], 2013). The state is known for being number one in production of oranges, but is also the number two producer of strawberries in the United States (XDACS, 2013). In fact, Florida is the only strawberry producer in the United States during the winter months (Boriss, Brunke, Kreith, & Morgan, 2012). In 2012, more than $300 million was added to Florida's economy through strawberry sales (FDACS, 2013). Out of the more than 200 million pounds of locally produced strawberries (Mossler, 2012), more than 90% of the strawberry acreage is located in two counties in southwest Florida (Mossler, 2012).

Strawberries are available year round in the United States (Boriss et al., 2012), but strawberries grown in Florida are only available for purchase during winter months (Boriss et al., 2012). Consumers have indicated their desire to purchase local produce (Conner et al., 2010; Rumble & Roper, 2014; Zepeda & Levitan-Reid, 2004), but their behavior has not always been reflective of this attitude (Chambers et al., 2007; Zepeda & Levitan-Reid, 2004; Yu & Tong, 2009). For Florida strawberries, this attitude-behavior gap may be even wider because the product is only available for a few months out of the year. If consumers are not aware of the winter strawberry season in Florida, producers will be faced with the challenge of promoting to buyers who may want their product but do not realize it is available. The purpose of this research was to identify if consumers' Florida strawberry purchasing preferences aligned with their purchasing behavior during Florida strawberry season in order to develop more effective promotional campaigns.

Theoretical Framework

Cognitive dissonance describes the feeling of discomfort developed after being presented with content counter to what information a person has already established as true (Festinger, 1957) and was used to guide this study. Cognitive dissonance describes three basic principles: people need cognitive consistency; cognitive inconsistency leads to people experiencing psychological discomfort; and psychological discomfort will motivate people to make sense of the inconsistency to obtain cognitive balance (Festinger, 1957). A person will almost always attempt to reduce the discomfort produced by dissonance (Hunt, 2004). People can reduce discomfort by one of three ways: changing the behavior to reflect the dissonant cognition; justifying the behavior through changing one of the cognitions, making it less dissonant with the behavior; or justifying the behavior by adding new, more constant cognitions with the behavior (Hunt, 2004).

Communicators can capitalize on this idea of dissonance by exploiting the contradicting idea while simultaneously providing a solution to minimize the dissonance (Dainton & Zelley, 2005). This strategy has typically led to the consumer adopting the suggested behavior (Dainton & Zelley, 2005). Care has to be taken, though, not to create too much dissonance, leading to a complete rejection of the product (Gas & Seiter, 2003). If communicators use cognitive dissonance correctly, consumers can be influenced to change their behavior to create cognitive harmony (Dainton & Zelley, 2005).

Cognitive dissonance cannot make adequate predictions of consumer behaviors *before* they purchase a product (Oshikawa, 1969). Research has shown that advertisements can be used to reduce the amount of dissonance felt by the buyer by promoting desirable qualities of the product (Oshikawa, 1969). A reduction in dissonance helps reinforce the buyer of his or her purchase and increases likelihood of buying the brand again (Oshikawa, 1969). The theory has been used to examine consumer attitudes toward organic food (Hjelmar, 2011). The study found that when mass media provides relatively "shocking information" (Hjelmar, 2011, p. 343) about food, consumers reacted emotionally before rationally processing the information to develop cognitive consistencies with their emotional beliefs. Cognitive dissonance was used for this research to explain consumers' belief that they were purchasing Florida strawberries, but due to their lack of knowledge concerning the growing season, were purchasing imported strawberries.

Purpose and Objectives

The purpose of this study was to determine if consumers' strawberry purchasing behaviors aligned with their preference for Florida strawberries. This study supports priority number one of the American Association for Agricultural Education National, aiming to inform consumers, allowing them to make more educated decisions about agricultural products (Doerfert, 2013). The following objectives guided this study:

Objective 1: Explore consumers' purchasing preferences for Florida strawberries.

Objective 2: Describe consumers' knowledge of Florida's strawberry season.

Methods

This study used mixed methods research to fulfill the purpose and objectives. Mixed method designs use both quantitative and qualitative research approaches "for the purposes of breadth and depth of understanding and corroboration," (Johnson, Onwuegbuzie, & Turner, 2007, p. 123). The weaknesses associated with qualitative and quantitative methods can be offset by utilizing a mixed methods design (Creswell & Plano Clark, 2011). A number of studies in agricultural education have used this method in recent years (Epler, Drape, Broyles, & Rudd, 2013; Walker, 2010; Witt, Doerfert, Ulmer, Burris, & Lan, 2013). Additionally, a literature review on consumer perceptions of local food found that 10% of the studies conducted in the United Stated and Europe used a mixed methods research design between 2000 and 2013 (Feldman & Hamm, 2015).

An exploratory sequential design was used for this study (Creswell & Plano Clark, 2011). This mixed method design was a two-step process that prioritized the qualitative phase over the quantitative phase (Creswell & Plano Clark, 2011). The initial data collected were qualitative, and a quantitative phase followed to help generalize the exploratory results (Creswell & Plano Clark, 2011). Additionally, the quantitative instrument was developed to assess the overall prevalence of themes identified in the qualitative phase (Creswell & Plano Clark, 2011). During analysis, the quantitative data were analyzed to see how they added to the qualitative results and made them more generalizable to Florida strawberry consumers (Creswell & Plano Clark, 2011).

Qualitative Phase

Qualitative methods are useful in research when an issue needs to be explored and researchers require a complex understanding of the problem (Creswell, 2013). The first phase of the mixed methods research design used focus groups to collect qualitative data. Focus groups allow participants to compare and contrast ideas and thoughts through guided group discussions, and can elicit honest answers when conducted appropriately (Morgan, 1998). The purpose of the focus groups was to assess consumers' motivations for purchasing Florida strawberries along with their knowledge of the product.

Participants for the focus groups were recruited using an external marketing firm. The firm used random digit dialing along with a monetary incentive to obtain participants. Focus groups were conducted in a city in north Florida with 50 participants total. Each group had an average of eight participants; the recommended size of focus groups is six to 12 participants (Krueger, 1998). Each participant was assigned a pseudonym for confidentiality in analysis. Table 1 shows the demographics of the participants. The majority of participants were White (66%), female (60%), with an income between $30,001 and $60,000 (56%). The majority of the participants were over the age of 50 (68%).

Table 1
Demographics of Focus Group Participants

Characteristic	*n*	%
Sex		
Female	20	40
Male	30	60
Hispanic Ethnicity	3	6
Race*		
Black or African American	16	32
White	33	66
Income*		
Less than $30,000	9	18
$30,001-$45,000	75	15
$40,001-$60,000	60	12
$60,001-$80,000	50	10
$80,001-$100,000	40	8
$100,001-$125,000	40	8
Age		
18-29	3	6
30-39	8	16
40-49	5	10
50-59	17	34
60+	17	34

*Note. Indicates one person declined to answer in the question.

Member checking was used as a measure of validation by having participants confirm the summary of the discussion (Creswell, 2007). Emergent themes from the focus groups were identified using a constant comparative method of analysis (Glaser, 1965) in the computer software MAXQDA. These themes were used to answer objectives one and two as well as guide the development of the questions for the quantitative portion of the study.

Quantitative Phase

Themes identified in the qualitative phase were used to guide the questions developed for the quantitative instrument (Creswell & Plano Clark, 2011; Morgan, 1998). A survey was used in this study to help generalize the results from the focus groups to the population of Florida (Creswell & Plano Clark, 2011). Florida consumers 18 years and older who purchased strawberries were the target population. Questions guided by the focus groups asked respondents to describe the importance of strawberry characteristics on their purchasing intent using a seven-question, Likert-type scale with the labels *not at all important*, *slightly important*, *fairly important*, *highly important*, and *extremely important*. Respondents also answered questions about their preference for purchasing Florida-grown products through a two-question, Likert-type scale with the labels: *never*, *rarely*, *sometimes*, *most of the time*, *always*. A question also asked respondents if they were given the choice between Florida or California strawberries, which they would prefer. The respondents who selected Florida were then asked what characteristics of the strawberries influenced their decision using a check all that apply question. Finally, one question asked if respondents knew Florida's strawberry season. Those who said yes then selected which months corresponded with the start and end of Florida's strawberry season.

The survey was reviewed by a panel of experts for face and content validity. An online survey company, Qualtrics, distributed the survey and used non-probability sampling to recruit respondents. This sampling is often used by public opinion researchers (Baker et al., 2013) and has been shown to be comparable or even better than probability samples (Twyman, 2008; Vavreck & River, 2008). Quota sampling was used to reduce bias (Baker et al., 2013), and respondents were matched to the 2010 U.S. Census results for sex, race/ethnicity, and age in Florida. The instrument was distributed to 1,812 respondents in Florida, and 500 ($N = 500$) met the set quota. The demographics can be seen in Table 2. The majority of respondents were female (62%), White (85%), over the age of 40 (63%), and had an annual income below $60,000 (68%).

Table 2
Demographics of Survey Respondents

Characteristic	*n*	%
Sex		
Female	310	62
Male	190	38
Hispanic Ethnicity	59	10
Race		
American Indian or Alaskan Native	19	2
Black or African American	45	9
Asian or Pacific Islander	25	5
White	425	85
Other	10	2
Income		
Less than $30,000	155	31
$30,000-$39,999	75	15
$40,000-$49,999	60	12
$50,000-$59,999	50	10
$60,000-$69,999	40	8
$70,000-$79,999	40	8
$80,000-$89,999	15	3
$90,000-$99,999	25	5
more than $100,000	40	8
Age		
18-29	85	17
30-39	100	20
40-49	130	26
50-59	95	19
60+	90	18

Quantitative data were analyzed using SPSS 21.0. Descriptive statistics were used to answer objectives one and two of the study.

Results

Objective 1: Explore Consumers' Purchasing Preferences for Florida Strawberries

Qualitative phase. Consumers' purchasing preference for Florida strawberries was initially explored through focus group questions. The following themes were identified as affecting consumers' strawberry preferences: location of origin, price, and freshness.

Location of origin. *When participants were asked if they cared about what country their produce came from, many replied that they did not care or did not pay attention. When asked, "So, how do you feel about strawberries that are grown in other countries? Does that affect your [purchasing] decisions at all?" Tiffany replied, "It doesn't affect my decisions." Similarly, Gayle said, "I don't care where they are grown. It doesn't matter." Participants also reported that they did not look on labels to see where the strawberries were grown. Jana explained, "Usually I just buy whatever. OK, there are strawberries. I'll get these. I don't even look at what country they're from, to tell you the truth. I just buy them, if that's what I'm looking for." Some participants, like Kenny, did not think the strawberry packages had the location of origin on them, "Usually if you buy [strawberries] out of the store, they don't really tell you actually where they actually really come from, but I don't think that makes a big deal."*

Participants were also asked specifically if they would purchase strawberries grown in Florida. Ben stated, "I would never turn Florida strawberries down." This sentiment was reflected in all the focus groups, participants agreed that they would prefer to purchase Florida-grown strawberries over imported products for the freshness most importantly. Claudette said, "But during the winter especially, Florida's fruits and vegetables are the freshest because we don't have the hard winters." Supporting the local economy and farmers was also identified as a reason for buying Florida strawberries, "Hopefully, you'd think that'd help the economy here in the state," Lee said. Sheree had a similar thought, "I want to be loyal to Florida growers, and be a part of it."

Price. *Price of the strawberries came up often during the focus groups. Participants said they preferred to purchase Florida strawberries during the season because of the lower prices. Barbara claimed, "If there's plenty of them [strawberries], the prices are lower, and because they're in season, they're moving them quicker so they don't go bad or get soft or whatever, you know." Similarly, Sandy said, "You want to buy what's in season for the freshness and the price. Because the less it has to travel, the less it's going to cost." Not only did the participants prefer to purchase strawberries during season for the cheaper prices, they also assumed the lower cost strawberries were from Florida. Ben explained, "I'm thinking … when the price comes down and [strawberries are] in season, I assume that I'm getting Florida because they're not shipping them from California or somewhere else and paying freight on them." Some people indicated they were willing to pay more for Florida-grown strawberries than for imported strawberries. Trenton said,*

> Well, if I had a choice between a strawberry that was grown in Honduras that was a dollar cheaper versus a strawberry that was grown in Florida that was a little more expensive, I would prefer to pay the extra money for the one that was grown in the States.

Price was also identified as determining factor for many of the participants when selecting strawberries. A number of participants said they would often choose the cheaper product if it was the same quality as competitors. Helena said, “I mean, I’m a budget shopper so if it’s from overseas, but it’s at the better price, I am going to get it.” Elise had similar preferences for price, “I mean, if I saw one strawberry package from Mexico and one from Florida and the Mexico’s cheaper and they looked just as good as the Florida, I would go with the cheaper.”

Freshness. *Freshness was a major theme that emerged from the focus groups. Participants felt that Florida strawberries would be fresher because they would travel fewer miles and be in season. Dana best described this theme by saying, “Well, you don’t have that time between the time [the strawberries] leave the field and the time they get to your refrigerator or your kitchen; they’re fresher.” Similarly, Charlotte said,*

> And it [Florida strawberries] is local and it probably is fresher because it is right here in town, and instead of traveling from somewhere and they have to put in a cold case and maybe it is not as fresh. We know it is coming right from our place. So, it may be fresher than moving from another city or coming from another city.

Participants also said that they would not buy the strawberries if they were not in season. According to Ben, “When it’s [strawberries] out of season, I prefer to stay away from it. I want to buy my fruits in season.” Overall, the participants preferred Florida-grown strawberries over imported products for the freshness. Trenton described his opinion, “Yeah, the ones that I’ve bought locally are much fresher. They taste better. The ones that I’ve bought from overseas, I think they’re usually picked over [and] under ripe.”

Quantitative phase. During the quantitative portion of the study, respondents were asked to indicate their preferences for strawberry purchases. Table 3 shows that 73% of respondents identified *freshness* as extremely important when making strawberry purchasing decisions and confirmed the findings from the focus groups. Whether or not the strawberries were *in season* was considered highly or extremely important by the majority of respondents (72%). More than half (51%) said *price* was a highly or extremely important factor for the strawberry purchasing decision.

Table 3
Importance of Strawberry Purchasing Preferences

Characteristic	Not at all Important		Slightly Important		Fairly Important		Highly Important		Extremely Important	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Freshness	1	0	1	0	18	4	115	23	365	73
Taste	2	0	0	0	13	3	136	27	349	70
Nutrition	10	2	31	6	89	18	181	36	189	38
In Season	15	3	31	6	97	19	189	38	168	34
Price	13	3	29	6	154	31	170	34	134	27
Support Local Farmers	32	6	56	11	134	27	152	30	126	25
Convenience	42	8	77	16	185	37	116	23	80	16

Table 4 shows how respondents used the growing location on strawberry packages to make their purchasing decisions. The majority (60%) reported looking on the labels to see where strawberries were grown sometimes or most of the time. Similarly, 53% of respondents indicated they made their purchasing decisions based on where the strawberries were grown sometimes or most of the time.

Table 4
Strawberry Purchasing Based on Growing Location

Characteristic	Never		Rarely		Sometimes		Most of the Time		Always	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
I look on the label to see where strawberries are grown.	35	7	58	12	135	27	163	33	109	22
I make my purchase based on where the label says the strawberries are grown.	56	11	106	21	152	30	117	23	69	14

The survey asked respondents if they would rather purchase strawberries grown in Florida or in California. The overwhelming majority selected Florida-grown strawberries (83%). Only 14% of the respondents reported not having a preference. The people who selected Florida were asked why they preferred those strawberries. Table 5 shows that the majority selected freshness (91%), supporting Florida's economy (83%), and taste (79%) as the reasons for their preference toward Florida grown strawberries.

Table 5
Reasons for Florida Strawberry Preference

Characteristic	*n*	%
Freshness	378	91
Support Florida's Economy	344	83
Taste	328	79
Quality	286	69
Food Miles Traveled	232	56
Safety	203	49
Nutritional Value	170	41
Other	8	2

Objective 2: Describe Consumers' Knowledge of Florida's Strawberry Season

Qualitative phase. During the focus groups, participants demonstrated confusion regarding Florida's strawberry season, and many indicated they rarely saw advertisements for Florida-grown strawberries. Out of the six focus groups, one group was completely unaware that Florida even grew strawberries.

In a few of the focus groups, one person may have known Florida's strawberry season, but the majority said they did not. There were a variety of ideas for when the strawberries would be in season. Even though Florida strawberries are in season during the winter, Elise said, "I look forward to every April and May for strawberry season. It's like yes, let's go, make a strawberry shortcake and the glaze to go with it, put it on ice cream, everything." Other people, like Mike, explained they preferred to purchase the strawberries during the summer when he believed they were in season, "Usually in the summer I'll buy them once a week or every other week, because like I said I like to snack on them when I'm watching TV or whatever. But in the off season, I'll get them maybe once a month."

During the focus groups, participants were asked to give their opinions on the design of several billboards promoting Florida strawberries. One of these billboards said the strawberries were "In season now, all winter long!" Even though the information was accurate, some participants rejected the fact that Florida strawberries were in season during winter months. Tom said,

> This is constraining the marketing season for these Florida strawberries. I don't know if you mean to do that when you say, "In Season Now" or "All Winter Long" you are suggesting that they are only available for a certain amount of time.

Tom's quote reflected a general feeling from the participants that Florida strawberries were available all of the time. Sheree suggested altering the billboard, "Or you could say, 'Florida Strawberries; Fresh All Year Long.'" The participants also had trouble believing winter strawberries would taste good. Tom continued to explain, "So, if they're trying to sell me strawberries in winter, they're going to have to give me more information to convince me that winter strawberries are as flavorful as summer strawberries."

The participants were also asked if they had ever seen any advertising for Florida strawberries. The majority said no. Some said that grocery stores may have a sign up next to the strawberries with Fresh from Florida on it. Many participants also indicated that they rarely saw where the strawberries were grown on the labels or were not looking. Beth said, "Because most strawberries sometimes don't have a label and if there is, it is very small and you are just looking for the price and how fresh it is. But the place, not really looking at the place."

Quantitative phase. The survey asked respondents if they knew when strawberries were in season in Florida. Sixty percent (n = 300) reported that they knew the Florida strawberry season. That 60% were then asked to select the start and end month of the season. Only 13% (n = 39) correctly selected December as the start month, but 28% (n = 84) correctly selected April as the end month. Most of the respondents thought the season started in February (37%, n =111). Even though the highest number of respondents correctly selected April, 29% (n = 87) believed the season lasted through May and June.

Discussion

The qualitative portion of this study found that participants had a strong preference toward Florida strawberries, but their reported purchasing behaviors did not always align with their attitudes. Similarly, the participants were not aware of Florida's growing season, likely making it even more difficult for them to purchase Florida strawberries. The survey was developed to see if these results were generalizable to Florida strawberry consumers, and found mostly consistent data with the focus groups.

Results from the focus groups and the survey show that consumers have a clear preference toward Florida-grown strawberries. During the focus groups, consumers indicated they preferred local strawberries because of their freshness and higher quality when compared to imported products. The survey yielded similar results, allowing the data to be more generalizable to Florida residents who purchased strawberries. These finding were consistent with previous research concluding consumers preferred to purchase local food (Conner et al., 2010; Rumble & Roper, 2014; Zepeda & Levitan-Reid, 2004).

Price was also brought up in relation to purchasing preferences. Many consumers in the focus groups indicated that local food was cheaper because it was traveling fewer miles and was likely supporting local farmers. However, participants indicated that if the local strawberries were more expensive than the imported strawberries, they would purchase the imports. Price being a barrier to purchasing local food is consistent with previous research on the topic (Chambers et al., 2007). The survey also showed that Florida consumers considered price to be important in their purchasing decisions, as well as food miles traveled.

Even though the consumers in the study displayed a preference toward Florida strawberries, the focus groups showed that they did not always think about where their food was coming from or often times simply did not care. This finding contradicts other statements in the focus groups indicating the participants would prefer Florida-grown strawberries, likely because the location of origin of the produce is not a top priority when selecting strawberries in the store. The focus group results support previous research, displaying an attitude-behavior gap among consumers (Chambers et al., 2007; Yu & Tong, 2009; Zepeda & Levitan-Reid, 2004). The survey had some conflicting results though. The majority of respondents reported looking at strawberry labels to see where the fruit was grown and often made purchasing decisions based on the growing location. A possible explanation for this contradiction was that focus group elicited more honest responses from the participants (Morgan, 1998).

This study found that consumers have conflicting knowledge about Florida strawberries. One of the focus groups even indicated not being aware the state even grew strawberries. A few participants may have known when the Florida strawberry season was, but the majority reported they did not. Even when presented with advertisements for the Florida strawberry season, the participants immediately rejected the information, likely because too much dissonance was created (Gas & Seiter, 2003). Many made suggestions to change the billboards to say the strawberries were available all year round. The participants' strong reaction toward the information, and their attempt rationalize it, was consistent with previous research (Hjelmar, 2011). These participants were likely experiencing cognitive dissonance and were attempting to alleviate the discomfort by suggesting changes to make the information more consistent with their beliefs (Festinger, 1957).

Many of the participants also reported that they mostly purchased strawberries during April, May, or summer months. Consumers may envision strawberries as a summer food, making it difficult for them to believe that the fruit is freshest during Florida's winters. This reported behavior also conflicts with their preference to purchase Florida strawberries for freshness. Unfortunately, the consumers likely do not realize they are not purchasing Florida strawberries during the off-season months based on many of them stating they did not look at source of origin information.

The survey found that the majority of Florida consumers believed they knew Florida's strawberry season, but only a small portion could correctly identify the start and end months of the season. These results were consistent with the finding of the focus groups and show that consumers are simply not aware of Florida's strawberry growing season.

Recommendations

Consumers' preference to purchase Florida-grown strawberries is not always reflected in their reported purchasing patterns. This attitude-behavior gap appears to be caused by the fact consumers are not always actively thinking about where their strawberries are coming from. In order to make consumers think more about the growing location of their produce, producers should make the location on their label easier to identify by using a state brand, such as Fresh from Florida. This will help consumers to identify the product as locally grown, and help them to match their behavior to their attitude.

A major issue identified by this study was that consumers did not know when Florida strawberries were in season, but they had a preference for purchasing them. Agricultural communicators should examine target audience knowledge when developing communication campaigns for Florida strawberries, or other commodities. Participants experienced cognitive dissonance when presented with the correct growing months for strawberries in Florida. Communicators should ensure that advertisements are framed to reduce, rather than increase, the amount of dissonance felt by the buyer (Oshikawa, 1969). Consumers may react emotionally to conflicting information (Hjelmar, 2011). Thus, advertisements should promote desirable qualities of the product, like freshness and quality along with the growing season, to reduce dissonance and increases the likelihood of repeat purchases (Oshikawa, 1969). As the consumers develop more cognitive balance with Florida strawberries being grown in the winter and being high quality, they will start more actively searching for Florida strawberries in the winter.

Cognitive dissonance may also be reduced through interactive promotional and educational opportunities. Cooking demonstrations using strawberries during the winter at local grocery stores, events, and community centers could help teach consumers when Florida strawberries are in season while allowing them to experience the product at the same time. Children and their parents could also be educated about Florida strawberry season through incorporation of product seasonality in curriculum, school garden programs, and school cafeteria promotions.

Future research should explore what messages would help consumers reduce cognitive discomfort when presented with information on when Florida strawberries are in season. Messages should focus on the positive qualities of Florida strawberries as well as their growing season. Another research opportunity would be examining consumers' knowledge and preference for strawberries at the point of purchase. This study should be replicated in other states with major agricultural commodities as well. Additionally, this study could be expanded to a larger region to see if consumers in other areas of the country have similar preferences and knowledge for Florida strawberries.

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What Side Are You On? An Examination of the Persuasive Message Factors in Proposition 37 Videos on YouTube

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Abstract

California's Proposition 37 was a ballot initiative to mandatory label products containing genetically modified organisms (GMOs). Although it eventually failed, it generated immense media exposure regarding GMOs and their possible regulatory, health, and economic impacts. The purpose of this study was to compare persuasive message factors in Proposition 37 videos on YouTube. We used a purposive sample taken from an auto-generated YouTube channel, which resulted in 174 videos. Using content analysis, we identified the message side (for, against, or neutral), sources used, message frames, and message appeals. The majority of videos in the sample presented messages in support of the proposition. Citizens were the most common on-camera source. Proponent videos used more emotional appeals, while both videos against and neutral to the proposition incorporated more logical appeals. In addition, the research found three frames were used more by the videos in favor of the proposition than in videos identified as neutral or against. Overall, the results provide insight to how the videos representing for, against, and neutral message sides utilized various sources, frames and message appeals. Recommendations for future research and practice are provided.

Introduction

As agricultural communicators, there is a need to recognize the escalating consumer demand for information regarding the industry's practices and products. When making food choices, Americans are considering more factors than just taste and cost. Now they are looking for information about where the food comes from and how it was produced (International Food Information Council, 2011). Catering to these needs, media outlets have increased their coverage of modern food production issues, including food technology (International Food Information Council, 2012). With the general consumers' limited understanding of the production process, specifically genetically modified (or genetically engineered) food and crops, it is to be expected that they will be hesitant and question the safety of the process (McHughen, 2013). The public's concern regarding the legitimacy and moral authority of information about genetically modified food has generated the need for new scientific communication methods (Augoustinos, Crabb, & Shepher, 2010).

Even after decades of existence, skepticism surrounds the term genetically modified organisms (GMOs), which fuels an intense debate in agriculture (Azadi & Ho, 2010). First developed in the 1980s for medicinal products (Azadi & Ho, 2010), there are now four consumable GM crops being produced: soybeans, corn, canola, and sugar beets (Chrispeels, 2014). GMOs are a common ingredient in 70% of packaged, bottled, or frozen items in American grocery stores (Chrispeels, 2014). In 2012, the dispute regarding GMOs became a mainstream concern in the

United States, specifically regarding labeling requirements for products containing GMOs. According to Premanandh (2010), the purpose of labeling is to help consumers have a choice when selecting food products by providing content information. Chrispeels (2014) stressed that labeling is meant to be neutral. However, Angoustinos et al. (2010) reported the debate of labeling genetically modified organisms is not just about science — it is social, moral, and political.

Introduced in 2012, Proposition 37 was a ballot initiative in California described as the “first major policy attempt to transition from voluntary to mandatory labeling of GE foods in the United States” (McFadden & Lusk, 2013, p. 174). Contrary to the poll results leading up to the election, the proposition failed. McFadden and Lusk (2013) said “support for [Proposition] 37 repeatedly polled around 70% until less than a month before the election” (p. 175). After tabulation, it was narrowly defeated with 51.5% opposing the proposition and 48.5% in favor of mandatory labeling (Zilberman et al., 2013). McFadden and Lusk (2013) claimed the failure might be largely due to campaign advertisements. Although the proposition failed, it served as catalyst for activists in other states to organize a fight for labeling using social media platforms (Plagakis, 2013). In 2013, 26 states introduced bills to label genetically modified foods (Center for Food Safety, 2014). Some surveys indicated more than 90% of Americans are in favor of labeling products containing GMOs (Kopicki, 2013; Langer, 2013). Therefore, monitoring the initiatives is not only important, but necessary because the discourse could be an indication of public opinion about the genetically modified foods.

People have progressively moved toward online media as their source for media consumption (Yoo & Kim, 2012). Particularly, YouTube has surpassed cable networks in reaching 18 to 34 year olds (Glenn, 2013). YouTube was one channel used to inform consumers about Proposition 37. Its ability to reach a wide audience can serve as an influential tool in shaping individual preferences (Susarla et al., 2012), and it is important to recognize not only who is using it, but how it is being used. Currently, it is the second largest search engine (YouTube, 2013). One hundred hours of video are uploaded to YouTube per minute and 60% of people on social media use YouTube as a social networking tool (Meeker & Wu, 2013). Individuals are not only watching videos, they are also sharing, liking, and commenting on videos creating a transformation in consumer engagement (Susarla, Oh, & Tan, 2012). This social aspect, along with effortless usability is driving its success (Cheng, Liu, & Dale, 2008; 2013).

With user-generated content and the swift dissemination of information, it is important to monitor content related to agriculture available through this source. Goodwin and Rhoades (2011) looked at the presence of California Proposition 2 on YouTube. Proposition 2 was a ballot initiative that passed in 2008 that “outlawed the use of battery cages for laying hens, gestation crates for sows, and veal crates for veal calves by 2015” (Goodwin & Rhoades, 2011, p. 22). The study determined what message appeals were used to increase viewers’ support for the legislation and found emotional appeals were used in a majority of the videos. They encouraged others to replicate the study with other issues posted on YouTube and extend the research to other social networking sites (Goodwin & Rhoades, 2011). In addition, Rhoades and Ellis (2010) studied how food safety was framed on YouTube videos and found several authors were posting multiple videos, concluding that “establishing a presence and publishing multiple videos can help the reach of a communication campaign and establish your credibility with the social network found on YouTube" (Rhoades & Ellis, 2010, p. 172).

Professionals and traditional communicators need to not only be aware of messages that could counter their communications efforts (Christensen, 2007), but monitor what videos are posted relating to their specific field of interest. The controversy of genetically modified food could potentially have a negative impact on agricultural production, thus stressing the importance of determining how GMOs are portrayed on new media outlets, including YouTube. For example, mandatory labeling will impose additional costs to regulate proper testing and labeling procedures (Legislative Analyst's Office, 2012). Additionally, although intended to provide objective information, due to negative coverage, these GM labels could be considered warning signs (Chrispeels, 2014), decreasing demand for GM products. In 2013, more than 90% of corn, cotton and soy producers used GM varieties (USDA, 2013). The decreased demand in GMO products would greatly impact those producers. Moreover, GMO policy regulation would complicate further development of technologies (Premanandh, 2010). Agricultural communicators have realized the advantages of adopting emerging technologies and are using sites like YouTube to provide a unique messaging channel (Rhoades & Ellis, 2010).

Literature Review/Theoretical Framework

YouTube has experienced immense growth in users and viewership due to its "usability and functionality" (Susarla et al., 2012, p. 23). Since its development in 2005, YouTube has become a popular platform for Internet users, businesses, advocacy groups, and even political parties as a free service to upload and share videos (Church, 2010; Paek, Kim & Hove, 2010). Unlike watching television and film, people watch YouTube when they have little time (Kavoori, 2011), making it essential to have effective and interesting videos. Kavoori stated, "If the video is poor, the sound is bad, and the context is problematic, it is time to play something else" (p. 8). With viewing condition becoming more critical, it is apparent that message features and content are even more important to study within communication research. The Obama 2008 campaign successfully utilized these components and through YouTube videos, brought politics to the digital realm, (Kavoori, 2011).

With activist groups and scientists supplying information on the negative effects of GMOs (Du & Rachul, 2012), advocates need to address how to effectively combat these messages by providing additional information on the positive impacts of agricultural biotechnology. McHughen (2013) stated, "scientific experts need to share their knowledge to enable a more informed populace and a healthier society" (p. 10). However, this is not an easy task. The constant access and exposure to persuasive communication efforts have made consumers cautious of what is truthful (Perloff, 2010). Therefore, it is important to research what persuasive tactics are most effective in presenting scientific information to ultimately impact political outcomes.

The theoretical framework for this study draws upon the Elaboration Likelihood Model, framing, and message appeals. The Elaboration Likelihood Model (Petty & Cacioppo, 1986) provides a framework to explain the basic processes underlying persuasive communication. The theory states that attitudes can be formed through two routes to persuasion, the central route and the peripheral route (Petty, Cacioppo, Strathman, & Priester, 2005). The central route is for individuals who have a high degree of elaboration when processing a message. Petty and Cacioppo (1986) defined elaboration as "the extent to which a person thinks about the issue-relevant arguments contained in a message" (p. 128). For individuals to generate issue-relevant cognitive responses to a message, or centrally process a message, they have to be motivated and able to process the message (Petty et al., 2005). If motivation is not present or ability is impaired, individuals will rely on simple cues and will not scrutinize the quality of the message (Petty & Cacioppo, 1986). Harington et al. (2006) described the peripheral route to persuasion process when "individuals rely upon affective states or simple heuristics to generate conclusions" (p. 145). Message length and source characteristics are examples of simple cues used in peripheral processing (Petty et al., 2005). For example, Metzger and Flanagin (2013) stated "people are likely to believe a source whose name they recognize as more credible compared to an unfamiliar source, with little inspection of the actual content" (p. 214). Attitudes formed by peripheral processing are less accessible and resistant than attitudes formed during central route processing (Harington et al., 2006). This theory is important to apply to videos, as it provides a framework for both visual elements and message content.

Another theory focusing on message persuasion is Goffman's (1974) theory of framing. Framing is used to describe how mass media present information by selecting or ignoring particular aspects of an issue (Stone, Singletary, & Richmond, 1999). Framing is determined by an individual's set of expectations; using them to create understanding in a given social situation (Baldwin, Perry & Moffitt, 2004). This definition is consistent with Goffman's (1974) explanation that individuals use previous experiences to process information. Traditionally in communication research, framing studies have examined news coverage, but the same process can be used when individuals view videos for information (Rhoades & Ellis, 2010). Regarding GMOs, Abbot et al., (2001) found the media used frames such as human health, environmental, regulatory, business, and morality. Rhoades and Ellis (2010) stated that it is important to understand the frames used in videos because they can influence an audiences' perception of a given topic depending on how the information is presented.

Particular message characteristics, such as appeals, can influence the persuasive ability of messages (English, Sweetser, & Ancu, 2011). Muller (1986) defined message appeals as the designing of messages to motivate consumer purchases. The two message appeals most often used are logical or emotional (Goodwin & Rhoades, 2011). Logical appeals, or logos, provide factual information allowing the audience to evaluate and decide if the information is valid (English et al., 2011). Stemming from information processing models of decision making, logical appeals rely on factual arguments about a given topic assuming the consumer bases behavior on rationale (Albers-Miller & Stafford, 1999; Goodwin & Rhoades, 2011). English et al. (2011) said logical appeals rely on source credibility and statistics.

Emotional appeals are used to motivate consumer behavior by arousing positive or negative emotions about a given product (Kotler & Armstrong, 2010). They deal more with affective processing and generate consumer feelings to persuade behavior (Albers-Miller & Stafford, 1999). Types of emotional appeals can be categorized by those specific emotions including fear, humor, and social appeals. English et al. (2011) examined political communications and the use of message appeals. Their results indicated humor appeals impacted how the viewers assessed the credibility of the message. They concluded “the information is not seen as credible as that coming from an expert or from a fact-based argument” (p. 744).

Purpose and Research Questions

Part of the *American Association for Agricultural Education’s 2011-2015 National Research Agenda* (Doerfert, 2011) is to help the public and policy makers understand agriculture and natural resources by recognizing the potential of emerging social media and messaging strategies. It is vital for agricultural communicators to understand the platforms consumers use to seek information about their food supply, and how agricultural issues are represented on popular media platforms. The purpose of this study was to compare persuasive message factors in Proposition 37 videos on YouTube among the different message sides of the debate (for, against, and neutral). The message side indicated if the video content wanted the proposition to pass, fail, or remained neutral and provided both sides of the debate. Specifically, the research identified the type of sources used in YouTube videos, how Proposition 37 videos are framed, and the message appeals used to convey information about labeling GMO products. This purpose allowed us to establish a fundamental understanding of Proposition 37 messages and how it is used to persuade the YouTube community. To accomplish this purpose, the following research questions guided the study. For each of the message sides:

RQ1: What sources are used in YouTube videos about Proposition 37?
RQ2: What message appeals exist in YouTube videos about Proposition 37?
RQ3: What message frames exist in YouTube videos about Proposition 37?

Methodology

This research used quantitative content analysis to evaluate YouTube videos about Proposition 37 in California. Content analysis is “a method of studying and analyzing communication in a systematic, objective, and quantitative manner for the purpose of measuring variables” (Wimmer & Dominick, 2003, p. 141). Using content analysis can provide new insights, increased understanding of a particular phenomena, or practical actions (Krippendorff, 2012). Content analysis can be conducted using either a qualitative or quantitative design. If the researcher establishes variables *a priori* and is able to use the variables to draw conclusions, the design is quantitative (Ary et al., 2006).

On November 11, 2013, the search term “California Proposition 37” on YouTube yielded about 33,500 individual video results (YouTube, 2013). Therefore, we decided to study a particular YouTube channel. Using the same search term in the main search bar and applying a filter to only display results that were channels, the population was chosen. Collected in mid-November 2013, we utilized an auto-generated channel, established by YouTube, making the population of the study 287 videos. An auto-generated channel is created using an algorithm to collect videos on prevalent topics (YouTube, 2013). A purposive sample was taken from the population, which resulted in 174 videos. The sample was chosen based on the average video length of YouTube videos, which was approximately 4 minutes (Pew Research Journalism Project, 2012). Cheng et al. (2013) also found medium-length (2 minutes and 52 seconds to 4 minutes) videos were more

popular than longer videos. Therefore, we omitted any videos longer than 4 minutes. In addition, 12 videos were eliminated including one duplicate video, one video not relevant to the research, four videos unavailable at the time of data collection, and six radio advertisements. The useable sample consisted of 162 videos ranging from 15 seconds to 4 minutes.
To analyze the sample, a code book was developed based on material adapted from previous literature (Abbot et al., 2001; Abrams & Meyers, 2009; Paek et al., 2010). This code book allowed coders to determine the message side, sources, frames, and appeals used to portray GMO labeling in Proposition 37 videos on YouTube.

To ensure accuracy and meet intercoder reliability, which is needed in content analysis studies, coders were trained and a pilot test was conducted. Intercoder agreement is "a measure of the extent to which independent judges make the same coding decisions in evaluating the characteristics of messages" (Lombard, Snyder-Duch, & Bracken, 2002, p. 587). Following the coder training guidelines set by Lombard et al. (2002), three coders independently analyzed 10 videos, separate from the research sample. All disagreements and concerns were addressed and the code book was altered to clarify any unclear descriptions. Once the researcher believed coders were adequately trained, they proceeded to assess intercoder reliability by conducting a pilot test. Thirty videos were randomly selected from the sample to test reliability.
Following De Swert's (2012) advice, Krippendorff's alpha was used to calculate intercoder reliability. Of the 37 variables, 16 variables met the reliability of .70 or higher, which is acceptable for Krippendorff's alpha and exploratory research (Lombard et al., 2002). The variables that did not meet the set reliability standard were evaluated and clarified with the coders. A second reliability test was conducted and Krippendorff's alpha met the minimum requirement of .70 on all variables. These reliabilities were recorded to verify the consistency between coders. Two coders then divided the remaining 132 videos evenly and proceeded to collect data over a three-day period. The data for each video were recorded on the code book, and later entered into a single Microsoft Excel document.

The final codebook was established after all training and the pilot reliability test were complete. Each video could be coded for one of three message sides (for, against, or neutral). If the video presented messages that clearly expressed a desire for the proposition to pass, it was coded as the "for" message side. Conversely, if the video contained messages stating the proposition should not pass, it was coded as the "against" message side. If the video showed both positive and negative aspects of the proposition, the coder selected the "neutral" message side.
Additionally, coders could select multiple on-camera sources: citizens, celebrities, scientists, farmers, doctors, industry, non-governmental organizations, governmental organizations, and other. If "other" was selected, the coder recorded a description of the source (or lack thereof).

The code book also included seven predetermined frames: human health, environmental, regulatory, business, morality/ethics, right to know, and other (Abbot et al., 2001). These were chosen based on Abbot et al.'s research on GMO media coverage, excluding for the right to know frame. This frame was added after training due to its prevalence in the coder training videos. In addition, the morality/ethics frame was originally just morality, but was extended to include ethics to clarify coder understanding. Depending on the information provided in the videos, coders could select multiple frames per video. Lastly, the code book guided coders to select if the video used logical appeals, emotional appeals, or both. This is another area in the codebook that need additional clarification in its description after coder training and the pilot test.

Once coding was complete, the lead researcher formally evaluated reliability using 10% of the full sample (*n* = 17). The sample was randomly selected, excluding the pilot test subsample. Reliability was calculated using Krippendorff's alpha with the online ReCal program (Freelon, 2013). All variables met the acceptable reliability standard for the measurement and type of research, which was .70 or higher (Lombard et al., 2002). To describe the sample of Proposition 37 YouTube videos, we calculated frequencies and percentages. Cross tabulations were analyzed to explore and compare the persuasive message factors with the message side.

Results

Out of 162 videos sampled, 116 (71.6%) were in support of the proposition, 26 (16.1%) were against, and 20 (12.3%) were neutral to passing mandatory labeling of GM products. The creator most frequently recorded was the category labeled user-generated, or individual creator (*n* = 67, 41.4%), followed by the undefined (other) creator (*n* = 41, 25.3%). The final two video creators identified were media (*n* = 28, 17.3%) and non-governmental organizations (*n* = 26, 16.0%). The video length was recorded with a minimum length of 15 seconds and a maximum length of 4 minutes. The average video length of the sample was 1 minute and 40 seconds (*SD* = 1.00 minute). All videos were uploaded to YouTube between July 1, 2012, and November 1, 2013. The majority of the videos were uploaded October 2012, the month prior to the election (*n* = 92, 56.8%).

RQ1: For each of the message sides, what sources are used in YouTube videos about Proposition 37?

The sources present on camera were identified and the "other" category was the most prominent with 44.4% (*n* = 72) of the videos not fitting a predetermined category. All the "other" sources were then categorized and Table 1 displays the frequency and percentage of each source. Coders identified actors as individuals acting out a role in the video; a celebrity was identified as a famous person. Pamm Larry, a principal campaign leader, was shown in multiple videos and self-described herself as the "initial instigator of Proposition 37." Her grassroots campaign was significant surrounding Proposition 37.

Table 1
Types of On-camera Sources Used in YouTube Videos About Proposition 37 (N=162)

Type of Source	Frequency	Percent (%)
Citizens	48	29.6
No sources	27	16.7
Celebrity	20	12.5
Actors	16	9.9
Scientists	16	9.9
Farmers	15	9.3
Doctors	10	6.2
Reporters	7	4.3
Pamm Larry "initial instigator of Proposition 37"	6	3.7
Industry	4	2.5
Non-governmental	4	2.5
Public officials	3	1.9
Radio hosts	4	2.5
Chefs	3	1.9
Campaign representatives	3	1.9
Characters	3	1.9
Governmental	2	1.2
Not specified	2	1.2
Veteran	1	0.6

Note. Coders could select multiple sources; percentages do not equal 100%

A crosstab was conducted to determine the frequency of sources used compared by the message side (for, neutral, and against). Citizens (n = 34), no sources (n = 21), and celebrities (n = 20) were utilized most by videos for the proposition. The videos against the proposition integrated scientists (n = 8) more frequently than any other on-camera source. Similar to proponent videos, neutral videos most frequently incorporated citizens (n = 10) as on-camera sources. Table 2 provides the frequencies of on-camera sources by message side.

Table 2
Crosstab of On-Camera Sources by Message Side

Type of Source	For	Against	Neutral	Total
Citizens	34	4	10	48
No sources	21	4	2	27
Celebrity	20	0	0	20
Actors	11	4	0	15
Scientists	3	8	5	16
Farmers	9	3	3	15
Doctors	7	3	0	10
Reporters	1	1	5	7
Pamm Larry "initial instigator of Proposition 37"	5	0	1	6
Industry	3	0	1	4
Non-governmental	3	0	1	4
Public officials	2	0	1	3
Radio hosts	4	0	0	4
Chefs	3	0	0	3
Campaign representatives	1	0	2	3
Characters	2	1	0	3
Governmental	1	1	0	2
Not specified	1	0	1	2
Veteran	1	0	0	1
Total	132	29	32	193

RQ2:* F*or each of the message sides, what message appeals exist in YouTube videos about Proposition 37?

The message appeals used in the sample were identified as emotional or logical, as they are the appeals most often used (Goodwin & Rhoades, 2011). If the video presented information using objective statements that used logic and reasoning, coders indicated logical appeals to be present. If the coders indicated the video used emotional appeals, the information was more subjective and appealed to the viewer's emotion. Of the 162 videos, 140 videos (86.4%) used an emotional appeal and 112 videos (69.1%) used a logical appeal. A majority of videos used both types of appeals (n = 93, 57.4%). The contingency table (Table 3) presents the frequencies of message appeals used according to the message side. The videos for the proposition tended to integrate more emotional appeals (n = 110) than the messages against (n = 17) or neutral to the proposition (n = 19). Messages against and neutral to the proposition used more logical appeals than emotional appeals.

Table 3
Crosstab of Message Appeals by Message Side

Message Side	For	Against	Neutral	Total
Logical	71	22	19	112
Emotional	110	17	13	140
Total	181	39	32	252

RQ3: For each of the message sides, what message frames exist in YouTube videos about Proposition 37?

The seven frames provided in the code book were human health, environmental, regulatory, business, morality/ethics, right to know, and other. The most frequently used frame in the sample was the right to know (*n* = 97, 59.9%), followed by human health (*n* = 83, 51.2%). The regulatory frame was used in 44.4% of the videos (*n* = 72), while the morality/ethics frame was used in 42% of the sample (*n* = 68).

To illustrate which message frames were incorporated by each side of the proposition, a crosstab was conducted. The side in favor of the proposition used the right to know (*n* = 84), morality/ethics (*n* = 61), and the human health (*n* = 61) frames more frequently than other frames. In videos against the proposition, the regulatory frame was most commonly incorporated frame (*n* = 17). The neutral videos primarily utilized the regulatory (*n* = 16) and the human health (*n* = 15) frame. Table 4 presents the frequencies of messages frame depending on the message side.

Table 4
Crosstab of Message Frames by Message Side

Message Frame	For	Against	Neutral	Total
Human Health	61	7	15	83
Environmental	14	2	4	20
Regulatory	39	17	16	72
Business	22	9	9	40
Morality/Ethics	61	6	1	68
Right to Know	84	3	10	97
Other	8	1	6	15
Total	289	45	61	395

Conclusions, Discussion and Recommendations

As consumers' interests in agricultural practices increase, the importance of effective communication is reinforced. According to Doerfert (2011), one way to support public understanding is through the development of message strategies on emerging social media outlets. By analyzing message sides, on-camera sources, frames and message appeals the research was able to compare the persuasive message factors in Proposition 37 videos on YouTube.

To describe the presence of Proposition 37 YouTube videos, data were collected using a researcher-developed code book. First, the sample was described by identifying if the videos supported, opposed, or were neutral to the proposition. Out of the 162 videos, 116 (71.6%) supported the proposition and wanted mandatory labeling of GMO products to pass. This is consistent with polls leading up to the election indicating a majority of the public wanted the proposition to pass (McFadden & Lusk, 2013). The remaining videos were 26 (16.0%) against the proposition, and 20 (12.3%) neutral to the proposition.

Research question one was to identify the sources used in YouTube videos about Proposition 37. Examples of the other on-camera sources included no sources, actors, reporters, Pamm Larry, radio hosts, chefs, campaign representatives, characters, and a veteran. Citizens were the most common (n = 48, 29.6%) source. This aligns with the nature of YouTube. As mentioned previously, user-generated content was the most common creator. Given this finding, it can be concluded that the most accessible source would be peers of video creators, rather than experts in the field, doctors, or celebrities. Videos against the proposition used scientists as their primary on-camera source. According to the Elaboration Likelihood Model, this could be beneficial if the viewers are using peripheral cues to process the message. Since a scientist is typically seen as credible, viewers relying on simple cues would assume the information is also truthful. English et al. (2011) stated expert sources are influential in changing an audience's attitude and behavior. However, as mentioned by Perloff (2010) and Augoustinos et al. (2010), consumers are wary of the scientific information.

Research question was to determine what message appeals exist in YouTube videos about Proposition 37. Emotional appeals (n = 140, 86.4%) were used more frequently in the sample than logical appeals (n = 112, 69.1%). This is consistent with Goodwin and Rhoades' (2011) finding that emotional appeals were used more frequently in YouTube videos about Proposition 2, another ballot initiative in California. In addition, the videos for the proposition used more emotional appeal than logical appeals, while both videos against and neutral to the proposition had more logical appeals. Those against the proposition and those neutral to the proposition utilized statistics and objective statements, rather than statements that could provoke emotions. However, in this research, a majority of videos used both types of appeals, typically providing rational and subjective statements to persuade viewers to vote for or against Proposition 37. Research question three was to determine what message frames exist in YouTube videos about Proposition 37. As Rhoades and Ellis (2010) stated, understanding how frames are used in videos is important because these frames can impact how audience members perceive a certain topic. Right to know and human health were the most prominent frames in the sample, present in majority of the videos. By identifying how GMO labeling was framed on YouTube, agricultural communicators can better address the questions and concerns consumers face. This is related to the concept that framing makes some information more salient and can influence how the audience understands the information (McCombs et al., 1997).

The right to know frame deserves recognition, as it was not originally incorporated into the code book. After conducting a pilot test, we noticed its frequency in the sample, and included it for the final coding procedure. Although earlier studies identified many frames used by newspapers and mass media outlets to convey GMO issues (Abbot et al., 2001; Lore et al., 2013), they did not recognize the right to know frame. However, in this sample it was the most prominent (n = 97, 59.9%). It is a unique finding because it addresses a more emotionally-driven, standalone concept of human rights while the other frames can be supported by facts. The very suggestion to take away someone's rights is enough to spark an emotional reaction. This could possibly pose a significant obstacle for the agricultural industry because those in the industry tend to rely on fact to help communicate the processes and products they developed. This frame indicates it may be important to consider other communication approaches, or type of messages to reach non-agricultural audiences.

The second most common frame was human health (n = 83, 51.2%). The human health frame was used to communicate health risk, as well as to reassure the safety of GMO products. When videos cited negative human health effects and provided a source, the most noted was a French study (Seralini et al., 2012) that indicated genetically modified corn produced tumors in rats. Since the release of that study, it has faced numerous criticisms and has been removed from the journal it was published in (Chrispeels, 2014); however, the impact still prevails in this sample of YouTube videos. With the majority of the videos using a human health frame, it implies that the safety of genetically modified organisms is still a concern.
Another important finding was the presence of the morality/ethics frame (n = 68, 42%). Although this frame was found in other studies, in this sample it was incorporated much more frequently (Abbot et al., 2001; Lore et al., 2013). This was interesting because this frame focused more on ethical and moral standards such as business transparency and honesty, rather than the negative or positive effects of labeling genetically modified organisms. Augoustinos et al. (2010) recognized the need for new communication tools when science is challenged by social, moral and political standards.

It is important to note that the three prominent frames were used more by the videos in favor of the proposition than those coded as neutral or against. Neutral videos utilized the regulatory and human health frame most frequently, and the videos opposing the proposition predominantly used the regulatory frame. These findings support and explain why videos for the proposition, as well as the overall sample, had more emotional appeals present. All three of these frames can easily incite emotional responses. Additionally, the results provide topics for agricultural communicators to consider when developing opposing messages on GMO labeling.

Based on the results of this study, we provide several recommendations for future research. One limitation of this study is the sample size. It is possible videos that better represent the Proposition 37 on YouTube were missed using the user-generated channel. Future research should take a random sample of videos to help obtain an accurate representation of all Proposition 37 YouTube videos. In addition, many of the identified sources were not originally included in the code book (n = 72, 44.4%). This could be because the nature of YouTube does not follow the typical gatekeeping processes, such as filtering sources based on professional news criteria. This difference allows other sources to be used that may not have met the more rigorous standards of traditional media outlets. Moreover, research should be conducted to address the moral/ethical frame more extensively. Exploring why consumers are concerned with business transparency and honesty can provide ways to build a better relationship with consumers. Future research should examine, through qualitative or experimental methods, which source is most favorable among viewers when supplying scientific information to the public on social media platforms.

The findings of this study lead to important implications for future practice. First, it is important to note the prevalent amount of videos related to Proposition 37 on YouTube. The keywords for Proposition 37 alone returned more than 33,000 results. This indicates that YouTube is now a platform where agricultural issues are presented. Therefore, there is a definite need for practitioners to use YouTube as a communications outlet. The complexity of political discourse makes it difficult to assert that YouTube alone could change poll results; however, it would be wise for practitioners to be aware of its content when developing messages. It provides insight on public opinion, an outlet to reach a younger audience, and an additional channel to supply information.

In addition, the findings associated with message frames used in the sample highlight an important issue. The most prominent frame in the sample was the right to know. This finding has important implications for developing campaigns against mandatory labeling because it is not a fact-based argument. Agricultural communicators need to be aware of these types of arguments to sufficiently approach and overcome such opposition. By recognizing competing messages, and the popular points of debate, communicators can produce more effective counterarguments.

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Perceived Safety Climate Attitudes of Missouri High School Agricultural Mechanics Students

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Abstract

Agriculture production encompasses a diverse array of machinery, animals, and plant systems, as well as a diverse workforce. Agriculture accounts for about 70% of the child labor worldwide and about three-quarters of a million youth are employed in agriculture in the United States. The training for youth oftentimes comes through 4-H and FFA programs developed to promote risk reduction, and specific training can be seen in areas such as the agricultural mechanics laboratory. While in the agricultural mechanics laboratory, students form perceptions about the climate around them and how others can influence this climate. The purpose of this study was to investigate the perceptions high school students had regarding the high school agricultural mechanics laboratories in Missouri. It was concluded that students across the state perceive to have a positive outlook on their safety climate. However, students also indicated improvement could be made regarding the perceptions of their classmates. These findings imply there is still opportunity for improvement, especially in regards to fellow student safety climate perceptions. Finally, further research should be conducted to investigate the impact of specific factors on student safety climate perceptions.

Introduction

Agriculture as an industry has drastically reduced the required labor hours to complete various tasks (MacDonald, Korb, & Hoppe, 2013) , provides commodities to the world, encompasses the work of many specific industries (Schwartau, 2013), and employs more than one-third of the world's labor force (*Safety and Health in Agriculture: ILO Code of Practice*, 2011). The diversity with varying machinery, animals, and plant systems coupled with a wide variety of environments has shown to have a significant bearing on the risk level involved with agriculture production. Moreover, this risk level is increased when youth, seasonal workers, and older adults are involved in the production of goods and services (*Safety and Health in Agriculture: ILO Code of Practice*, 2011). Specifically, agriculture accounts for 70% of the child labor worldwide, and about three-quarters of a million youth are employed in agriculture in the United States each year. In 2009, 16,000 adolescents were injured on farms while using machinery and over the last 20 years, an average of 113 youth have died annually (Ragins & Verbos, 2007). Service programs through organizations such as the FFA and 4-H have been developed to help reduce injury levels and provide safe practices for those living and working in the agricultural sector (Rudolphi, 2011).

Agricultural training for youth often comes in the form of a learning laboratory such as a greenhouse, animal farm, or agricultural mechanics laboratory (Phipps & Reynolds, 1992). Specifically, the agricultural mechanics laboratory experience is a means to enable students to learn in a safe and controlled environment, thus providing students a place to learn concepts that can be transferred to the home and workplace (Langley & Kitchel, 2013). As such, the use of laboratories has been an integral part of agricultural education programs (Ingersoll & Kralik, 2004), and the laboratory is potentially a powerful context for student learning outcomes to occur (Roberts & Ball, 2009). With previous research identifying the importance of laboratory use in a complete agricultural education program, educators must evaluate the process of teaching students while providing a safe environment for learning.

In the agricultural mechanics laboratory, students are exposed to metal working, wood working, agricultural machinery, chemicals, compressed gasses, and electrical equipment identified as potentially dangerous (D. Johnson & Schumacher, 1989). It is the obligation of the instructor to maintain a high regard for the safety of the students while they are in the agricultural mechanics laboratory (Gliem & Miller, 1993). However, research has revealed teachers may not be providing adequate safety equipment when students are working with dangerous equipment (Lawver, 1992). In addition, more than a third of the students surveyed at the 2002 Houston Livestock Show and Rodeo-Agricultural Mechanics Project show identified they were not required to wear eye protection, had not been instructed on the use of hand and power tools, and were not required to wear hearing protection when necessary (Ulrich, Pavelock, Mueller, & Harrell, 2005). This countered teachers' perceptions as they perceived having an above average ability in regards to safety instruction and consider safety instruction highly important in regards to the agricultural mechanics laboratory (D. Johnson & Schumacher, 1989; Saucier, 2010; Smith & Ingersoll, 2004). These contradictory findings could suggest a disconnect between teachers' perceived ability and the actual effectiveness of the safety instruction they are providing to their students.

Agricultural education has a tradition of being very practical in the approach taken to teaching skills and competencies. As of late, many teachers in states specifically providing instruction in the Power, Structural, and Technical Systems career cluster have adopted industry curriculum to help focus their instruction (Chumbley, Gill, & Chesher, 2013). Examples include curriculum developed by the National Center for Career and Educational Research (NCCER) and general safety curriculum developed by the Occupational Safety and Health Administration (OSHA). The Common Career Technical Core curriculum, which has been adopted by 46 states, contains the Power, Structural, and Technical Systems area (PSTS). The PSTS outlines competencies students should be taught while in the agricultural mechanics laboratory. Thus, teachers fulfilling state standard requirements would be expected to provide instruction in areas such as metal fabrication, woodworking, electrical principals, and operating and maintaining agricultural machinery. Specifically, these areas should include current practices that pertain to each individual task and should be focused on industry-based standards (Wong, 2004). Along these same principals, Hubert, Ulrich, Lindner, and Murphy (2003) asserted that if skill development was one of the focuses of laboratory instruction, then attention to all components of a skill including safety is essential. However, agricultural mechanics students have indicated potential gaps in content and safety instruction.

In academia, there have been concerns regarding safety training and compliance with calls for research on noise exposure and Personal Protective Equipment (PPE) use and availability (Dyer & Andreasen, 1999). When one references industrial safety literature, some of the same concerns exist and have direct ties to curriculum used to teach competencies of the Power, Structural, and Technical Systems career pathway. For example, hearing loss due to high noise levels over a period of time is a recognized problem in the construction industry (Hong, 2005). Likewise, over 70% of agriculture teachers providing agricultural mechanics instruction in West Virginia were found to have measurable hearing loss (Woodford, Lawrence, Fazalare, & Martin, 1996). However, when one starts to identify causes of injury or degraded health (e.g. hearing loss), often the equipment being operated/used is scrutinized, even though 10% of reported accidents are from unsafe mechanical or physical conditions of machinery (Vredenburgh, 2002). Most accidents result from humans performing unsafe acts and are series of events rather than one single phenomenon (Vredenburgh, 2002). The agricultural mechanics laboratory houses various types of machinery and teachers have reported up to 30 students in the agricultural mechanics laboratory at one time (Chumbley et al., 2013). With only minimal injuries resulting from faulty machinery and a majority resulting from human behavior (Vredenburgh, 2002), the behaviors of teachers and students could be a potential cause.

Agriculture teachers, school administrators, and university experts alike have noted potential dangers within the agricultural mechanics laboratory exist (Gliem & Miller, 1993; D. Johnson & Fletcher, 1990). Industrial safety experts identified 10 areas of neglect related to construction safety: scaffolding, fall protection, ladder safety, respiratory safety, PPE, first aid and fire safety, confined spaces, recordkeeping, welding safety, and safety training (Tom & Todd, 2008). Consequently, seven of the areas listed by industry experts as areas of neglect are also listed in the PSTS as competencies students should be learning. Thus, safety performance of instructors and students while in the agricultural mechanics laboratory should be evaluated.

Safety performance evaluation is an essential part of a safety management system and has traditionally been in the form of retrospective data such as injury rates, accident frequency, severity rates, and cost due to accidents (Sgourou, Katsakiori, Goutsos, & Manatakis, 2010). While these indicators give a very clear picture of what has happened in the past, they often miss underlying causes of accidents (Sgourou et al., 2010). Consequently, prospective performance evaluation methods provide information that is often lacking in retrospective methods such as organizational methods, cause and effect relationships, and commitment to procedures (Sgourou et al., 2010). Prospective methods aim at revealing how well an organization is performing in regards to activities that prevent injuries and ill-health. When researchers investigate an organization using prospective methods, the activities of the safety management team, employee activities, and immediate supervisor’s activities are often investigated as a means of evaluation (Flin, Mearns, O’Connor, & Bryden, 2000). Nevertheless, academic safety evaluations using retrospective methods and instructors’ perceptions could be misrepresenting the agricultural mechanics laboratory.

Conceptual Framework

Safety analyses and safety management have become more important as more people have become aware of possible dangers that exist in various workplace situations (Flin, Mearns, O'Connor, & Bryden, 2000). Safety within a particular setting where a group of people form beliefs, attitudes, and general perceptions of workplace safety can be termed a *safety climate* (Schneider, Ehrhart, & Macey, 2013). Safety climate characterizes the day-to-day operations of an organization and five themes have been consistently evaluated across multiple questionnaires:

perceptions of management, environmental risk, competence, work pressure, and safety systems are the most common themes found in multiple safety climate measures (Flin et al., 2000). Safety climate literature examines the role of managerial personnel in relation to others' perceptions of the aforementioned characteristics. Conceptually, safety climate in the agricultural mechanics laboratory could equate agriculture mechanics teachers to the role of the manager. Students can be conceptualized as having similar roles of workers in that they are expected to complete a task in a way set forth by their teacher.

Safety climate research posits individuals' safety climate perceptions are influenced by the attitudes of the supervisor, and unsafe attitudes almost always precede accidents. Harper (1983) conducted a safety attitude study with agricultural students where students were evaluated on their safety attitudes in comparison to the safety attitudes of the person supervising their activities. Various agricultural activities such as livestock production and machinery operation, where a parent, county extension agent, or an agriculture teacher contributed their attitudes toward safety, was evaluated. Harper (1983) concluded that students were more likely to be safety conscious when their supervisor demonstrated knowledge, provided a safe environment, conveyed a positive safety attitude, and followed proper safety practices.

Safety climate measures can be a route to analyze a component of the safety attitudes within a group of people (Flin et al., 2000). Specifically, safety climate research provides a basis for assessing the perceptions of students while in the agricultural mechanics laboratory (Harper, 1983; Ulrich et al., 2005).

Agricultural mechanics instructors are using industry-based safety curriculum to provide instruction to meet Common Career Technical Core competencies. Agricultural mechanics instructors have also identified that they perceive having an above average ability to provide safety instruction to their students (McKim & Saucier, 2011), but students expressed safety instruction provided is inadequate (Ulrich et al., 2002), and noted instructors conveying a poor safety attitude in the agricultural mechanics laboratory (Schulz, Anderson, Paulsen, & Schulz, 2013). Industrial safety literature identifies ways an organization could potentially evaluate the safety climate and posit all who inhabit an area at a specific time have a perception of the current safety climate (Flin et at., 2000). Past agricultural education research indicates teachers have shared their perceptions of safety instruction, equipment availability, self-efficacy of tool usage, and comfort while in the agricultural mechanics laboratory (Hubert, Ulrich, Lindner, & Murphy, 2003; D. Johnson & Schumacher, 1989; Langley & Kitchel, 2013; McKim & Saucier, 2011). However, research identifying student perceptions related to safety in the agricultural mechanics laboratory is lacking within our profession. Thus, when research related to agricultural mechanics safety evaluation is synthesized, two of the emerging themes contradict one another. Agricultural mechanics instructors have a perception of effectively teaching safety instruction, yet students identify a lack of proper safety instruction and a lack of PPE . This contradicting phenomenon warrants further investigation into the safety climate with in the agricultural mechanics laboratory. Thus, the following research question was developed to guide this research: What safety concerns are present in the agricultural mechanics laboratory among high school students?

Purpose

The purpose of this research is to determine if industrial safety measures can identify potential safety concerns and attitudes regarding the safety climate in Missouri agricultural mechanics laboratories. Specifically, this study will focus on the safety climate attitudes and perceptions of the students utilizing the agricultural mechanics learning laboratory. The following research objective was generated to guide this study. Further, this study aligns with research priority three, *scientific and professional workforce*, of the American Association of Agricultural Educators. The objectives set forth in this study will contribute to the body of knowledge impacting the needed workforce from farm workers to Ph.D. scientists (Doerfert, 2011)

1. Describe Missouri high school agricultural mechanics students perceptions of the seven safety climate dimensions:
    1. Teacher safety priority, commitment, and competence
    2. Teacher safety empowerment
    3. Teacher safety justice
    4. Student safety commitment
    5. Student safety priority and risk non-acceptance
    6. Safety communication, learning, and trust in fellow student safety competence
    7. Student trust in the efficacy of the safety systems

Methods

This study utilized descriptive research methods. Consistent with the literature on research design, a tailored, mailed approach of data collection was employed to gather information necessary to accomplish the purpose and objectives of the study (Dillman, 2007). Descriptive research methods were used to "produce information on groups and phenomenon that already exist" such as students and teachers (Fink, 2003, p. 33). Furthermore, many studies describe social phenomenon based on form, structure, activity, changes over time, and any relationship to other phenomenon (Gall, Gall, & Borg, 2003). One way to gather information about groups of people and to describe any occurrences within groups is through the use of survey data (Fink, 2003). Following literature on research design, this study used a self-administer instrument to gather data regarding safety perceptions of both students and teachers.

The target population was all Missouri high school agriculture students enrolled in courses involving competencies related to the PSTS area of the Common Career Technical Core Standards ($N = 21{,}486$). The selection criterion established *a priori* was the agricultural education district each program represented and agriculture programs offering courses with competencies related to the PSTS area of the Common Career Technical Core in the 2013-2014 school year. Thirty agricultural education programs were invited based on the agricultural education district represented and the requirement of providing courses with PSTS competencies. Agricultural education programs were selected using a stratified random sample. Stratified sampling is used when sub-groups of a population are evident (Fink, 2003). Within the Missouri agriculture education program, there are six districts across the state. Thus, having districts broken down by geographical region, and evidence to suggest varying curriculum components and learning outcomes, the six agricultural education districts served as the strata for this study.

Of the 30 agriculture programs identified, 24 individual school districts granted permission to access both their agriculture teachers and students. Of the 24 districts, 21 teachers across 15 individual school districts agreed to participate in this study. Upon agreeing to participate, each teacher provided how many students were eligible to participate based on the requirement of being enrolled in a course where agricultural mechanics competencies had already been taught for the 2013-2014 school year. Thus, Missouri agriculture teachers provided access to a sample of 742 (n = 742) students across all six Missouri agricultural education districts. Initially, 573 responses were returned providing a response rate of 77.2%. After data entry, a final usable student sample of 548 (n = 548) was available for data analysis; therefore, a final response rate of 73.85% was achieved. Twenty-five student responses were unusable due to incomplete questionnaires, response set data, or an entire section(s) was incomplete. Student data were considered unusable if students either failed to complete an entire section(s) of the survey or circled entire columns within the questionnaire

The average student respondent for this study was male (76.3%) and 16.33 (SD = 1.29) years old. Student respondents reported having an average 3.06 (SD = 2.22) semesters of agricultural mechanics instruction including the one they were currently enrolled in.

Instrumentation

For this study, a paper questionnaire for gathering student data was created. This instrument was derived from the Nordic Safety Climate Questionnaire (NOSACQ-50) initially designed to investigate safety climate in an industrial setting. The modified instrument titled, Student Safety Climate Perceptions, was modified to reflect an educational setting rather than an industrial setting for use in this study. Thus, we measured seven perceptions of student safety climate.

The first construct of the NOSACQ, *teacher safety priority, commitment, and competence,* contained nine items. This construct assessed students' perceptions of the priorities teachers have in being active in promoting safety and how teachers react to unsafe behavior. Furthermore, this construct assessed the student perception of how their teacher handled communicating safety issues and how much competence they showed when unsafe situations arose (Kines et al., 2011). The second construct, *teacher safety empowerment,* contained seven items. This construct assessed students' perception of teacher safety empowerment toward the students. Empowerment is a delegation of power, and demonstrates that teachers trust students' ability and judgments and value students' contributions to the safety in the agricultural mechanics laboratory (Kines et al., 2011). The third construct, *teacher safety justice*, contained six items. This construct assessed the student's perceptions of how the teacher treated students who were involved in an accident. Often, justice of safety is seen to be inflexible and inhibits learning from a situation due to blame (Kines et al., 2011). As such, Kines et al. (2011) suggest that justice could be different for each situation. Each of the 22 items in the first three constructs were measured on a four-point Likert type scale. The anchors are as follows: *1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree*.

Each of the remaining four constructs allowed students to share perceptions of themselves and fellow student safety aspects. The fourth construct of the NOSACQ, *student safety commitment,* contained six items. This construct assessed worker perceptions of how they themselves relate to safety while in the agricultural mechanics laboratory (Kines et al., 2011). Specifically, this construct aimed at measuring the safety commitment, how active they are in promoting safety, and how much they care for each other's safety. The fifth construct, *student safety priority and risk non-acceptance*, contained seven items. This construct assessed whether or not students put safety before production, how willing they are to accept risk, and show fearlessness (Kines et al., 2011). The sixth construct, *safety communication, learning, and trust in fellow student safety competency,* contained eight items. This construct aimed at assessing how student communicate with each other when safety issues emerge. Moreover, students shared perceptions of how much they feel they help each other work safely, take safety suggestions seriously, and trust each other's ability to ensure a safe work environment each day in the agricultural mechanics laboratory. The seventh and final construct of the NOSACQ, *students trust in the efficacy of safety items*, contained seven items. This construct assessed in general if students consider formal safety as effective, see benefit in early planning, see benefit in safety training, and see benefit in clear safety goals and objectives (Kines et al., 2011). Each of the 28 items in the last four constructs were measured on a four-point Likert type scale. The anchors are as follows: *1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree*. Thus, the higher number, the more agreement with each item.

The original form of the NOSACQ-50 instrument was based on industrial terms such as managers and workers. For this study, the researchers felt it was appropriate to change the terms to reflect the educational setting that it was being used in. Furthermore, changing words in each of the items, as well as using this instrument in a new population, presented concerns about reliability. As an industrial measure of safety climate, the NOSACQ showed Cronbach's reliability estimates ranging from .71 to .87 (Kines et al., 2011). However, since this instrument was not used in its original form, pilot test data were collected from a sample of recently graduated high school students attending the University of Missouri and were previously enrolled in agricultural mechanics courses. Fink (2003) asserted 10 or more people are needed to complete the instrument so reliability estimates can be calculated. Sixty-two instruments were sent to the pilot test population. Responses from 58 students were gathered for an initial response rate of 93.54%. This pilot test involved test-retest for reliability analysis of specific components. As such respondents were initially asked two questions: 1) While in high school, were they enrolled in a course where they received instruction in agricultural mechanics? and 2) Were they willing to repeat the last 11 items of this survey in approximately 10 days? Of the 58 respondents, 25 meet both criteria and submitted usable data. Cronbach's reliability estimates for the seven safety climate dimensions range from .78 to .96. According to Nunnally and Bernstein (1994) these reliability estimates are well within the limits early research reliability estimates. The last 11 items of the instrument were estimated for reliability using the test/re-test method, producing a percent agreement ranging from .94 to .86. According to Rubin and Babbie (2009), percent agreement above .80 is acceptable.

Data Collection and Analysis

To gain access to the 30 schools selected for this study, the researcher gathered contact information via the published state directory. Upon retrieving the contact information, each school was contacted by email, informing them of the study. Two persons were contacted: first, the principal/superintendent to gain permission to access the school district teacher(s) and students, and secondly, the agriculture teacher(s) to gain permission to use their agricultural education program in this study. Each agriculture teacher gave permission for data to be collected from themselves as well as their students during a routine school day. Teachers were provided with instructions pertaining to each instrument as well as instructions regarding non-participation. Teachers were informed that students should be provided the opportunity to withdraw any or part of their information with no penalty. Data were collected from students one time via a mailed questionnaire. Each school was mailed a packet containing instructions, student instruments, and a return envelope with prepaid postage attached. Schools not returning the instrument packets within the first 10 business days were contacted by telephone to encourage them to return the completed instruments for evaluation. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) 21.0 for Windows.

Specifically, the developers of the NOSACQ-50 established guidelines for interpreting the results of each dimension. The researchers saw fit to use those guidelines for data interpretation and reporting in this study. According to the NOSACQ-50 developers, a mean score higher than 3.31 indicates a *good level of safety climate*, a mean score between 3.00 and 3.30 points to a *fairly good level of safety climate*, a mean score of 2.70 to 2.99 shows a *fairly low level of safety climate*, and a mean sore less than 2.69 indicates a *low level of safety climate*.

Results

The first research objective sought to describe perceptions held by Missouri high school students regarding the seven dimension of safety climate. Each of the seven safety climate dimensions were measured on a four-point Likert scale using the anchors: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree, and N/A = not applicable. Those anchors correspond to safety climate levels with the following prescribed limits of the original NOSACQ-50 instrumentation: 1.00-2.69 = *low level of safety climate*, 2.70-2.99 = *fairly low level of safety climate*, 3.00-3.29 = *fairly good level of safety climate*, and 3.30-4.0 = *good level of safety climate* (Kines et al., 2011). The first three dimensions of safety climate describe how the students feel about safety management, safety procedures, and safety practices implemented by the teacher within the agricultural mechanics laboratory. Students from all six agricultural education districts indicated a good perceived level of safety climate for the first dimension, *teacher safety priority and commitment* with mean scores ranging from 3.95 (*SD* = .10) to 3.64 (*SD* = .36) as well as the second dimension, *teachers' safety empowerment,* with mean scores ranging from 3.90 (*SD* = .23) to 3.40 (*SD* = .49). However, the third dimension, *teacher safety justice,* the Southeast, Southwest, and South Central agricultural education districts indicated a good level of perceived safety climate while the Northeast, Northwest, and Central districts indicated only fairly good levels of safety climate. Mean scores for the dimension ranged from 3.52 (*SD* = .51) to 3.16 (*SD* = .62). Figure 1 gives a visual comparison of each of the three constructs for each district.

To further describe the first three dimensions of safety climate, the researcher noted that each FFA district reported having higher levels of safety climate for the dimension *teacher safety priority*, followed by *teacher safety empowerment* and the lowest level of safety climate for *teacher safety justice*. *Figure 1* illustrates each dimension as reported by students within each FFA district.

Figure 1. Student perceptions of the safety climate provided by the teachers, by agricultural education district.

The remaining dimensions of safety climate evaluated student workgroup safety management, policies, and procedures. The data for the following dimensions were measured on the same four-point Likert scale with the same anchors and prescribed limits as the first three dimensions.

Students from five (Northwest, Central, Southeast, Southwest, and South Central) of the agricultural education districts reported having fairly good levels of safety climate for the fourth dimension, *student safety commitment.* Students from one (Northeast) of the agricultural education district reported having fairly low safety climate levels. Mean scores for the dimension ranged from 3.29 (SD = .40) to 2.96 (SD = .55).

Students in all six of the Agricultural education districts reported having fairly good levels of safety climate for the fifth dimension, s*tudent safety priority and risk non acceptance,* with mean scores ranging from 3.29 (SD = .40) to 3.08 (SD = .64). Meanwhile, students in four (Northeast, Northwest, Central, and Southeast) of the agricultural education districts indicated having fairly good levels of safety climate for the sixth dimension, *safety communication, learning, and trust in fellow student safety competence.* Students in two (South Central and Southwest) agricultural education districts reported having higher safety climate scores of good in regard to this dimension.

Students in three (Southeast, Southwest, and South Central) of the agricultural education districts reported having fairly good safety climate levels while students in the remaining three agricultural education districts (Northeast, Northwest, and Central) districts reported having fairly low safety climate levels for the final dimension, *student trust in the efficacy of the safety systems.*

Figure 2 illustrates how students in each district regarded dimensions of safety climate when dealing with fellow students.

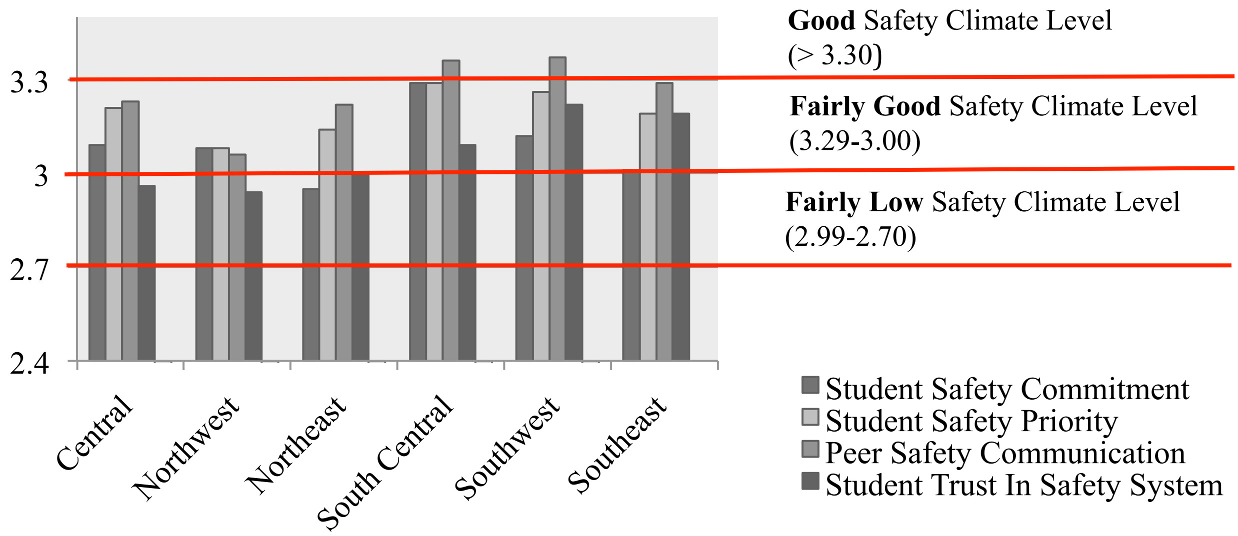

Figure 2. Individual FFA district student perceptions of the safety climate when dealing with fellow students.

Overall, students in the Southeast, Southwest, and Southcentral districts indicated perceiving an overall good level of safety climate with mean scores ranging from 3.45 (*SD* = .30) to 3.39 (*SD* = .36). Meanwhile, students in the Northeast, Northwest, and Central districts indicated only having a fairly good level of perceived safety climate with mean scores ranging from 3.24 (*SD* = .32) to 3.22 (*SD* = .38). *Figure 3* illustrates the overall safety climate for each FFA district in Missouri.

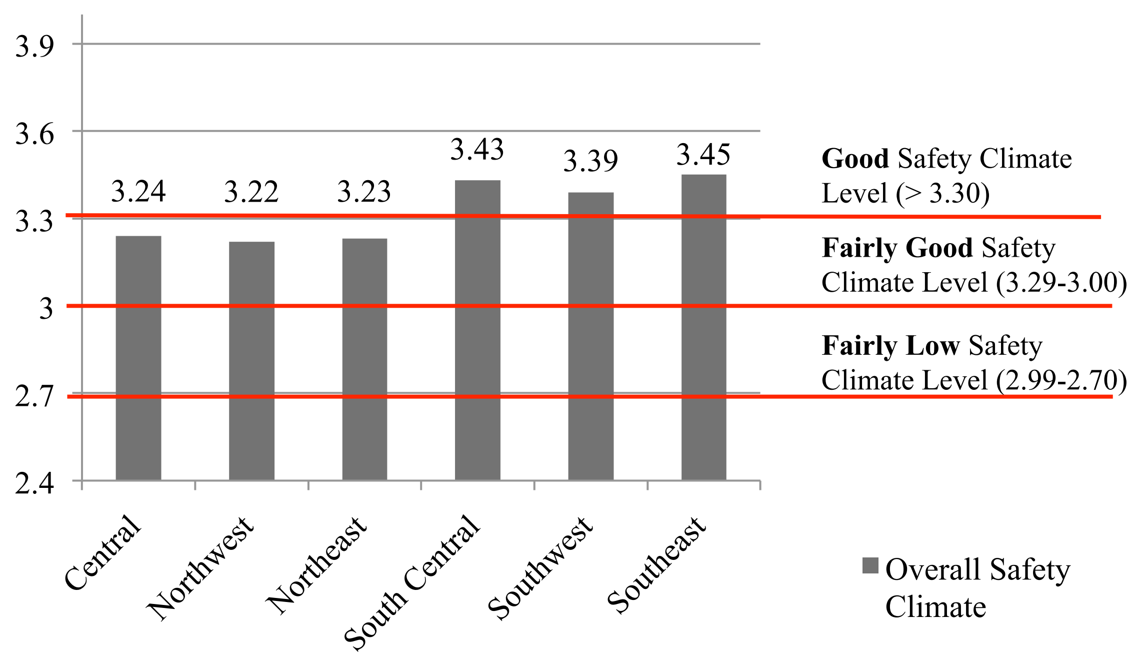

Figure 3. Overall safety climate for Missouri agricultural education districts (n = 548).

Conclusions

This study was the first study to utilize the NOSACQ-50 safety climate questionnaire in a high school academic setting; therefore, direct comparison of previous studies is not possible. It was concluded that students from all Missouri agricultural education districts perceive having a good level of safety climate in regards to items evaluating teacher safety management, teacher safety procedures, and teacher safety practices in the agricultural mechanics laboratory.

Further, it was concluded that students from all Missouri agricultural education districts perceive having only a fairly good level of safety climate in regards to items evaluating fellow student safety management, fellow student safety procedures, and fellow student safety practices. K. Johnson (1982) asserted that poor attitudes toward safety almost always precede accidents and Lutness (1987) asserted safety climate provides early warning signals to basic safety problems. Flin et al., (2000) stated "safety climate…may reduce the need to wait for the system to fail in order to identify weakness and to take remedial actions" (p.178). Further, Kines et al. (2011) stated safety climate mean scores above 2.5 would represent a positive safety climate when using the NOSACQ-50 instrument. Thus, the overall conclusion can be drawn that Missouri high school students' perceptions indicate they do not feel they are at an immediate risk to be involved in an accident.

Implications

Safety climate research using the NOSACQ-50 offers a multi-level and multi-faceted perspective of a group safety climate perspective rather than a global measure of safety climate (Kines et al., 2011). By using this approach, organizations can more specifically identify areas where improvement is needed (Kines et al., 2011). Students in all districts identify the teacher as providing a positive perception of safety climate. This implies teachers should continue with the teaching practices that are currently being used in the agriculture mechanics laboratory to convey safety practices and procedures expected by the teacher.

Meanwhile, students perceive their fellow student to lessen their safety climate perception to only fairly good. Kines et al. (2011) asserted that people need to be in equilibrium with the social environment around them, and the safe actions expected by others can influence one's perception of safety climate. Clark (2006) suggested that people are more committed to similar groups (student group) and these groups are the most influential, especially of new members. Kines et al. (2011) also suggested trust in fellow student qualifications, skills, and knowledge can influence one's safety climate perceptions. Thus, it can be implied that when students perceive their peers to have a lower level of safety climate, they also follow in a similar path due to the perceived qualifications, skills, and knowledge of their peers around them.

Overall, students' perceptions of safety climate indicate they do not feel they are at an immediate risk of injury while in the agricultural mechanics laboratory. As reviewed earlier, safety climate measures individual aspects and provides areas where improvement can be made (Kines et al., 2011). Thus, it can be implied that although students have an overall positive ($M \geq 2.5$) safety climate perception, there is still opportunity for improvement, especially in regards to fellow student safety climate perceptions.

Recommendations

Secondary agriculture teachers in Missouri should largely continue with the current practices and teaching methods currently used based on the positive safety climate perceptions reported across all six Missouri agricultural education districts. Safety climate perceptions of students indicate a need to improve the perception students have regarding fellow students in the agricultural mechanics laboratory. A group with higher homogeny in its safety climate has the largest impact on the overall perception of safety climate; thus, secondary teachers should focus on this as an area of improvement. Specifically, teachers should make sure the group understands the commitment one another have for safety of not only themselves, but those around them as well. An example of this could be to allow a student to simulate a potentially dangerous situation involving a fellow student and allow the students in the class to correct the situation based on protocols set forth by the teacher.

Research should be conducted to investigate what methods and practices are being used in Missouri agriculture mechanics laboratories to teach safety concepts and practices. Research should also be conducted as to which, if any, of those practices most influence safety climate in Missouri FFA students. Further, research should be conducted to determine what influences students' perceptions of their fellow classmates. One possible research question could center on the value of fellow students performing demonstrations and the actual knowledge students have about others' competence while in the agricultural mechanics laboratory.

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Dexterity: An Indicator of Future Performance in Beginning Welders?

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Abstract

This study examined the use of dexterity as an indicator of future performance of beginning welders in order to select participants for welding training programs. With a high demand for welders, it is imperative that welding training programs be efficient at producing certified welders (Stone, Watts, & Zhong, 2011). The time required to train certified welders is one of the obstacles training programs face. Many occupational fields have tried to predict a student's future performance before admitting them into a training program by analyzing their dexterous ability. This study utilized the Complete Minnesota Dexterity Test (CMDT) to examine participants' dexterity during a welding training program. At the end of the training program, participants performed tests welds that were overseen by a certified welding instructor (CWI) who visually inspected each weld. The data from the dexterity tests and the pass/fail rate of the test welds were analyzed using Predictive Analytics SoftWare (PASW) Statistics 18 software package. All three dexterity tests were found to have statistically significant relationships with the visual pass/fail rates of the participants for basic shielded metal arc welds (SMAW). It can be concluded that dexterity can predict future performance of beginning welders completing basic SMAW welds.

Introduction

Due to a global boom in the industrial manufacturing sector, welders are in greater need now than ever before (Brat, 2006). According to the U.S. Department of Labor, Bureau of Labor Statistics (2012), the number of jobs for welders is expected to increase 15% from 2010 to 2020, which is faster than all other occupational fields reported. Welding is a technical skill that requires its practitioners to be certified, which takes time, money, and talent (Stone, Watts, & Zhong, 2011). The time that is needed to train a person to become certified to weld is one of the areas that many welding educators have tried to shorten. According to Giachino and Weeks (1985), for a skilled manual welder to master the craft of welding, it requires years of on-the-job training. Many companies have expressed that after extensive training, individual are not able to perform at acceptable standards, this has led to the high interest in trainability testing (Hitchings & Moore, 1991).

Since its inception, both industry and post-secondary welding training programs have been continuously evolving to better prepare welders. The graduates from these training programs have primarily been trained to become fulltime welders. Others use their welding skills to teach others. One such population of trainers/teachers is agricultural education teachers. Within the average agricultural education teacher program welding skills are commonly taught in agricultural mechanics courses (Burris, Robinson, & Terry, 2005). Upon graduating, the newly certified teachers go and instruct secondary students the same welding skills they were taught. As the welding training evolves, so does the ability of agricultural education teachers to train and expose a younger generation to welding. One of the newer welding training aids being used are computer-based advancements such as virtual reality simulators (Byrd & Anderson, 2012).

Simulations have been used in several occupational fields such as medical, dental, and welding to train students to become proficient at various skills (Boulet et al., 2003; Kunkler, 2006; Papadopoulos, Pentzou, Louloudiadis, & Tsiatosos, 2013; Stone et al., 2011) The use of virtual reality simulators have helped increase the awareness of welding to the younger gaming generation (Postlethwaite, 2012). With a majority of learning and interaction occurring in a digital environment, virtual reality simulators create an avenue to recruit new students (Lincoln Electric, 2013). With this potential influx of newcomers to training programs is there a way to predict which people will have the best capability to weld?

Many occupations have tested potential student's ability to predict future performance prior to admitting them into a training program. Some of the common tests that have been utilized to predict future performance include analyzing cognitive ability, psychomotor skills, and perceptual tests (Gettman et al., 2003; Levine, Spector, Menon, & Narayanan, 1996; Hitchings & Moore, 1991; Brown & Ghiselli, 1951). Dental and surgical training programs have conducted studies examining how effective these aptitude tests are at predicting future performance. A study by Gettman et al. (2003) showed that the measures of innate ability were able to accurately predict the future performance of 65% of laparoscopic surgeons (N=20). Gansky et al. (2004) found that manual dexterity was able to predict future performance of dental students in subsequent preclinical restorative courses.

One factor that has been studied to examine the ability to predict future performance is dexterity. According to Campbell (2007), dexterity is the skill of using one's hands and body, which addresses the quickness or the coordination of sight, and other senses, with muscles. Dexterity has been validated in predicting performance in jobs that require routine assembly, coil winding, and packaging than on jobs that require higher order abilities (Hitchings & Moore, 1991; Levine et al., 1996; Mansell, 1969). Because welders are required to routinely perform many welds that require higher order thinking skills to complete would dexterity be able to predict performance in a welder?

Welding literature has stated that welders need manual dexterity, good eyesight, and good hand-eye coordination (Giachino & Weeks, 1985; Jeffus, 2012; Jeffus & Bower, 2010a). Giachino and Weeks (1985) also stated that welders need the ability to concentrate on detailed workbe free of disabilities that would prevent work in awkward positions. To evaluate these criteria, welder training programs have employed tests that evaluate mechanical ability, ability to judge shapes and sizes, remember designs, and manual dexterity when selecting apprentices (Fleming, 1937), but have not extensively evaluated the predictive ability of individual factors for future performance.

Mansell (1969) stated that technical teachers are mostly concerned with trainee knowledge and dexterity. Mansell (1969) also stated that to teach dexterity of a skill, an analysis of the skill must first be completed because every skill has sub-skills that must also be known. Using dexterity and trainability testing techniques require the tests be designed around the skills of the particular job being studied (Hitchings & Moore, 1991).

A few of the welding parameters that a welder is required to maintain during the welding process are arc length, weld position, travel angle, work angle, and travel speed (Jeffus, 2012; Jeffus & Bower, 2010a). These parameters are crucial in order for the welder to correctly weld two pieces of material together. In the process of shielded metal arc welding (SMAW), also known as arc or stick welding, these parameters are always in a state of flux (Jeffus, 2012). The state of flux is created by the welding electrode being consumed during the welding process (Jeffus, 2012). This requires the welder to maintain the correct position, angles, and travel speed all while slowly feeding the electrode downward to maintain the correct arc length. The other aspect of welding that increases the need of manual dexterity is the use of weave patterns. The manipulation of the electrode, weaving, can help control penetration, width, porosity, undercut, and slag inclusion (Jeffus, 2012; Jeffus & Bower, 2010b).

Understanding that welders need to be dexterous to weld effectively could lead a researcher to hypothesize that if a person has a high level of dexterity then they could be able to weld and vice versa. Therefore, if a dexterity test that replicates the psychomotor skills necessary for welding were implemented in a training program, would the results of the dexterity test accurately predict the future performance of the individuals tested?

Theoretical Framework

The theoretical framework that guided this study was Campbell, McCloy, Oppler, and Sager's (1993) determinants of job performance components. To understand determinants of job performance, one must ask what performance is. Campbell et al. (1993) stated that "performance consists of goal-relevant actions that are under the control of the individual, regardless of whether they are cognitive, motor, psychomotor, or interpersonal" (p. 40). In an industry setting confusion between performance, effectiveness, and productivity is common (Campbell et al., 1993). Therefore, an individual must understand the differences between the terms in order to fully comprehend what performance truly represents. Performance of a job will produce a result, whereas effectiveness is the systematic evaluation of the results of a performance (Campbell, 1999, Campbell et al., 1993). Productivity refers to the financial side, which studies how much money and effectiveness of workers is needed to achieve the next level of effectiveness (Campbell, 1999, Campbell et al., 1993).

A performance component is comprised of determinants and antecedents (Campbell et al., 1993) as seen in Figure 1. Performance components are categories of actions people are expected to complete as part of a job (Campbell, 1999, Campbell et al., 1993). Differences between people that perform the same job are expressed through performance determinants. Performance determinants include declarative knowledge; procedural knowledge and skill; and motivation (Campbell, 1999, Campbell et al., 1993). The three performance determinants compose a performance component (Campbell, 1999, Campbell et al., 1993). Declarative knowledge refers to the knowledge about facts and principals related to the job that an individual possesses (Campbell, 1999, Campbell et al., 1993). Procedural knowledge and skill refers to the physical and cognitive skills needed in order to complete a performance component (Campbell, 1999, Campbell et al., 1993). Skills that fall under procedural knowledge include cognitive, psychomotor, physical, self-management, and interpersonal (Campbell, 1999, Campbell et al., 1993). The final determinant is motivation, which refers to the effort a person puts towards a job (Campbell, 1999, Campbell et al., 1993). This involves an individual making the decision to expend effort, determine what level of effort to exert, and how long to exert effort when performing a job (Campbell, 1999, Campbell et al., 1993).

Performance Component	=	Declarative Knowledge (DK):	X	Procedural Knowledge and Skills (PKS):	X	Motivation (M):
		• Facts • Principles • Goals • Self-knowledge		• Cognitive skill • Psychomotor skill • Self-management skill • Interpersonal skill		• Choice to perform • Level of effort • Persistence of effort

Predictors of Performance Determinants

DK = [(ability, personality, interests), (education, training, experience), (aptitude/treatment interactions)]

PKS = [(ability, personality, interests), (education, training, practice, experience), (aptitude/treatment interactions)]

M = (whatever independent variables are stipulated by your specific motivation theory being utilized)

Figure 1. Determinants of Job Performance Components. Adapted from "A theory of performance," by J. Campbell, R. McCloy, S. Oppler, and C. Sager, in "Personnel selection in organizations" N. Schmitt, W. Borman, and associates (Eds.), 1993, San Francisco, California: Jossey-Bass Publishers.

Antecedents of performance determinants are the predictors of performance (Campbell, 1999, Campbell et al., 1993). Performance indicators of declarative knowledge include ability, personality, interests, education, training, experience, and aptitude interactions (Campbell, 1999, Campbell et al., 1993). Procedural knowledge and skill performance predictors consist of ability, personality, interests, education, training, practice, and aptitude interactions (Campbell, 1999, Campbell et al., 1993). Motivational antecedents are comprised of variables related to the theory of motivation being utilized (Campbell, 1999, Campbell et al., 1993). For this study, the researchers will focus on the performance antecedents of procedural knowledge and skill. The specific antecedent that will be examined is psychomotor skill as it relates to welding performance.

Purpose and Objectives

The purpose of this study was to examine if dexterity could predict the future performance of a beginning welder entering a welding training program. In addition, the study sought to describe the change in dexterity during the welding training program. This study also sought to determine if a relationship exists between an individual's dexterity and pass/fail rating from the visual inspection of the test weld. This research aligns with the American Association for Agricultural Education's National Research Agenda Priority Area 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century (Doerfert, 2011, p. 9). Specifically relating to improve agricultural productivity efficiency and effectiveness to increase sustainable growth in the private setting (Doerfert, 2011). The following objectives were identified to address the purposes of this study.

1. Describe the dexterity of the participants in a welding training program.
2. Report the pass/fail rating of visual inspection of test welds performed by participants.
3. Determine if a relationship exists between participant dexterity and the pass/fail rating of visual inspection of test welds.

Methods

This study is part of a larger research study that examined the effectiveness of integrated virtual reality welding training programs utilizing the VRTEX® 360 and VRTEX® Mobile units. This study was conducted at the Iowa State University 450 farm where a virtual reality and welding training laboratory were utilized. The individuals who participated in this study did so voluntarily. There were incentives for participation that included having lunch provided each day and having the weld certification test fees paid for. There were three female and twenty male participants within this study. The background of the participants varied between college students, secondary educators, to industry workers. The welding training programs were offered in five variations. They included two one-week programs provided with the following training treatments a 50/50 virtual/traditional training and a 100 virtual reality training. There were three two-week programs provided with the following training treatments 50/50 virtual/traditional training, 75/25 virtual/traditional training, and 100 virtual reality training. The variation of training programs are based on the programs used in the study conducted by Stone, McLaurin, Zhong, and Watts (2013). In the study conducted by Stone et al. (2013) the program groups received either 50/50 virtual/traditional or 100 percent virtual reality training. The 75/25 virtual/traditional group was added to determine if this treatment could be more successful at training participants to weld than the other two treatments.

To obtain dexterity data about the participants the researchers utilized the Complete Minnesota Dexterity Test (CMDT). The CMDT is used to measure a person's rapid eye-hand coordination and arm-hand dexterity also known as gross motor skills (Lafayette Instrument, 2012). This test consists of five individual tests, but only three tests were utilized because they closely replicated the movements used during the welding process. The tests that were completed by the participants included: a) placing test; b) turning test; and c) displacement test. The CMDT utilizes two test boards, each containing 60 holes. Sixty corresponding disks are utilized during the tests that participants manipulated with their hands and arms. The participants were required to stand for the dexterity tests and were not allowed to lean against the table. The dexterity tests were completed by participants on the first day of the welding training program and after the test welds were completed on test days. Depending on which training program the participants were in determined how many times the dexterity tests were completed. Participants in the one-week session completed dexterity tests twice. During the two-week long session, participants completed the dexterity tests three times. Once at the beginning and at the end of each week

In the placing test, the two boards are laid on a tabletop side-by-side about 1" from the edge of the table. The board farthest away will have the disks in it. When the examiner says start, the participant using their dominant hand will move the disks one by one from the top board to the bottom board. The participant's non-dominant hand was not allowed to brace the participant in anyway during the test. Once all the disks have been placed the time taken to complete the test was recorded.

The turning test used only one board and all 60 disks. Starting in the top right corner, the participant used one hand to pick up a single disk, turn it with the other hand, and then place it back on the board. The participant will replicate this for all discs on the top row of the board, then proceed to the next row below and work back across the board. They will continue to follow this procedure until all of the disks have been turned, and the amount of time needed to complete the test is recorded.

The displacement test used one board and all 60 disks. With all the disks inserted on the board, the participant were instructed to remove the disk from the top left hand corner of the board and place it to the side. This would leave an empty space in the top left hand corner of the board. The participant would then pick up the disk located directly below the empty space and then place it into the empty space. The participant would then continue moving the disks in the same manner until they reached the last disk in the bottom right hand corner. Time was recorded once the participant has completed the test.

For each test, the participants were given a practice run to fully understand how to perform the tests. Following the practice run, the participants completed the test three times. The time taken to complete the practice run and all three test runs were recorded. The three test times were then averaged. The average was used along with the interpretation chart developed by Ziegler, Jurgensen, Harmon, Roberts, and Bauman (American Guidance Service, 1969), to identify the participants' percentile rank. The percentile scale is used to interpret a subject's score in terms of percent of the normative population, the scale ranged from zero to 100 (Lafayette Instrument, 2012).

After all the participants completed the welding training programs they were given the opportunity to complete test welds that were visually inspected by a certified welding inspector (CWI). The length of the training program dictated how many test welds were to be completed by the participants. The four possible test welds a participant could perform were 2F (horizontal fillet weld), 1G (flat groove weld), 3F (vertical fillet weld), and 3G (vertical groove weld). The participants performed the welds utilizing shielded metal arc welding (SMAW) and gas metal arc welding (GMAW) processes. The participants in the one-week session completed the 2F and 1G welds for both welding processes. Whereas the two-week session participants completed all four weld types in both welding processes. The CWI examined the test weldment and measured for the following discontinuities underfill, overfill, undercut, porosity, lack of fusion, and cracks according to American Welding Society (AWS) D1.1 structural welding code. The data from the visual inspection was recorded as pass or fail.

The data were analyzed using Microsoft Excel 2010 and Predictive Analytics Software (PASW) Statistics 18 software package. Descriptive statistics were calculated to identify frequencies for pass/fail rates and dexterity percentile rankings. A bivariate correlation was calculated to examine the relationship between recorded times and visual pass/fail rates. With a numerical variable and a dichotomous variable utilizing the bivariate correlation calculation was needed to evaluate the relationship between the variables (Gravetter & Wallnau, 2009). Researchers utilized the *r* squared (r^2) statistic to examine the effect size of the bivariate correlation. To evaluate the effect size of a bivariate correlation Gravetter and Wallnau (2009) indicated that r^2 should be used.

Results

The performance measures used in this study included the time it took to complete the dexterity tests and the visual inspection of participants test welds. Objective one sought to describe the average dexterity of the participants in this study. Table 1 shows the average dexterity in quartiles of the population norm. For example, if you put the entire population on a scale of zero to 100, the quartiles would be 25 (low), 50 (medium), 75 (high), and 100 (very high). Dexterous ability range was lowest at zero and is highest at 100. This means that the participants in the 25 percent quartile represent those with the least dexterous ability. The individuals in the 100 percent quartile represent those with the most dexterous ability within the population.

Table 1
Average Overall Dexterity of Participants in Quartiles by Type of Dexterity Test

Type of Test	25% *f* (%)	50% *f* (%)	75% *f* (%)	100% *f* (%)
1st Day of Training[a]				
Placing	18(78.3)	3(13.0)	2(8.7)	0(0.0)
Turning	18(78.3)	3(13.0)	1(4.3)	1(4.3)
Displacement	9(39.1)	5(21.7)	1(4.3)	8(34.8)
Week 1 Test Day[a]				
Placing	11(47.8)	4(17.4)	3(13.0)	5(21.7)
Turning	13(56.5)	2(8.7)	0(0.0)	8(34.8)
Displacement	9(39.1)	1(4.3)	2(8.7)	11(47.8)
Week 2 Test Day[b]				
Placing	7(46.7)	0(0.0)	0(0.0)	8(53.3)
Turning	6(40.0)	0(0.0)	2(13.3)	7(46.7)
Displacement	3(20.0)	2(13.3)	0(0.0)	10(66.7)

Note. [a]n = 23, [b] n = 15.

When examining participant dexterity on the first day of training, it can be identified that with the placing and turning tests 78.3 percent of the participants had low dexterous ability. However, 34.8 percent of participants exuded a very high level of dexterity on the displacement test on the first day of training. An increase in dexterous ability can be seen from the first day of training to the test day at the end of week one. This is evident on the placing test where the first day of training shown where none of the participants were identified as having very high dexterity, however after the end of week one test day 21.7 percent (n = 5) of the participants had a very high dexterous ability. This increase in dexterous ability was also evident in the turning and displacement tests. The increase of dexterous ability continued improvement the week two test day. The number of participants exuding a very high level of dexterity grew by 11.9 – 31.6 percent.

To further examine this increase in dexterous ability, the data were separated by the type of training program. The participants in the 50/50 virtual/traditional training program had no change in dexterous ability from the first day of training to the week one test day. However, in the 100 percent virtual training program a growth in dexterous ability can be seen in all three dexterity tests. Although, it is interesting to note that 25 percent of participants' dexterous ability dropped in the one-week training program.

In the two-week 50/50 virtual and traditional training method, an overall increase in dexterous ability can be seen across all three types of tests completed. The one exception was during the week-two test day where 13.7 percent of participants fell from the 50 percent group to the 25 percent group. The drop indicates a loss of dexterous ability. The 75/25 virtual/traditional training group shown an increase in overall dexterous ability for all types of tests completed on test days for both weeks. The most striking change is in the turning test, where 80 percent of the participants had an increase in dexterity. Within the 100 percent virtual training group, participants also had an overall increase in dexterity. The placing and turning tests had the highest increase in ability where 75 percent of participants had a positive shift in ability.

Objective two examined the visual inspection, based on AWS D1.1 standards, of participants' test welds. The rating of the visual inspection was either a pass or fail, determined by a CWI. It can be determined that the participants fared better with the groove welds than the fillet welds in both weld processes. This is shown in the overall pass/fail rates as the groove welds were the only weld type that majority of participants passed the visual inspection for both weld processes. The weld type that had the highest number visual inspections that passed was the 1G in each weld processes. The most difficult weld for the participants of this study in terms of successfully passing was the 3F in both weld processes.

When examining the pass/fail rate by training program type several patterns can be identified. In the 50/50 virtual/traditional one-week program, the majority of the participants failed visual inspection in all weld types except the 1G in the GMAW welding process. Within the 100 percent virtual one-week training program a majority of participants passed visual inspection, expect for the GMAW 2F weld. When examining the two-week training programs, the 50/50 virtual to traditional group failed 60 percent (n = 29) of the visual inspections. However, the 75/25 virtual/traditional group passed 62.5 percent (n = 25) of visual inspections. The 100 percent virtual group failed 59 percent (n = 19) of the test weld visual inspections.

The third objective of this study sought to examine the relationship between participant dexterity and the participants corresponding visual inspection pass/fail rates. To examine the relationship a bivariate Pearson's correlation was calculated. The results can be seen in Table 2. All three dexterity tests given were found to be significant with the visual pass/fail rates of the participants for the 2F and 1G weld types in the SMAW welding process. The placing test was found to be significant with the 2F weld type on the first day of training. However, all three dexterity tests were found significant wit the 2F weld type on test day of week one. The turning test was significant with the 2F weld type on test day of week two. The 1G weld type found significance on both test days with the turning test only.

Table 2

Bivariate Correlations between Participant Dexterity and Visual Inspection Pass/Fail Rate

	SMAW				GMAW			
Type of Test	2F *r(p)*	1G *r(p)*	3F *r(p)*	3G *r(p)*	2F *r(p)*	1G *r(p)*	3F *r(p)*	3G *r(p)*
1st Day of Training								
Placing	.417*	.257	.504	.358	.203	-.077	.110	-.087
	(.048)	(.237)	(.055)	(.190)	(.353)	(.726)	(.695)	(.758)
Turning	.117	.351	.344	.355	.084	-.202	.359	.355
	(.596)	(.100)	(.209)	(.209)	(.705)	(.355)	(.188)	(.194)
Displacement	.206	.244	.354	.111	.383	-.151	.069	.095
	(.345)	(.262)	(.196)	(.695)	(.072)	(.491)	(.807)	(.736)
Week 1 Test Day								
Placing	.590**	.351	.424	.229	-.118	.140	.052	.115
	(.003)	(.101)	(.115)	(.411)	(.593)	(.523)	(.509)	(.684)
Turning	.614*	.546**	.181	.113	-.132	.019	-.185	.184
	(.002)	(.007)	(.518)	(.688)	(.548)	(.933)	(.509)	(.512)
Displacement	.619*	.406	.272	.298	.200	.067	.152	.231
	(.002)	(.055)	(.326)	(.280)	(.359)	(.760)	(.588)	(.407)
Week 2 Test Day								
Placing	.428	.066	.328	.204	-.018	.338	-.019	-.018
	(.111)	(.815)	(.232)	(.467)	(.950)	(.218)	(.946)	(.950)
Turning	.642**	.560*	-.085	.312	-.179	.454	-.092	.183
	(.010)	(.030)	(.764)	(.257)	(.524)	(.089)	(.745)	(.513)
Displacement	.450	.140	.109	.430	-.228	.486	.100	.107
	(.092)	(.620)	(.699)	(.110)	(.413)	(.066)	(.724)	(.703)

Note. $*p = 0.05$, $**p = 0.01$.

To interpret the magnitude of the relationship between two variables, Gravetter and Wallnau (2009) indicated that r^2 should be used. The results of the r^2 calculations can be seen in Table 3. Gravetter and Wallnau (2009) suggested the following scale when interpreting the r^2 statistic: 0.01 = small effect; 0.09 = medium effect; 0.25 = large effect. Following the suggestions of Gravetter and Wallnau (2009), all dexterity tests exhibited a very large effect on the pass/fail rates of the participants test welds. The turning test exhibited the largest effect in the study on test day of week two. The placing test on the first day of training exhibited a large effect on the pass/fail rate, yet was the lowest out of the tests that revealed a significant relationship.

Table 3

Effect Size of Dexterity Tests and Visual Pass/Fail Rates

Dexterity Test	*n*	*r*	*p*	r^2
2F-SMAW				
Placing Test (0)	23	.417	.048*	.173
Placing Test (1)	23	.590	.003**	.348
Turning Test (1)	23	.614	.002**	.377
Displacement Test (1)	23	.619	.002**	.383
Turning Test (2)	15	.642	.010**	.412
1G-SMAW				
Turning Test (1)	23	.546	.007**	.298
Turning Test (2)	15	.560	.030*	.313

Note. $*p = 0.05$, $**p = 0.01$.

Conclusions and Discussion

From the results of this study several conclusions can be drawn. First, one trend that was identified was dexterous ability for a majority of the participants increased during the training program. Conversely, there were several participants that either exhibited no change in dexterous ability or they lost dexterity during the training program. The change in ability supports the notion that it takes time to master the craft of welding (Giachino & Weeks, 1985). Because of the increase in dexterous ability over the first week of training raises the question would it be better to test for dexterity after the first week of training? Do participants need a sufficient amount of time to become acclimated to the new skills they are learning before being tested or should a person's innate ability before learning new skills be the basis of selection?

It can also be concluded that with more time in a virtual reality environment the more dexterous ability increase. This is evident in all but the 50/50 virtual/traditional training methods. This suggests that virtual reality gives participants the capability to hone task related abilities, which supports the conclusions of previous research using simulations in the medical, dental, and welding fields for training purposes (Boulet et al., 2003; Kunkler, 2006; Papadopoulos et al., 2013; Stone et al., 2011). With the VRTEX® systems users are able to get instant feedback through numerical grades and graphical representations of the welding parameters. The use of cheater lenses that help guide the user to the correct angles, speed, position, and arc length can also be used. With traditional training methods, it is a trial and error type of learning environment where there is no instant feedback provided when welding. The feedback in a traditional training program comes after showing an instructor. From the results, it can be concluded that dexterity can increase with the use of both instant and accurate feedback.

When examining the pass/fail rates from the visual inspections, it can be concluded that participants were better at performing the less complex welds. It can also be concluded that the participants in the 100 percent virtual training programs performed the 1G weld better than the other training program participants. The 75/25 virtual/traditional training methods outperformed the other training method types. This suggests that the 75/25 virtual/traditional training method may best suited at preparing beginning welders. As virtual reality trainers gives the ability to replicate welds faster than traditional training methods leads to the notion that practicing in a virtual environment leads to quicker development of psychomotor skills in participants.

Objective three sought to explore the relationship between participant dexterity and the pass/fail rating of the visual inspection in order to examine the predictability of dexterity on future performance. This reinforces Campbell et al. (1993) determinants of job performance component procedural knowledge and skill because dexterity can affect overall task performance. It can be concluded that dexterity can predict future performance of beginning welders completing basic SMAW welds. The ability of dexterity to predict future performance supports the finding in other occupational fields (Gansky et al., 2004; Gettman et al., 2003; Hitchings & Moore, 1991; Levine et al., 1996; Mansell, 1969). All of the tests utilized shown a significant relationship with a beginning welder's ability to visually pass or fail inspection. This implies industry personnel can use dexterity to select people to enter welding training programs that use basic SMAW welds.

Recommendations

Conclusions from this study lead to several recommendations. First, it is recommended that welding training programs utilize virtual reality simulations to aid in the training process. With the use of virtual reality, welding training programs can become more efficient, in terms of passing visual inspections, which is imperative to meet today's demand for certified welders. With the increased need for certified welders, it is a necessity to create efficient training programs.

With the ability to use dexterity to predict future performance with simple welds, it is recommended that training programs that teach simple welds use dexterity testing to select individuals to enter the training program. With the requisite of having high dexterity may lead to better candidate selection for the welding training programs. With the influx of individuals drawn to welding by virtual reality simulators, welding training programs will be able to objectively select the best individuals for training.

In secondary agricultural education programs, it is recommended that teachers work with local welding training programs to expose students to advanced welding training methods, such as virtual reality simulators. In an effort to prepare students to become successful at welding, agricultural education teachers need to examine the hands-on skill they teach to examine if a sequence of skills can be created to help improve students' gross dexterity.

The researchers also recommend that future studies be conducted to further examine the use of dexterity to predict future performance by utilizing different dexterity tests. Further investigation is needed to examine if dexterity can predict future performance for more complex welds. It is suggested to use dexterity tests that evaluate fine, finger and hand, and gross, hand and arm dexterity. It is also recommended that future studies look into the possibility of creating a dexterity test that more resembles the movements of a welder to improve the ability of dexterity to predict future performance. Further investigation is needed to determine if dexterity can predict future performance of GMAW type welds. GMAW is considered to be easier to perform than SMAW type welds. Is that why dexterity is not an indicator?

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Examining Agricultural Mechanics Projects and Their Use as Supervised Agricultural Experiences in Texas

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Abstract

The purpose of this study was to examine current agricultural mechanics project construction and its use as a supervised agricultural experience in Texas. This descriptive study was conducted using survey methods. Agricultural science teachers who had an agricultural mechanics project at one or more of four selected agricultural mechanics project shows were used as the population. The sample was purposive in nature, so all teachers were surveyed (N=324). A response rate of 45.1% (n=146) was achieved. Participants reported 2,626 agricultural mechanics projects were constructed by students. Agricultural science teachers reported that the majority of the projects used as a student's SAE were under the FFA SAE category of entrepreneurship. Teacher practices and opinions of SAEs included that in-class hours should count toward a student's SAE, agricultural mechanics projects should be used for SAEs, and record books were kept on about half of the projects. Recommendations include using more agricultural mechanics projects as SAEs and professional development for teachers in the area of using group projects as SAEs.

Introduction/Literature Review

According to Talbert, Vaughn, Croom, and Lee (2007), the supervised agricultural experience (SAE) is the part of agricultural education that allows students to practice in the workplace what they have learned in the classroom or laboratory. Agricultural mechanics has roots in early vocational agriculture courses. In the book *The FFA at 50: A Golden Past-A Brighter Future* (Tenny, 1977), it was noted that when agricultural classes began, it was recognized that agricultural mechanics courses were needed to enable students to cope with technical changes that were taking place in farming. This led to the development of school shops used to teach essential agricultural mechanics skills to students and prepare them to use and maintain the equipment and machines on the farm.

Many researchers have noted that SAE participation was declining as a portion of a complete agricultural education program (Croom, 2008; Lewis, Rayfield, & Moore, 2012b). However there are more ways available for students to participate in SAEs than in the past. There are now four categories of SAEs recognized by the National FFA Organization (2012): entrepreneurship, placement, research, and exploratory. Of the 49 proficiency areas awarded by the National FFA Organization (2013), four are directly related to agricultural mechanics. The National FFA recognizes power, structural, and technical systems, an agricultural mechanics area, as a category in the Agriscience Fair. This is one of six categories recognized on the national level.

Researchers have noted that agricultural education is deeply tied to experiential learning (Knobloch, 2003; Roberts, 2006; Baker, Robinson, & Kolb, 2012). Knobloch (2003) posited that experiential learning is supported by four pillars: learning in real-life contexts, learning by doing, learning through projects, and learning by solving problems. The construction of agricultural mechanics projects makes use of all four of the pillars described by Knobloch, highlighting their importance in the experiential learning process. It could be postulated that agricultural mechanics SAEs fit the mold for experiential learning, reinforcing their importance as a teaching tool and pointing out the need to incorporate them more frequently into agricultural science programs.

There are many benefits from students participating in SAEs. A benefit Robinson and Haynes (2011) found was that SAEs provide instructional value for agricultural science teachers in the area of developing critical thinking skills. They also found that teachers in Oklahoma who were alternatively certified recognized that SAEs are experiential in nature and allow students to develop important career preparation skills (Robinson & Haynes, 2011). Dyer and Williams (1997) concluded in a synthesis of research that research findings support the belief that SAEs are valuable in helping prepare people for jobs in agriculture and that they help develop good work attitudes and habits in students. In a study conducted by Ramsey and Edwards (2011), agriculture industry experts reached consensus on 60 entry-level skills that students should learn from participating in a SAE. In a second Delphi study by Ramsey and Edwards (2012), consensus was reached on 161 entry-level skills that should be learned by students participating in SAEs, with the greatest number of skills in the agricultural communication, agricultural power, structures, and technology, animal science, and plant and soil science career pathways. These studies quantified the number of skills that students can learn from participation in SAEs, highlighting one of the benefits of participation in them.

Today SAEs are considered learning programs for agricultural education students designed to provide learning experiences in an agricultural career pathway (Croom, 2008). With SAEs, students are expected to conduct them outside of normal daily instruction, maintain records of their activities, and they should put into practice principles learned in the agriculture classroom (Croom, 2008). Others have similar definitions, in that SAEs should be conducted outside normal class hours, the agricultural science teacher should observe the project, the project should have educational value, and the project should be linked to classroom and laboratory instruction (Phipps, Osborne, Dyer, & Ball, 2008, p. 439; Talbert, Vaughn, Croom, & Lee, 2007, p. 422). An area not clearly defined across the agricultural education field is whether or not SAEs can be conducted at school facilities or during class time. Talbert et al. (2007, p. 422) says that under some circumstances the students' SAEs can be located on the school premises, but they should occur outside of normal instruction hours. Phipps et al. (2008, p. 439) clearly states that the experience should be conducted outside of the normal class time. In a publication from the Texas FFA Association (n.d.) concerning types of SAEs, it was stated that "laboratory SAEs may take place either during or outside of the regularly scheduled school and tend to serve students who have no facilities to conduct specialized activities at home or away from school." This provides a contradiction to other literature on the subject. Dyer and Osborne (1996) stated that SAE programs lack definition, direction, and focus, supporting the findings above.

Conceptual Framework

While many believe that student participation in SAEs is positive and a critical component of agricultural education, Dyer and Osborne (1995) found that the percentage of students conducting SAE projects in programs is declining. Dyer and Osborne (1995) stated that participation in SAE programs by both teachers and students is lacking. Many researchers have reported that the cause for the decrease in SAE participation is a lack of time the teacher has to spend supervising the projects (Lewis, Rayfield, & Moore, 2012a; Dyer & Osborne, 1996; Foster, 1986). Other causes contributing to decreased involvement in SAE have been identified as a lack of student interest in the subject and lack of school facilities to conduct projects (Robinson & Haynes, 2011; Lewis, Rayfield, & Moore, 2012a; Foster, 1986).

In Texas, agricultural mechanics courses are taught in 90% of agricultural education programs (Hanagriff, Briers, Rayfield, Murphy, & Kingman, 2011). Most schools in Texas have labs available to students. In Texas students have the opportunity to show agricultural mechanics projects at numerous major, regional, county and local shows. Hanagriff, Briers, Rayfield, Murphy, and Kingman (2011) found that programs not involved in agricultural mechanics shows had higher SAE involvement than those that did participate in agricultural mechanics shows, indicating that those programs participating in agricultural mechanics shows were not reporting those projects as SAEs. Information on the percentage of students with agricultural mechanics projects and whether or not they consider them to be SAEs could shed light on this problem.

In their conclusions, Dyer and Osborne (1995) recommended the identification of factors that aid and/or limit student participation in SAE programs. Identifying areas where participation is lacking may be useful in determining reasons for the decline in SAE participation. In an attempt to address this area of need, this study will examine an area lacking in SAE participation, agricultural mechanics. A snapshot of what is currently taking place with project construction, teacher opinions of SAE and agricultural mechanics, and how teachers are using projects as SAEs may be helpful in identifying areas to address to increase agricultural mechanics SAEs. If many teachers do not consider the projects to be SAEs, this could be an area strengthened by instruction so teachers can begin to incorporate agricultural mechanics projects in the students' supervised agricultural experience programs.

Purpose and Research Objectives

The purpose of this study was to assess current agricultural mechanics project construction in Texas and examine their current use as supervised agricultural experiences. The research objectives for this study were the following:

1. Identify the type of agricultural mechanics projects constructed by students in high schools with agricultural mechanics programs in Texas.
2. Determine the number of agricultural mechanics projects in high school agricultural mechanics programs that are considered SAEs by the agricultural science teacher.
3. Determine which FFA SAE category teachers use to classify an agricultural mechanics project if it is considered to be a SAE.

4. Examine agricultural science teacher practices and opinions of agricultural mechanics project instruction.
5. Identify sources of funding agricultural science instructor's use in agricultural mechanics project construction.

Methodology

To accomplish the objectives of this study, a descriptive survey design was utilized. The survey instrument included questions in the form of yes/no, multiple choice (both single- and multiple-response items), and open-ended short-answer and essay items. Descriptive statistics were used to analyze the data. Fraenkel, Wallen, & Hyun (2012, p. 187) note that descriptive statistics allow researchers to describe information contained in scores with a few indices, such as mean, standard deviation, and frequencies.

The population of this study was Texas high school agricultural science instructors who teach agricultural mechanics courses. The participants in this study were selected from a purposive sampling frame developed from lists of schools that participated in the San Antonio Junior Agricultural Mechanics Show, the Houston Livestock Show and Rodeo Agricultural Mechanics Show, the San Angelo Agricultural Mechanics Contest, and the Blinn College Agriculture Mechanics Show during the spring of 2013. There were 324 unique participants in the previously mentioned agricultural mechanics shows. A sample size of 319 was calculated by a power analysis based on a total population of 1846 agricultural science teachers with a confidence level of 95% and a 5% margin of error. Since the sample was purposive based on their knowledge of agricultural mechanics and SAE, all 324 participants were surveyed. The participants used in this study were representative of the population of agricultural science teachers across the state. Participants in the aforementioned agricultural mechanics shows came from all areas of the state, representing all program sizes. The teachers in this study were considered experts in the area of agricultural mechanics because of their involvement in the construction of agricultural mechanics projects. They were also considered experts in SAE because of the training received in teacher preparation programs, a requirement to become an agricultural science teacher. After the survey was completed, it was noted that 146 out of the total 324 agricultural science teachers completed the survey for a total response rate of 45.1% (N=324, n=146).

The instrument used in this study was developed by the researcher. Categorical data such as personal and program information was collected with the 20 question instrument. A panel of experts in agricultural education with agricultural mechanics expertise at [University] reviewed and established content and face validity for the instrument. After revisions to the instrument, it was pilot tested to determine reliability by 25 Texas agricultural science teachers who teach agricultural mechanics and were not selected to participate in the main study. Reliability was calculated with a Cronbach's alpha to determine internal consistency. An alpha of .90 was calculated.

Survey methods followed the Dillman's tailored design method (2000), with a link provided in an email to complete the online, researcher-designed, Qualtrics™ questionnaire.

Teacher contact information was obtained from the show superintendents of the four agricultural mechanics project shows listed earlier.

Data from the online Qualtrics™ survey was exported into a Microsoft Excel spreadsheet. Each participant's survey was checked for missing data and was coded for electronic calculations in Microsoft Excel. Basic descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyze this study and were calculated in the above mentioned program.

Findings

Demographic data were collected from respondents of the online agricultural mechanics survey. Frequencies and percentages were calculated for gender, years of teaching experience, high school size, and agricultural science department size. This information is summarized in Table 1. A vast majority of the teachers surveyed were male (91.1%, *n*=133), while only a few female teachers responded (8.9%, *n*=13). Years of teaching experience was distributed well among respondents. During the 2012-2013 school year (22.6%, *n*=33) respondents had been teaching for one to five years, (19.9%, *n*=29) had been teaching for six to ten years, (17.1%, *n*=25) had been teaching for 11 to 15 years, (13.7%, *n*=20) had been teaching for 16 to 20 years, and (26.7%, *n*=39) had been teaching for 21 years or more.

Table 1
Breakdown of teacher demographics (N=146)

Demographic	*f*	%
Gender		
Male	133	91.1
Female	13	8.9
Teaching Experience		
1-5 years	33	22.6
6-10 years	29	19.9
11-15 years	25	17.1
16-20 years	20	13.7
21 or greater years	39	26.7

To develop an idea of the program size, the researcher asked agricultural science teachers how many teachers were in their department at their school during the 2012-2013 school year. This information is summarized in Table 2.

Table 2
School agriculture program size (N=146)

Agriscience Department Size	*f*	%
1 Teacher	54	37.0
2 Teachers	54	37.0
3 Teachers	30	20.5
4 Teachers	5	3.4
5 or More Teachers	3	2.1

Teachers were also asked to specify student enrollment numbers for the 2012-2013 school year to gain an idea of program size. Specifically teachers were asked how many students were in the whole agricultural science program, including non-agricultural mechanics courses, and how many students were in enrolled in their agricultural mechanics courses alone. Means and standard deviations for this data are shown in Table 3.

Table 3
Program and course student enrollment numbers for 2012-2013 (N=146)

Student Enrollment	M	SD
Total in Agriscience Program	166.0	121.8
Total in Agricultural Mechanics Courses	58.9	38.5

To gain an understanding of the courses taught by survey participants, they were asked to indicate which of the four Texas Education Agency recognized agricultural mechanics course they taught or to indicate other if they taught another local course related to agricultural mechanics. Table 4 indicates the frequencies and percentages of the teachers surveyed that taught the listed courses.

Table 4
Agricultural mechanics courses taught by teachers surveyed (N=146)

Course	*f*	%
Agricultural Mechanics & Metal Technologies	131	89.7
Agricultural Facilities Design & Fabrication	94	64.4
Agricultural Power Systems	54	37.0
Practicum in AFNR	39	26.7
Other	28	19.2

Note. Teachers were asked to check all that apply for which agricultural mechanics course they taught. Some teachers may teach multiple agricultural mechanics courses.

Identifying the types of agricultural mechanics projects constructed by high school students with agricultural mechanics programs in Texas was the first objective used to guide this study. To accomplish this objective, teachers were asked to list the types and quantities of projects that were constructed in their program during the 2012-2013 school year. In order to conserve space, the top 25 responses to this question are summarized in Table 5. The complete table can be provided by the researchers.

Table 5
Agricultural mechanics projects constructed by programs surveyed (N=146)

Project Type	*f*	%
BBQ Pit	302	11.50
Firewood Rack	207	7.88
Trailer	202	7.69
Grill	160	6.09
Art/Decorative Projects	159	6.05
Hay Rings	133	5.06
Quail Cage	100	3.81
Toolbox	94	3.58
Picnic Table	93	3.54
Deer Stand	76	2.89
Signs	74	2.82
Feeders	73	2.78
Gates	65	2.48
Fire Pit	63	2.40
Flag Holder	60	2.28
Livestock Panels	59	2.25
Lamp	56	2.13
Livestock Pen	45	1.71
Benches	42	1.60
Hog Trap	40	1.52
Shop Table/Work Bench	31	1.18
Coffee Table	27	1.03
Cooker/Fryer	26	0.99
Tractor Implements	23	0.88
Cooking Stands	20	0.76
Totals	**2,626**	**100.00**

Determining the number of agricultural mechanics projects that are considered SAEs by agricultural science teachers in high school agricultural mechanics programs was the second objective of this study. Participants were asked to provide the number of agricultural mechanics projects constructed by both a single student and projects constructed as a group. Teachers were also asked to specify how many projects were considered to be a SAE on projects constructed by both a single student and as a group. The results of these questions can be found in Table 6.

Table 6

Quantity of agricultural mechanics projects constructed (N=146)

Category	*f*	%
Single Student Projects Constructed	2044	57.3
Group Projects Constructed	1523	42.7
Totals	***3567***	***100.0***
Single Student Projects Considered as a SAE	798	47.2
Group Projects Considered as a SAE	893	52.8
Totals	***1691***	***100.0***

The third objective of this study was to determine which FFA SAE categories teachers use to classify an agricultural mechanics project if it is considered a SAE. Teachers were asked to provide specific numbers of any agricultural mechanics projects considered to be SAEs in any of the following categories: Entrepreneurship, Placement, Research, Exploratory, and Improvement. The frequency of reported SAEs in each category and percentages are reported in Table 7. A total of 1,519 SAEs were classified by agricultural science teachers.

Table 7

Agricultural mechanics SAE categories used by ag mechanics instructors (N=146)

SAE Category	*f*	%
Entrepreneurship	1,041	68.5
Placement	126	8.3
Research	36	2.4
Exploratory	212	14.0
Improvement	104	6.8
Totals	**1,519**	**100.0**

The fourth objective of this study was to examine agricultural science teacher practices and opinions of agricultural mechanics project instruction. A series of yes/no questions were asked regarding time and location of project construction, record book practices, and opinions of in-class and outside of class hours and their consideration for a SAE. Frequencies and percentages can be found for the answers provided to these questions in Table 8.

Table 8
Teacher practices and opinions of agricultural mechanics project instruction

	Yes		No	
Question	*f*	%	*f*	%
Did your students use school facilities to work on ag mechanics projects outside of their class period? [a]	117	81.8	26	18.2
Did your students use instructional/class time to work on ag mechanics projects during their class period? [a]	142	99.3	1	0.7
Do all of your students who construct ag mechanics projects maintain a record book? [b]	73	51.4	69	48.6
Do you think in-class hours used to build ag mechanics projects should count toward a student's SAE? [a]	127	88.8	16	11.2
Do you think outside of class hours used to build ag mechanics projects should count toward a student's SAE?	142	98.6	2	1.4
Do you think all ag mechanics projects should be considered SAEs? [d]	113	80.1	28	19.9

Note. [a]n = 143, [b]n = 142, [c]n = 144, [d]n = 141

The final objective for this study was to identify sources of funding agricultural mechanics instructors use for agricultural mechanics project construction. The objective was addressed by asking participants to check all that apply as sources of funding for agricultural mechanics projects in the following areas: student, parent, teacher, ag program/school, community member, built to sell, or other. Frequencies and percentages of participants that indicated each area of funding are provided in Table 9.

Table 9
Sources of funding for agricultural mechanics project construction in Texas (N=146)

Funding Source	*f*	%[a]
Ag Program/School	104	71.2
Student	100	68.5
Parent	96	65.7
Built to Sell	84	57.5
Community Member	78	53.4
Teacher	59	40.4
Other	8	5.5

Note. Multiple sources of funding were reported by respondents. Percentages are reported as percent of sample indicating each source of funding.

Conclusions/Recommendations/Implications

With this study, a snapshot of current agricultural mechanics project construction in Texas has been provided as well as teacher practices concerning their inclusion as SAEs. It should be noted that the results of this study cannot be generalized to all students, teachers, and agricultural programs across the country because the data for this study was obtained from teachers in Texas only.

According to the data collected, over 90% of the teachers surveyed were male. Teachers surveyed were only those who taught agricultural mechanics as indicated by their participation in agricultural mechanics project shows. Since nearly half of the agricultural science teachers in Texas are female, it could be concluded that agricultural mechanics programs do not reflect the gender demographics of the agricultural education profession. Years of teaching experience was spread out evenly across participants in the study. It should be noted though, that the largest area of teaching experience was 21 years or greater, with 26.7% of the agricultural mechanics teachers falling into this category. This may suggest that nearly a quarter of agricultural mechanics teachers in Texas are nearing retirement, meaning there will soon be a greater need for future teachers trained in the agricultural mechanics field.

Agriscience program total student enrollment averaged approximately 166 students. The average number of students enrolled in agricultural mechanics courses in Texas is approximately 59. When compared to the average total number of students in agriscience programs, these students make up nearly one third of the total students. According to the Texas Education Agency (2010), there are four courses out of 24 agricultural science courses that have agricultural mechanics standards to be taught. Based on the results of this study, the number of students enrolled in agricultural mechanics courses is disproportionate compared to the number of agricultural science courses offered. Enrollment numbers in agricultural mechanics courses may indicate a high level of student interest in courses designated as the agricultural mechanics pathway in Texas.

To gain an understanding of what is currently being constructed by students in agricultural mechanics programs, teachers were asked to list the number and type of project constructed during the 2012-2013 school year. Out of the total 2626 projects reported, 302 were BBQ pits. This project accounted for over 10% of the total projects constructed alone, indicating that this is a popular project for high school students in Texas. Another reason this question was asked was to determine if the projects presently constructed could be considered an SAE. Due to the time and effort required to build BBQ pits, it could be used as any of the four categories of SAE: exploratory, placement, research, or entrepreneurship.

From attending the agricultural mechanics project shows in Texas, one might expect that trailers would be high on the list for projects constructed. Trailers ranked third in number with 202 constructed in the programs surveyed. Building trailers has many different processes involved including metal cutting, measurement, welding, electrical systems, painting, and basic mechanical work to name a few. Most trailers require extensive time to construct and could be used as a student's or multiple students' SAE.

Other notable projects reported were grills, art/decorative projects, hay rings, quail cages, toolboxes, picnic tables, deer stands, signs, feeders, gates, fire pits, flag holders, livestock panels, and lamps. Most of these projects are smaller in size than the top three reported above, but are still popular with all of them having been reported in numbers of 50 or greater. While the projects may be small in size, it is still possible to report them as a student's SAE.

Dyer and Osborne (1995) stated that participation in SAE programs by teachers and students is lacking. Information gathered in this study supports Dyer and Osborne's position on the subject. When teachers were asked to specify how many projects were constructed in the 2012-2013 school year and how many of the projects were considered to be SAEs, there was a large difference in numbers. Teachers responding to the survey for this study reported a total of 3,567 projects constructed with only 1,691 of the projects used as SAEs. Less than half of the projects constructed were used as a student's SAE, confirming that not all agricultural mechanics projects are considered SAEs.

Teachers were asked to specify how many of the projects were group projects and how many were single student projects. This same information was collected on project use as an SAE as well. Interestingly of the 3,567 projects constructed, 2,044 were single student projects. When asked how many projects were used as an SAE, 893 of the total projects used as a SAE were group projects. Over half of the projects considered to be SAEs were group projects, while nearly two-thirds of the projects built were constructed by a single student. Since the number of projects built by a single student was greater, one might expect the number of SAEs for single student projects to be greater as well. In this case, the opposite was found.

Participants were asked to list the number of agricultural mechanics projects they considered as SAEs in each of five categories. Out of the 1,519 projects that participants classified in the survey, 1,041 of them were classified in the entrepreneurship category. The second highest category used by teachers was exploratory, accounting for a distant 14.0% (n=212) of the total reported. SAEs classified as placement and improvement both had numbers slightly over 100. By far the least used was research with only 2.4% (n=36) reported. The results of this part of the study might indicate that using agricultural mechanics projects as an entrepreneurship SAE is more easily done than in other categories. It may also indicate that teachers are unsure how to enter agricultural mechanics projects in a record book as a placement, research, exploratory, or improvement SAE. According to Roberts and Harlin (2007), projects in general have had a history of having many different ways of being classified. Teacher confusion in this area may have its roots in the ever evolving and complicated past of classifying projects.

When teachers were asked a series of yes/no questions to gain a clearer understanding of their practices and opinions regarding agricultural mechanics project construction and their implementation as SAEs, 81.8% indicated that their agricultural mechanics laboratory was available for student use outside of normal class hours. According to the definition of SAE by many, this would allow the students to consider the projects as SAEs (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008, p. 439; Talbert, Vaughn, Croom, & Lee, 2007, p. 422). Over 99% of the teachers reported that the projects were worked on during class hours. If a project is constructed only during class time, then it probably should not be considered a SAE (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008, p. 439; Talbert, Vaughn, Croom, & Lee, 2007, p.

422). When teachers were asked if all students who construct agricultural mechanics projects maintained a record book, the responses were approximately half no and half yes. Maintaining a SAE in any area of agricultural education, including agricultural mechanics should include maintaining a record book to simulate real world business applications and further reinforce the purpose of having a SAE.

Concerning teacher opinions on hours spent constructing agricultural mechanics projects, 98.6% of teachers thought that outside of class hours should count toward a student's SAE. This may indicate that most of the teachers surveyed were familiar with requirements for SAEs and agreed with them. On the other hand, 88.8% of the teachers surveyed thought that in-class hours should be counted toward student SAEs. This is interesting since most publications do not list in-class hours as part of a SAE. One source for this line of thought may come from a publication from the Texas FFA Association (n.d.) that stated "laboratory SAEs may take place either during or outside of the regularly scheduled school and tend to serve student who have no facilities to conduct specialized activities at home or away from school."

When agricultural science teachers were asked if they thought all agricultural mechanics projects should be SAEs, 80.1% of them said yes. Most of the teachers surveyed thought that all agricultural mechanics projects should be SAEs, indicating that the intention to use them may be there, but other factors may prevent their full implementation. As an indicator of how agricultural mechanics projects could be categorized as a SAE, participants were asked to identify which sources of funding their program used to finance agricultural mechanics projects. The source that the most teachers acknowledged using for agricultural mechanics project construction was from the agriscience program/school. This type of funding for a project can limit which type of SAE a student could use to the categories of exploratory or research. The source of funding for projects that was indicated as the second highest was from students. This source of funding makes it easy to use as an entrepreneurship SAE. Parents were the third most used source of funding followed by built to sell.

Approximately 53% of teachers reported that community members fund projects, also eliminating the possibility of using the project as an entrepreneurship SAE. The source of funding with the lowest number reporting was funding by the teacher. Interestingly, the category of SAE used the most was entrepreneurship. Personal investment by the student is only one of the sources of project funding teachers indicated using. The other five sources of funding do not technically allow the students to use a project constructed from those sources as an entrepreneurship SAE because they would not be investing their own money. This may indicate that teachers are unsure how to enter records to use the project as a SAE when it is funded by someone other than the student.

Agricultural mechanics projects can provide hands-on experience for students, both inside and outside of class. Often these projects are completed in groups by students in a class. Professional development for agricultural science teachers should be provided to clarify how group projects can be used for SAEs not only in the area of agricultural mechanics, but others as well. Based on the findings of this study, teachers sometimes do not know how to enter some projects into a record book when documenting SAEs. Teacher educators in Texas should clarify how to enter group projects in record books. Davis and Williams (1979) stressed that record keeping for supervised agricultural experiences should not be over emphasized, but is a critical component in agricultural education because it provides skills in simple business analysis.

Due to some of the responses provided for the questions in this study, it was apparent that there is some misunderstanding as to what defines a SAE among teachers. Unless the agricultural education community agrees on one definition of SAE, there will likely continue to be confusion on the subject. One of the limitations of this study was the use of a purposive sample of agricultural science teachers in Texas. A broader investigation should be conducted concerning the use of agricultural mechanics projects as SAEs across the nation. Agricultural mechanics SAEs have the potential to instill many entry-level technical skills on students (Ramsey & Edwards, 2012). These SAEs should continue to be developed and further implemented to guarantee a future in this pathway. Since there is a lack of SAE involvement, the use of agricultural mechanics projects as SAEs could be a way to begin to reverse this trend. Further research in other states may reveal that agricultural mechanics projects are being used more effectively as SAEs and could provide insight into how to implement their use more effectively in Texas. Before professional development concerning SAEs is presented to teachers in Texas, an assessment of teacher knowledge in SAEs is necessary in order to more effectively address problems in the area.

The identification of record keeping practices in all pathways of SAE could be helpful in determining why there is a lack of interest in the process. Identifying specific reasons for lack of both student and teacher interest in the record keeping process would be vital information in order to attempt to correct the problem. To address a concern identified in this study, further research should be conducted concerning the use of group projects as SAEs.

Identification of specific record keeping practices and practices used in applying for FFA awards when using a group project would be useful for teachers so that these projects may be used as SAEs. A possible way to encourage the use of group projects may be to explain how to classify the project in each student's record book. The classification of the project would depend on the student's role in the financing of the project. A group project may have one student classify it as entrepreneurship if he/she financed its construction. Other students in the group could categorize their role as unpaid placement or exploratory, depending on how much time was spent working on the project by each individual student. Students should be encouraged to keep records on the project if it was part of their course grade. If each student is required to have an SAE, a group project would be a way to get several students keeping records on an active SAE, with little difference required in explanation of record book entry for each individual.

Supervised agricultural experiences are an essential part of the integrated three-component model of agricultural education (Croom, 2008). Research in the area of SAE should continue so that its interaction with FFA and classroom activity will continue to enhance the complete agricultural science program.

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The Use of Virtual Welding Simulators to Evaluate Experienced Welders

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Abstract

The use of Virtual reality welding simulations have been an emerging trend in welding training programs. The goal of this study was to examine the use of virtual reality simulations as an assessment tool for existing welders. This study used a virtual reality welding simulator, specifically the VRTEX® 360, to assess the existing skills of experienced and trained novice welders. This study used the Shielded Metal Arc Welding (SMAW) process to perform simple (2F and 1G) and complex welds (3F and 3G). Performance was computed with the virtual reality welding simulator in the form of a quality score. The quality score was based on five welding parameters: arc length, position, work angle, travel angle, and travel speed. On average, experienced welders scored 10 quality points higher than did trained novice welders. One identified trend for both experienced and trained novice welders was as the weld difficulty increased, the quality score decreased. The results demonstrated the ability of a virtual reality welding simulator to identify an individual's welding skill level for the weld types used in this study. It is recommended that industries use virtual reality simulators to evaluate experienced welders to ensure high quality welding in production practices.

Introduction

An emerging method of assessment within several professions is the immersion of individuals into a virtual reality (VR) simulation (Jones & Dages, 2003). This is the result of industry use of VR simulations to allow trainees to learn basic skills in a safer environment (Lucas, Thabet, & Worlikar, 2007). One study found that full and partial VR integration into a welding training program was appropriate, but depended on the level of task difficulty (Stone, McLaurin, Zhong, & Watts, 2013). However, the ability of VR simulations to evaluate existing skill has received limited attention.

VR environments can be used to train workers to acquire basic skills to perform the tasks required for a technical job (Manca, 2013). Manca (2013) stated that performance in a VR environment could be used as an indicator to hire an individual. Furthermore, training within a VR environment can prepare a trainee to anticipate and recognize when situations go awry, as well as to test an individual's decision-making skills under normal and stressful conditions. Such evaluation is possible through dynamic and continuously changing VR environments. Training in such environments can lead to increased memory retention, reduced human error, and a deeper understanding of the complexities of a work environment. Evaluating the critical thinking skills is possible by evaluating how an individual adapts to changing conditions within a VR environment (Manca, 2013).

Seymour et al. (2002) found that training surgeons, within a VR surgical simulation, increased performance efficiency by 20%. However, the focus of incorporating VR simulations is evolving from educating novices and interns to continued training of experienced personnel. One example of experienced personnel using VR is found within aviation, where VR simulations have been used to train pilots regularly regardless of experience (Gaba, 2004). Boulet et al. (2003) found medical residents scored higher than medical students did on medical VR simulations. Boulet et al. (2003) also suggested that VR simulations could play a future role in continuing medical education and recertification.

A VR simulation in certifying medical personnel is an important consideration for medical programs because it gave the trainees the ability to practice multiple times gaining valuable hands-on learning experience in a VR environment. Kunkler (2006) noted that several associations and training programs have considered the use of simulators for health care professionals' skills certification. For example, the Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO) used simulations to evaluate Certified Ophthalmic Technician (COT) skills. Simulator-based evaluations have replaced hands-on skills used in JCAHPO evaluations in 250 test centers nationwide. Research has found simulations that look and feel like actual procedures help clinicians develop skills and maintain those skills throughout their professional practice (Kunkler, 2006).

According to Giachino and Weeks (1985), for a skilled manual welder to master the craft requires years of on-the-job training. Therefore having a way to continually monitor or train experienced welders is important. Since VR simulations are currently being used to train beginning welders in career and technical colleges and agricultural education teacher preparation programs (Anderson & Byrd 2012), could it be used to evaluate existing skill of current welding professionals?

Theoretical Framework

The theory of individual differences in task and contextual performance guided this study. Individual performance is described as behavioral, episodic, evaluative, and multidimensional (Motowidlo, Borman, & Schmit, 1997). Furthermore, performance is defined as an aggregate of behavioral episodes that add value to an organization. The theory of individual differences distinguishes between task and contextual performance to identify and define behavioral episodes to describe an individual's performance. Refer to Figure 1.

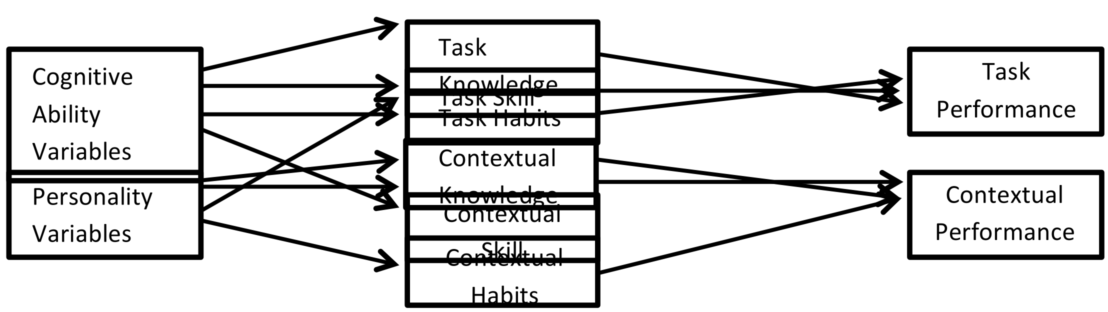

Figure 1. A theory of individual differences in task and contextual performance. Adapted from

"A theory of Individual Differences in Task and Contextual Performance," by S. Motowidlo, W. Borman, and M. Schmit, 1997, *Human Performance, 10*(2), p. 79. Copyright 1997 by Lawrence Erlbaum Associates, Inc. Reprinted with permission.

According to Motowidlo et al. (1997), contextual performance refers to behaviors that influence the psychological, social, and organizational environments of an organization. Task performance refers to an individual's effect to the technical core of an organization, which assembles the products of that organization. Task performance is divided into two types of tasks. The first task includes the transformation of raw material into a finished product or service. The second includes service and maintenance of the technical core by helping restock raw materials, move finished products, planning, and supervising or coordinating the first type of task performance.

For this study, the researchers focused on the first task performance that deals with the construction of finished products. Task skill is affected directly by an individual's cognitive abilities, such as prior experiences. Additionally, cognitive ability can have positive or negative effects on performance depending on the nature of prior experiences. Specifically, cognitive ability can affect three intervening variables of task performance: task knowledge, task skill, and task habit. Task knowledge, which is largely affected by an individual's cognitive ability, allows for a higher rate of retention and mastery of procedures, principles, and facts. Task skill refers to an individual's ability to use technical information, make judgments, and perform technical skills related to an organization's core functions. Task habits refer to patterns of learned behavior that contribute or impede to the execution of organizational tasks (Motowidlo et al. 1997). Within a task performance, the researchers focused specifically on the effect of an individual's cognitive ability for task knowledge and task skill when completing welding related tasks.

Purposes and Objectives

The purpose of this study was to examine the ability of VR welding simulations to be an effective assessment tool. The researchers addressed this goal by comparing experienced welders to trained novice welders in terms of participants' VR performance. Performance was defined in terms of a quality score based on five welding parameters. For this study, the VRTEX® 360 welding simulator was selected because it is capable of providing realistic simulations that were appropriate for this study. The researchers hypothesized that a VR simulator would be able to indicate the difference between experienced welders and trained novice welders. This study aligns to the National Research Agenda Priority area four which states that learners in all agricultural education learning environments will be actively and emotionally engaged in learning, leading to high levels of achievement, life and career readiness, and professional success. The following objectives were identified to address the purposes of this study:

1. Describe the welding skill level of experienced and trained novice welders.

2. Report the weld score of test welds performed on the virtual reality welding simulator performed by participants.

3. Determine if virtual reality welding simulators can distinguish between experienced and trained novice welders.

Methods/Procedures

Researchers utilized the VRTEX® 360 Virtual Reality Arc Welding Trainer equipped with a shielded metal arc welding (SMAW) stinger, helmet, and plastic coupons. This trainer was chosen because it was the highest fidelity VR simulator on the market at the time of this study. This VR simulator allowed users to be fully absorbed in a VR welding environment. Participants wore a welding helmet with integrated stereoscopic VR screens. This study took place at several locations to obtain a sufficient number and diverse group of participants. The research sites varied between nine locations ranging from classrooms, factories, and union halls. The day, time, and number of participants at each location varied because of the specific times requested by each location.

The population of this study consisted of 49 male participants of varying ages. All participants in this study had completed a formal welding training program and were currently employed as a welder. The participants were categorized as either experienced welders or trained novice welders. Experienced welders were categorized based on having at least 10 years of welding experience or were a certified welder (CW). Trained novice welders were individuals that had less than one year of experience and did not have any welding certifications. This study included 18 experienced and 31 trained novice welders.

Participant performance was evaluated using a quality score generated by the VR simulator. The quality score was determined by averaging the individual scores of five welding parameters: weld position, arc length, work angle, travel angle, and travel speed. Weld position refers to where the weld bead is formed in relation to the center of the weld joint. The appropriate distance from the tip of the electrode to the weld coupon is referred to as arc length. Work and travel angles are the appropriate horizontal and vertical angles the welder should keep between the electrode and weld coupon. Travel speed is the appropriate horizontal speed that a welder should move the electrode across a weld joint. After the completion of each test weld, the VRTEX® 360 welding simulator calculated a score for each of the welding parameters that ranged from 0 to 100. The VRTEX® 360 welding simulator also averaged the five parameter scores into an overall quality score, which was recorded for each participant.

At each test site, participants were evaluated on four weld types including: SMAW: 2F (horizontal fillet weld), 1G (flat groove weld), 3F (vertical fillet weld), and 3G (vertical groove weld). Participants were given time to become acclimated to the VR welding simulator and were required to achieve a weld score of 75 or better prior to the data collection stage. Individuals completed test welds in the following order: 2F, 1G, 3F, 3G. Once an individual started the test welds, they had to complete all four without a break. Once completed with a weld, the score for the weld was recorded prior to moving on to the next weld.

Results

Once participants completed each test weld, a quality score was recorded (see Table 1). Differences were identified between experienced and trained novice welders in several instances. A major difference was found in the range in quality scores, in which trained novices had a wider range of scores than the experienced welders. Another difference emerged when examining the minimum quality scores. Experienced welders maintained an average minimum score in the low 70s for all weld types; the 3G weld yielded the lowest quality score at a 49. Trained novice welders' minimum scores fluctuated between 20 (3G) and 61 (2F). Examining the standard deviation, experienced welders were more consistent in ability than were trained novice welders for each weld type. Consistency amongst experienced welders was evident with the 3F weld type in which the standard deviation was 4.43. It was also identified that the most difficult weld performed by experienced welders scored slightly lower than the easiest weld performed by the trained novice group.

Table 1

Quality Scores by Experience and Weld Type

Experience and Weld Type	*N*	Range	Minimum	Maximum	*M*	*SD*
Experienced 2F	18	30	70	100	86.33	7.88
Experienced 1G	18	30	70	100	84.89	8.24
Experienced 3F	18	17	72	89	82.50	4.43
Experienced 3G	18	41	49	90	77.39	10.57
Trained Novice 2F	31	38	61	99	78.94	9.05
Trained Novice 1G	31	57	32	89	74.68	11.41
Trained Novice 3F	31	38	52	90	71.97	9.10
Trained Novice 3G	31	65	20	85	62.35	16.23

When comparing the minimum score of the experienced welders and the maximum score of the trained novice welders, it is evident that there is overlap. This data illustrates that the VR simulator can evaluate current skill, but cannot accurately identify an individual as an experienced welder or a novice welder.

The test weld quality scores were averaged for each weld type by welder experience. An overall average was also calculated by averaging all scores for each experience level (see Fig. 1). Based on the data, the experienced welders outperformed the trained novice welders by an average 10 quality points. As a descriptive trend, on average experienced welders outperformed the trained novice welders on all weld types. The separation in quality scores grew progressively between the groups as weld difficulty increased. The separations in average quality scores were 2F (7.39), 1G (10.21), 3F (10.53), and 3G (15.04). Another trend that emerged was the 2F weld, the easiest weld performed by welders of both experiences levels. The scores then decreased progressively for each group as the weld difficulty increased. Overall performance was highest among the experienced welder group with an average of 83, which was higher than the trained novice welder group by 12 quality points as illustrated in Figure 1.

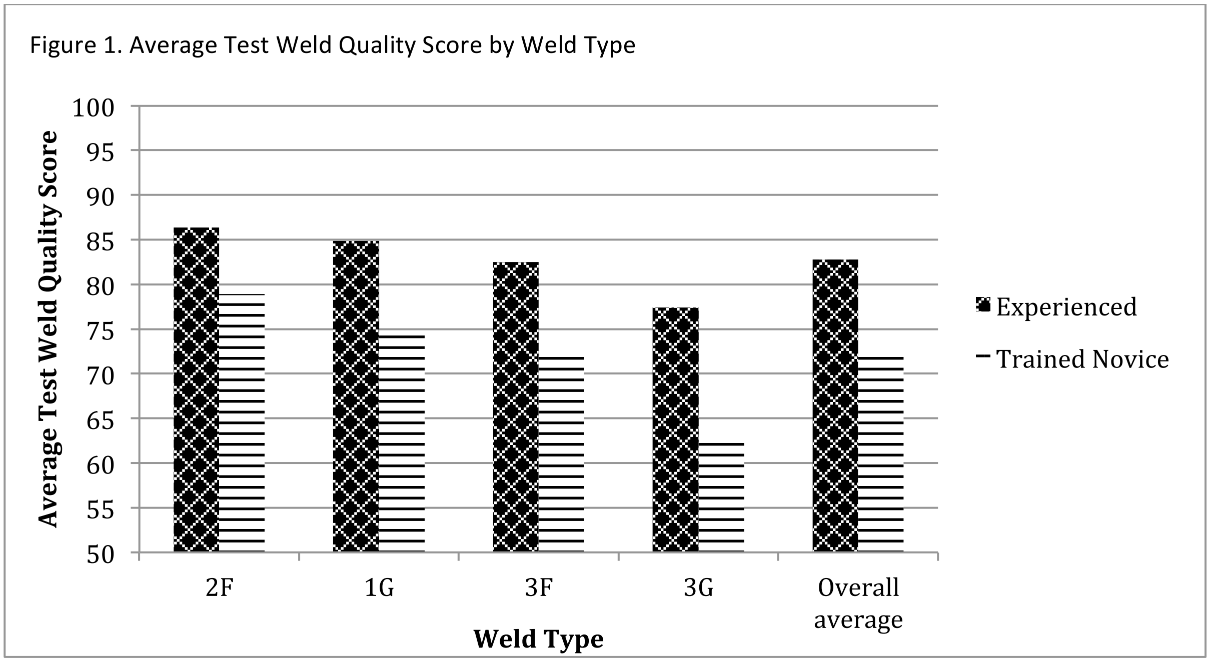

Figure 1. Average test weld quality score by weld type

To determine whether the groups were significantly different, it was necessary to determine whether the data were normal and had homogeneity of variance. Homogeneity of variance was examined by conducting Levene's Test (Gravetter & Wallnau, 2009) (see Table 2). Each test was conducted using $\alpha = 0.05$ to indicate significance. Significance of the Levene's Test indicates that equal variances are not assumed. All weld types, except for 3F had equal variances; 3F ($p = 0.015$) indicating which line to use to interpret the following *t*-test.

Table 2
Levene's Test for Equality of Variance

Weld Type	*F* Ratio	*p* Value
2F	0.657	0.422
1G	1.402	0.242
3F	6.315	0.015
3G	2.458	0.124

After homogeneity of variance was calculated, a *t*-test was calculated for the levels of experience on all four weld types. The results identified statistical significance for all weld types with *p* values ranging from 0.000 to 0.007. These findings indicated that a significant difference existed between the experienced welders' and trained novice welders' average quality score for each weld. To examine the effect that experience had on the average quality score, Cohen's d was calculated and was interpreted following the suggestion of Gravetter and Wallnau (2009) as small (0.2), medium (0.5), and large (0.8). According to the results, experience had large effect on the 2F ($t = 2.846$; $d = 0.830$) and 1G ($t = 3.352$; $d = 0.977$) weld types. Refer to Table 3.

Table 3
t-Test Results for Welder's Experience

Weld Type	*t*	*p*	*d*
2F	2.846	0.007	0.830
1G	3.352	0.002	0.977
3F	5.426	0.000	1.582
3G	3.512	0.001	1.024

Conclusions and Discussion

For the effectiveness of VR as an assessment tool to evaluate existing ability in existing experienced and trained novice welders, it was hypothesized that VR simulations would indicate a difference between experienced and trained novice welders. A discussion in light of this hypothesis follows for each of the weld types.

2F Weld Type

In this study, the 2F weld type was the simplest to complete. This was seen in both groups as the 2F weld had the highest average quality scores of all weld types tested. This finding indicates that the welders, both experienced and trained novices, were, on average, most competent to complete the 2F weld type. It was found that the VR simulator could not identify a welder as experienced or trained novice, but could assess the existing welding skill of a welder. From the results obtained, it was determined that experience level had a large effect on an individual's weld quality score.

1G Weld Type

The 1G weld type was the second easiest weld for both experienced and trained novice welders. The difficulty was identified in the results as the average quality scores were second highest when performing the 1G weld. The 1G average quality score decreased from the average quality scores of the 2F weld type. The relationship between experience and quality score was also apparent with this weld type based on the results of the *t*-test. Specifically, the findings revealed a large effect of experience on the 1G weld type quality score. The results of the VR simulator continued to show a difference between experienced and trained novice welders with the 1G weld type.

3F Weld Type

The vertical fillet weld, 3F, was the second most difficult weld performed in this study by both experienced and trained novice welders. The average quality scores continued to decrease as the 3F weld type was identified as more complicated to perform than were the 2F and 1G weld types. A distinct difference was identified between the quality scores of experience and trained novice welders for the 3F vertical fillet weld. The results also revealed that the experience level had a very large effect on the quality score for the 3F weld type. Welding experience had the largest effect on performance with the 3F more than any other weld type in this study. Experienced welders also demonstrated more consistent ability when examining the standard deviation of the quality scores on the 3F weld type compared to the trained novice welders. The VR simulations were able to distinguish between both experienced and trained novice welders for the 3F weld type.

3G Weld Type

The most difficult weld performed by the experienced and trained novice welders in this study was the 3G weld type. Experienced and trained novice welders both scored the lowest quality scores on this weld type. A distinct difference was also apparent using the VR simulation between experienced and trained novice welders for the 3G weld type. Experience was also identified as having a very large effect on quality scores.

The results of this study suggest that VR simulations can be used as assessment tools to evaluate existing skill levels of welders. The differences between the experienced and trained novice weldering groups were distinct for all weld types examined. These findings support the theory of individual differences because groups with more experiences were able to consistently perform tasks at a higher level of success due to increased task knowledge and skill (Motowidlo et al., 1997). However, the VR simulations could not classify an individual as an experienced or a trained novice welder.

It can also be concluded that experienced welders, as a group were able to perform significantly better than trained novice welders. This supports the findings of Boulet et al. (2003) were medical residents outscored medical students in medical simulations. Both groups showed a trend of decreasing quality scores as weld difficulty increased. The 2F and 1G welds tended to be easier for both the experienced and trained novice welders. Where the 3F and 3G welds were more complex in nature, and yielded a lower quality score from both groups. This conclusion supports the theoretcial framework as experience allows welders to perform better because of prior task knowledge and skill of each weld type (Motowidlo et al., 1997). Byrd, Stone, and Anderson (2014) found that gross dexterity was a predictor of future performance with simple welds, 2F and 1G welds. The dexterous ability gained by experienced welders could be a factor as to why they out performed the trained novice welders, because the trained novice has not be able to learn and improve their dexterous ability. However, the quality scores were able to identify which weld types the welders were most and least competent to complete.

Although the experienced welders did significantly outperform the trained novice welders in the VR simulations they did not however have perfect scores. This leads to the notion that regrdless of the experience level, continual training and development of skill are still needed, which supports Gaba (2004) where pilots are continually training on simulators no matter the level of experience.

Because VR has demonstrated the ability to assess existing welding skills, this method could be used to track a welder's skills over time. This use of longitudinal data could be used in worker assessments for educational purposes, as well as identifying when novice welders are ready to test for certification. In a setting where VR simulation would be used to assess existing skills, a system could be put into place for routine assessment to ensure high quality welds in a production setting. This would allow a company to monitor the task skill, task knowledge, and task habits (Motowidlo et al., 1997) of welders during the completion of a weld to identify areas of improvement for an individual welder. The results of this study demonstrated the ability of VR simulation, specifically the VRTEX® 360, in assessing existing skills in welders in terms of a quality score based on five welding parameters (position, arc length, work angle, travel angle, and travel speed).

Recommendations

The conclusions from this study lead to several recommendations. First, it is recommended that welding programs utilize VR welding simulators to help quantify the progress of welders throughout a training program due to the ability of the simulator to assess the existing skill of a welder. However, it should be noted that training programs should not soley rely on the the VR welding simlator as the only means to distinguish if a welder is exeperienced or novice. However, utilization could be used to assess when a trained novice welder is ready for American Welding Society (AWS) certification testing. This would allow training programs and industry alike to save money by not sending individuals for AWS certification testing prematurely.

It is recommended that training programs in industry and post-secondary schools utilize VR simulators to monitor the welding parameter scores recorded from the LASER screen to identify individual areas of needed improvement. This monitoring of skill is needed for both the trained novice and experienced welders because both groups did not score 100% on the VR welding simulator. The monitoring will help identify any bad habits that experienced welder may have picked up over the years and prevent any in the trained novices.

Further research is needed to fully evaluate the VR welding simulator's ability to successfully track skill in a longitudinal study within an industry setting to maintain or increase welding ability within its welders. It is also recommended to replicate this study by examining existing skill with the gas metal arc welding welding (GMAW) process.

In training programs with Career and Technical Education and within Agricultural Education the utilization of VR opens up new educational opportunities. The utilization of VR welding simulations can help provide new innovative methods of training future welding educators. The VR simulators could be used to setup self-guided modules before having students enter an actual welding booth. VR simulators will also give educators the ability to quantitively track improvement over a period of a semester. By better educating future teachers on how to weld properly, could this help increase the amount of students graduating from the secondary level as competent welders?

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Supervised Agricultural Experience: An Examination of Support, Supervision and Culture

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Abstract

Over the years examination of what was wrong in regards to Supervised Agricultural Experience (SAE) programs has gained traction. This has led the profession to question the relevance of SAE. However, the profession continually notes that SAE remains a foundational component and perhaps the only distinguishing difference between school-based agriscience education (SBAE) and other Career and Technical Education programs or specialty courses that tie in a student leadership organization. While collecting evidence of perceived barriers is important, at some point the question must be asked: What is right with student SAE programs in SBAE? This study uses a qualitative approach to examine factors that exist in rural SBAE programs that maintain exemplary SAE programs. Through focus groups, one-on-one interviews, observations, and informal interviews nine factors that were embedded in three themes emerged. Researchers concluded that a culture for SAE existed throughout the total program, school, and community. It was recommended that agriculture teachers aspire to instill SAE culture within their program.

Introduction and Literature Review

According to the American Management Association's Critical Skills Survey (2010), employers in the United States reported that the future workforce must be equipped with skills beyond reading, writing, and arithmetic to include problem solving and critical thinking skills. Phipps, Osborne, Dyer, & Ball (2008) stated that student involvement in supervised agricultural experience (SAE) programs promotes the acquisition of problem solving and critical thinking skills. Students who complete an SAE program have been required to make decisions that affect the economic productivity and overall success of their program (Newcomb, McCracken, Warmbrod, & Whittington, 2004). The development of these skills assists students in being successful member of society and a well-prepared employee for the workforce (Barrick et al., 1992).

To ensure that SAE programs were properly implemented, teachers have been expected to supervise students' programs. Traditionally, supervision has occurred through home visits to the student's SAE program. During the home visit, teachers often have the opportunity to interact with the student's parents. This opportunity was used to provide parents with an understanding of SAE programs and garner support for the agricultural education program. Based on this interaction, parents engage in their student's education. Parent, community members, and employers may provide informal supervision (Phipps et al., 2008). Informal supervisory roles, support the agricultural education program by developing relationships and advancing student focus in their SAE programs (Lewis, Rayfield, & Moore, 2012).

Roberts and Harlin (2007) proposed administrative, development, and implementation changes to ensure that SAE programs remain relevant. Due to some students' inability to acquire resources to conduct an SAE program (Retallick, 2010), teachers should allow students to utilize school facilities and resources to conduct an effective SAE program. Further, students should have the ability to work on SAE programs during school hours, as long as those hours were not during an agricultural education course and teachers must shift their role from being the holder-of-knowledge to the role of a facilitator (Roberts & Harlin, 2007). However, the teacher should be involved in SAE supervision (Barrick et al., 2011).

The supervision of SAE programs was an important role of an effective agriculture teacher (Dyer & Williams, 1997; Roberts & Dyer, 2004). Studies have reported that the number of supervisory visits that a teacher conducts positively influences the quality of the SAE program (Anyadoh & Barrick, 1990; Dyer & Williams, 1997; Gibson, 1988; Harris & Newcomb, 1985). Franklin (2008) found that 81% of teachers surveyed in Arizona utilized their school greenhouse facilities to house and implement student SAE programs. The utilization of school facilities can reduce teacher time spent traveling to SAE supervisory visits and increasing the level of supervision that the student receives while conducting an SAE program (Franklin, 2008). Dyer and Williams (1997) found that teachers, school administrators, and employers believe that teacher supervision was necessary; however the utilization of supervision practices varies by state and teacher.

For SAE to be successful, teachers must effectively assist students in the development and implementation of SAE programs that meet their needs and interests (Barrick et al., 1992). In order to effectively develop SAE programs, teachers must develop positive working relationships with students, parents, employers, administrators, and community members (Phipps et al., 2008). Many teachers have reported that changing demographics and increased student enrollment has affected the SAE development and implementation process (Dyer & Williams, 1997). However, little to no research has been done to examine how teachers currently develop and implement SAE programs (Dyer & Osborne, 1995). An examination of these considerations could assist in an increased relevance of SAE. Therefore, this study investigated the development and implementation process utilized in rural schools where exemplary SAE programs were conducted.

Purpose and Research Questions

The purpose of this study was to identify factors that were present in the development and implementation of exemplary SAE programs in rural schools. This study supported Priority Area Four, Meaningful and Engaged Learning Environments, of the National Research Agenda (Doerfert, 2011). This study was part of a larger study of which the research questions were as follows:

> What [teacher; student; school; community; & family] factors were present in the development and implementation of exemplary SAE programs in rural schools?

Conceptual Framework

Within the SAE literature, little work has been completed in the construction of a model that guides the development and implementation of SAE programs. Figure 1 represents the researchers' conceptual framework to guide this study. The framework explains the role of student, teacher, parent, community, and school factors on student intention, development, implementation, and continual use of SAE programs. Phipps et al., (2008) stated that all involved in the program must agree upon the development and implementation of SAE programs. SAE program development and implementation was affected by the students' intention to participate in SAE. Bird, Martin, & Simonsen (2013) stated that external and internal factors influence a student's decision to participate in SAE. The goal of this study was to identify the student, teacher, parent, community, and school factors that influence the development and implementation of SAE programs.

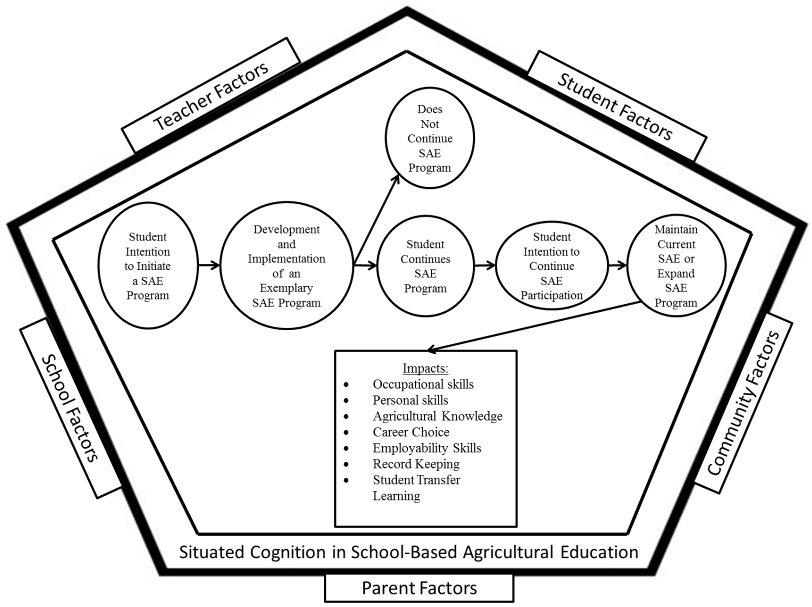

Figure 1. Conceptual model of SAE programs in SBAE.

Methods

The methods of this study were developed as part of a larger study. This qualitative study utilized a purposive method for participant selection (Koro-Ljungberg, Yendol-Hoppey, Smith, & Hayes, 2009). Two states were selected where the researchers had not previously worked and also had not partnered with anyone from the states on research activities to reduce threats to researcher bias. Within the two states, the researchers contacted an agricultural education university faculty member and the state agricultural education supervisor to garner three to five rural agricultural education programs, due to most SAE research focusing on rural SBAE programs, which met the *a priori* criteria of exemplary SAE programs. The criteria were as follows:

1. SBAE programs that conduct exemplary student SAEs have, at minimum, 75% of students engaged in SAE programs, where student SAEs consist of a multi-year program in which more than 100 hours of active participation have been recorded.
2. Rural SBAE programs were where a majority of the student body lives in a community of less than 2,500 people (USDA, 2013). However, in a county school, the SBAE program should be located in counties of less than 49,999 people (OMB, 2013).

Following, the researcher emailed and phoned each school to establish contact and request a phone interview to gather evidence of the criteria *a priori*. The researchers gathered additional evidence through the United States Department of Education and the United States Department of Agriculture to determine if the school met the demographic characteristics. The selected schools were deemed to be situated in a rural agriculturally-based community. Seven teachers in Minnesota and ten teachers in Georgia were contacted and interviewed by phone to garner greater information for criterion one. Upon completion of the phone interviews and probing questions, based on criterion one, the researchers selected one school in each state.

Once the schools were selected, the agriculture teacher at each program was notified of his or her selection for participation in the study, and on-site visits were established. The agriculture teacher was then asked to select six students who were establishing an SAE program for the first time and six students who had conducted an SAE program for 3 years or more. A parent or guardian of each student was asked to participate in a focus group during the on-site visit.
Site visits were scheduled for a two-day observation and data collection period. During the site visit, a minimum of two student focus groups, two parent focus groups, one community member focus group, and one or two teacher interviews (depending on the number of agriculture teachers in the program) were conducted. Each focus group contained between four and six participants (Morgan, 1988). Participants were given the opportunity to opt-out of the focus group or interview at any point during the data collection process.

Each focus group and interview was held in a conference room or classroom that was familiar to the teacher, student, parent, and community member participants. School A comprised nine students, eight parents, and three community member participants. School B comprised 12 students, eight parents, and one community member. The focus groups and interviews were audio recorded and transcribed for data analysis. Observations and informal interviews were conducted with additional agriculture students, who did not participate in the focus groups, by the researcher to establish consistency in the data between all students enrolled in an agricultural education course and to ensure that the researcher had achieved data saturation. Data saturation was achieved by the researcher and was noted during the initial stages of data analysis.

Interviews and focus groups were conducted utilizing a semi-structured interview guide. The individual interviews lasted between 50 and 90 minutes, while the focus groups lasted between 80 and 110 minutes. Even if participants chose not to utilize a pseudonym, pseudonyms were assigned to all participants during the transcription process to ensure anonymity of the data (Creswell, 2013; McMillian & Schumacher, 2010). Further, all identifiers were removed from the data to ensure that participant anonymity was upheld.

The data collection process spanned two on-site days. During day one, the agriculture teachers were asked to conduct a normal instructional lesson and the researcher observed the relationships between the agriculture teacher and students. These observations were conducted to understand the teacher-student dynamic and to assist in reducing the novelty effect. During day one, the agriculture teacher was interviewed during their planning period or after school. Immediately following school, the researcher conducted one student and one parent focus group. The second on-site day consisted of observing the researcher conducting observations of the students' interaction with their SAE program, their record system, and the agricultural education facilities utilization in SAE programs. During the observations the researcher randomly identified students to participate in an informal interview.

Focus group participants received an incentive for participating in the research study. The incentive was not a reward, honorarium, or salary. An incentive was utilized as a stimulus to participate in the focus group. In this study, parents and community members were provided with a $25 check for participation in the study (Krueger & Casey, 2009). Further, the agriculture teachers were provided with a $75 dollar check for their participation and assistance with organizing participants and rooming needs. Furthermore, participants were provided snack items before each focus group.

Lincoln and Guba (1985) constructed a four-step constant comparative method that was utilized to compare across multiple cases without the development of relationships and a theory, thereby allowing the constant comparative method to be used solely as an analysis methodology. This study was not conducted to develop a mid-level theory; it was conducted to identify factors that should be utilized by SBAE teachers when developing and implementing SAE programs in rural secondary SBAE programs. The researchers utilized each of the proposed steps as follows:

1. Compare incidents applicable to each category – the researchers established the creation of categories that described occurrences within the data. Categories were developed for each case and then compared between cases. The researcher defined properties or rules for the data that was incorporated in each category.
2. Integrate categories and their properties –the researchers analyzed the categories established during the first step of the process. Some of the established categories were redefined, combined, or a subcategory was created.
3. Delimit the construction –the researchers integrated categories as they become more defined during the analysis process. During this step fewer categories were created and more categories combined to develop one category.
4. Write the construction – the researchers ensured that member checking of the data had been conducted and that the final written manuscript had been prepared.

To ensure the credibility of the research study, the researchers utilized: member checking; peer debriefing; persistent observations; referential adequacy materials; and triangulation (Dooley, 2007; Lincoln & Guba, 1985). Transferability was upheld through the use of thorough and thick descriptions of the context and data. To ensure that dependability and trustworthiness was upheld, the researchers provided an audit trail with documentation on methodological decisions made during the study (Dooley, 2007). Further the researchers in this study were a PhD Candidate and Assistant Professor with formal training in SAE program development. Both researchers believed that SAE was an integral component of a SBAE program.

Findings

Supportive Surrounding "Community"

When ensuring that every student was involved in an SAE program, it was essential to understand the factors that influence student involvement. The data provided evidence that parents, community members, and other external factors influence students' desires and interests in SAE. The four factors that emerged from the data analysis were: supportive parents, parental knowledge of SAE, program goals, and community member support.

Supportive parents

When working with students involved in an SAE program, teachers must address the needs of the students' parents. The teachers noted that they spent time discussing a student's SAE program whenever they were engaged in a conversation with the student's parent. Teacher-1 described "anytime I talked to a parent I talk to them about their student's SAE, no matter what the conversation is about." Parents noted that they believed their role was to be supportive and provide supervision to their student while they were engaged in their SAE program at home. Parent-2 stated, "we support what he wants to do but we also encourage, like as a parent I encourage him to take every opportunity that comes his way." The parents felt as though they had an interest in seeing their students succeed and learn from their SAE. Parent-11 remarked, "My son was working with wood and me being a contractor, he's been around it all his life and it was something that I could get involved with, with him."

The students in the study recognized that their parents and other family members were extremely supportive of their SAE program. Throughout the focus groups and informal interviews, the students mentioned that their parents assisted them in acquiring pertinent resources for their program and that they were always there to answer questions they may have. Further, they believed the support of their parents and family members was a reason they remained involved in an SAE program. Student-3 affirmed "as I got involved, I got more interested and I continued working with him (grandfather) and see if it's something I would like to do in the future."

Parental knowledge of SAE

Throughout the study it became evident that parents had a limited knowledge of SAE. In each focus group, "What does SAE mean?" was asked. Many times the parents were unable to answer the question. The teachers required the parents to sign a sheet stating that they understood the requirements and expectations of their student. Teacher-3 described their policy, "one of the things that they (parents) have to do to start it off, is that they do have to sign off on the course syllabus that has that grading spelled out."

Parents were confused as to if SAE was a separate course, a part of FFA, or if it was an assignment for the agriculture education course. Parent-1 stated, "I actually am not sure if this is a new class or what this is in general." The lack of knowledge continued when Parent-6 said, "I did not know that it was called an SAE program, the assignment that she had to do. All I knew was that I had to take her to work sometimes." Some parents were unsure how the student even developed the program topic. Parent-7 added, "I really didn't know what we were getting into. In some ways I'm not sure that wasn't better because if I'd known what we were getting into I'm not sure I'd have gotten involved." In an attempt to describe an SAE program, Parent-12 responded that SAE was "an unknown secret that we have here."

Program goals

During the development and implementation process, teachers and students work together to develop adequate and achievable goals for the student to work toward during the SAE program. The main purpose of the goals was to continually motivate the student to continue their involvement and to apply their knowledge to their SAE. Teacher-2 explained that every student was expected to "identify three goals that they want to achieve." Further, teacher-1 described that students' goals should be established to provide an achievable point within the program. "I think that that’s encouraging for that student to feel like they have met that success. Even if they were unable to reach all of their goals, to at least reach a goal is important.” Teacher-2 mentioned that “if a kid can say that they can see they're learning through their SAE, that's probably the easiest way” to help them realize that they have achieved their goals.

SAE goals were viewed as an essential component to guide student engagement in an SAE program. When working with their agriculture teacher, the students recognized that there were different types of goals that they could set for their SAE program. Student-9 remembered that the teacher “emphasize that you should have short and long-term goals.” Further, Student-9 mentioned that the agriculture teachers did not expect that all of the goals that were set would be directly related to the SAE program and that their agriculture teacher encouraged students “to think about the personal side of the goals and [my teacher] always told me let yourself grow.”

The students’ learning goals were important to parents when they were involved in assisting and supporting their sons and daughters. The parents recognized that the goals that students developed for themselves would assist the parent in guiding and supporting their child as they engaged in an SAE program. Parent-15 expressed that “they set goals and I know they have certain skills that they want to attain. I know that they go online and they post their goals and the skills that they want to attain through their SAE.”

Community member support

When developing an SAE program for students, community members play a large role in providing students with resources or assisting students in achieving their goals. Some community members provide supportive comments to students conducting SAE programs or hire a student to complete work. When starting a business, Student-16 mentioned that community members have “pushed us along saying we would definitely buy eggs from you. So they kind of supported us once we brought that idea to them.” When developing SAE programs, agriculture teachers assist with connecting community members with students. Teacher-1 explained that the development of “SAE’s is based on the community’s needs and what the community has to offer.” Community members will contact the agriculture teacher before they hire employees to see if they have a student who might be interested in a job. Teacher-3 described a situation where a community member was reluctant to hire a high school student for an opening in a construction business. A year later, the community member contacted that agriculture teacher to say that the student “was the first person he's ever seen in high school that he would rather hire straight out of high school.”

The agriculture students noted through informal interviews and focus groups that community members had been positive influencers on student SAE programs. Students who worked for different community members recognized that their knowledge and skill had been enhanced because of their opportunity to work with a local community member. When talking about a local community member who was his/her boss, Student-8 expressed that “he’s been a big influence just igniting that passion and going beyond just helping me and cushioning me. He’s really cracked the whip and made sure I did all the dirty stuff as well as the good stuff.” Further, Student-6 expressed that community members had provided opportunities to expand skills by “coming up to me and asking me to come ride their horses and work with their horses rather than just at the local farm it helps me meet other people and get to work with new horses or new.”

Joint Supervision

Every participant group recognized that providing supervision to students during an SAE program was important. However, community members believed that the supervision that was being provided in the classroom was not adequate. The data were collected through informal interviews, observations, and focus groups provided evidence that students believed that they were adequately supervised. Therefore, the two subthemes that emerged from the data analysis were: classroom supervision and on-site supervision.

Classroom supervision

Within the classroom setting, the agriculture teachers provided students with classroom time to work on the development and implementation of their SAE program. During this classroom instructional, time the agriculture teacher spent the entire time talking with students and asking questions about their SAE program. Teacher-2 described their philosophy of SAE supervision as "it's the teacher's job to evaluate the student and to encourage the student to make sure the problems are getting done correctly, than the community member or the parent is there to offer support as well." Teacher-1 recognized some issues with only classroom supervision but described that the classroom can be effective if "there's progress checks and if there's something really alarming I can say okay, let's talk about what's going on here." Teacher-2 described the typical classroom instructional practices when students are working on their SAE program. "We take time in class and in computer labs so they can enter records on AET and we do performance reviews with the kids or progress checks with the kids in class."

Students recognized the benefits of classroom supervision and the role that their teacher played in the supervision of their SAE program. The students explained that when they were in class that they spend time working with the agriculture teacher to ensure that they were completing their assignments and SAE correctly. Student-21 recalled one experience with classroom supervision, "in class he (agriculture teacher) would set days so we could work on our SAE's and if we had questions about it, he would just answer them, so that always helped."

The parents who participated in the study recognized that the teachers were providing supervision in the classroom. In many cases, the parents denoted this practice as providing the students guidance and encouragement to keep them on schedule and assist them in meeting their goals. Parent-10 described the teacher's role in supervision "as keeping them (students) on track to make sure they're meeting their goals." Further, Parent-12 explained that the teacher provided supervision when conducting "weekly checks on the paperwork, you know, do you have pictures, and do you have a way to present this to the class at the end of the year."

On-site supervision

While the teachers in this study recognized the importance of conducing on-site supervision, each of the teachers affirmed that due to time constraints and the number of students enrolled in the SBAE program that on-site checks were near impossible. Teacher-2 stated that the only time to see a student's SAE in person was "if they bring it up here to school." The teachers recognized a need to be more actively engaged in providing on-site supervision. Teacher-2 mentioned that they relied on parents and community members "for supervision, for the most part. Their (student) supervisor has to sign off on their project at the end, their hours, to make sure that they've actually completed those hours." Teacher-3 noted that if parents or community members provided supervision to a student that they were required to complete "some forms and they can say, this student is doing these things, this student has showed me how to do this specific task." Teacher-3 expressed that there was a need to train community members to provide supervision to students, "if there were the opportunity to get out and explain to them all, yes, it could happen, but there is just so many students, especially the ones that don't know their employer."

The students realized that if the SAE program was conducted on the school grounds utilizing school resources that the agriculture teacher provided more supervision to the student than if the SAE was conducted at home. Student-9 described, "if it's (SAE) at school then yes, they're going to be with you and supervising you in everything you do, but if you're kind of doing it at your house … they're not really going to be there to supervise you." Student-10 further explained, "my supervisors, they've always been my parents or boss."

Community members were rather concerned with the amount of time that the agriculture teacher spent on-site with students. Being the supervisor of the student's SAE program was recognized by the community members as one of their roles in assisting with a student SAE program. However, the community members suggested that if the agriculture teacher expected this that a training session should be conducted with community members assisting with student SAE programs. Community member-3 recognized that teachers may not need to be the "direct supervisor but I think one thing they could do is make sure that the employer realizes that this is an education[al] experience." Further, community member-2 explained that the agriculture teacher needed to provide "clear expectations up front so the employer knows what is expected of him as the employer in terms of guidelines, rules, regulations, expectations."

Shared Expectations

The final theme established from the collected data was the theme of shared expectations. Participants described a developed and now inherent culture for SAE development and implementation within the SBAE program, where buy-in by students, parents, community members, and school administrators was essential. Based on the data analysis the following factors were established: supportive administration, prior sibling/family involvement in SAE, and development of a culture for SAE.

Supportive administration

When working in a public school system, teachers must ensure that their local administration supports the work that was being done in their classrooms. The teachers and community members in this study recognized and discussed the supportiveness of the building administrators in both schools. While only an informal conversation to thank the building administrators for their support of this study was held, it was noted that the administrators were proud of the SBAE programs in their schools. Teacher -2 explained that the "administration in our school is very supportive of what we do, especially with the way we conduct our SAE projects." One way that administrative support was increased was through involving them in different aspects of the SAE program. Teacher-1 explained one way that administrative support was increased in their school, "when we do our presentation expo at the end of the semester, we invite our faculty and administration to participate. We encourage them to come down because they hear a lot about the SAE project." Teacher-3 explained that having supportive administrators can "see the connection between career development and the SAE portion of the Ag program and my administration said that our Ag programs needs to do more SAE and we need to find ways to make that available to them." Community member-3 further explained that "unless you have them on board because they can through up roadblocks and challenges" for the agriculture teacher to face when developing and implementing student SAE programs. Community member-2, who had served on the local school board, added that school administration will "discover that a successful program will attract students to it. If there's enrollment in the classes it must be doing pretty good but the administrator that has the correct vision about it sees if they are learning in the classroom."

Prior sibling involvement in SAE

When conducting an SAE program, students and their parents discussed that older siblings' experience with SAE had an impact on the current student's involvement in SAE. Further, the prior student's involvement in SAE assisted in the development of a culture within the family that participation in SAE was an expectation. Parents noted that they had a perceived better conceptualization of the concept of SAE and that they believed that they were better able to support their son or daughter. Student-20 discussed that older siblings had a large impact on involvement in SAE. "I have older brothers that were super involved in FFA, they were both presidents and I saw them succeed with their SAE, so I kind of felt like I should then." In some cases, the older and younger brothers and sisters worked together to develop a single SAE program that met the needs of each student. When discussing the development of an SAE program, student-18 shared that a grandfather first had the idea to raise poultry and "brought the interest to me and then also to my sister, but I basically run the program." Student-18 further stated that her sister would take over the project when she enters high school in two years. The parents added that it was especially exciting when they saw both children find their interest. Parent-10 discussed the experience of having two students conduct an SAE program, our "1st daughter did it and then the 2nd daughter picked up on it and she did expand it to some other things that the 1st daughter didn't. Then, we have a son coming in. He's looking forward to it."

Development of a culture for SAE

Participants described a culture for participation in SAE that had been developed at each of the participating schools. The students understood that they were expected to conduct an SAE program if they enrolled in an agriculture course. Teacher-1 explained that "there are kids who will not take ag classes because of the SAE, because there's extra work involved and they can go take another CTE class and not have extra work." Teacher-3 explained that student perspectives regarding SAE change over time when a culture for SAE was developed. The agriculture teachers expressed that they were proud of the culture that they had developed and that they were pleased that students recognized that involvement in an SAE program was required of every agricultural education student. Teacher-2 explained how the culture for SAE had changed. "We've seen that go from maybe one or two kids with quality projects to six, eight, ten, twelve kids with quality projects and we've identified kids that are coming in that could have really good projects." This was supported when student-8 stated that watching friends develop their SAE "helped me develop my SAE and I was just constantly reminding myself, I have people backing me up, I have resources and I can do this."

The parents noticed that the students were assisting in the process of developing a culture for SAE. Many of the parents described that their son or daughter enjoyed being in an agricultural education course and they had made friends through FFA. Those friendships encouraged students to participate and engaged in the SAE development and implementation process. Parent-10 explained that "it's a great community … from the other students, the students they work with, also. They're excited about the projects each of them is working on." Parent-10 continued that because of the culture for SAE that had been developed that his children "..wanted to do it. It hasn't been where we had to beg and prod like with some things that you have. They would rather be doing that than just about anything else. You don't find many things like that."

Conclusions/Implications/Recommendations

Agriculture students, teachers, and parents in this study believed that classroom supervision was an adequate form of supervision for SAE programs. The agriculture teachers noted that classroom instructional time was dedicated to classroom SAE supervision and that this was a choice they made to ensure that all students were successful in their SAE. However, community members believed that the agriculture teacher should conduct more on-site supervision during a student SAE program. One community member noted that they believed the agriculture teacher should conduct one on-site supervisory visit per student per month.

The findings of this study supported the work of Dyer and Williams (1997) and Roberts and Dyer (2004) that stated agriculture teachers recognized that providing agriculture students with adequate supervision was an essential component of their role in an SAE. Similar to previous research by Dyer and Williams (1997) the agriculture teachers denoted that lack of resources and time limits the number of on-site supervisory visits. However, the agriculture teachers in this study believed that on-site supervision was beneficial to student success in their SAE. The agriculture teachers in this study believed that student SAE programs would be of higher quality based upon the amount supervision that students received. Anyadoh and Barrick (1990), Dyer and Williams (1997), Gibson (1988), and Harris and Newcomb (1985) supported this finding. All of the participants believed that an adult other than the agriculture teacher could supervise a student SAE program. This finding supported the work of Lewis et al., (2012) that reported that supervision practices be shared between the agriculture teacher, parent and community member. Therefore, agriculture teachers should work to identify capable parents and community members to serve as SAE supervisors.

The community members in this study stated that they had never received any formal training regarding supervision practices for a student SAE and felt unprepared to properly supervise student SAE programs. Therefore, it was concluded that community members need specific training sessions. More specifically, the training sessions need to include pertinent techniques for providing students with adequate supervision during an SAE. However, it was noted that even if adequate training was conducted that agriculture teachers still needed to increase the number of on-site supervisory visits they conduct.

Students were more engaged in their SAE programs if their peers were involved in an SAE as well. The agriculture teachers and students discussed that prior student experience assisted in the development of a culture for SAE within the SBAE program. It was further noted by the agriculture teachers that the development of a culture for SAE assisted in engaging other students in agricultural education courses and SAE programs. While little research has been conducted to examine the development of a culture of student participation in SAE, the participants in this study described that a culture for SAE participation fostered student participation. Therefore, it was concluded that agriculture teachers needed to develop a culture for SAE within the SBAE program.

The findings of this study supported the need for garnering administrative support for student SAE involvement. This finding was supported by the work of Rayfield and Wilson (2009) who investigated school principals' perceptions of SAE. Rayfield and Wilson found that school principals perceived SAE as an important component of agricultural education. The agriculture teachers supported the recommendations Phipps et al. (2008) posited for garnering administrator support. The agriculture teachers invited administrators to SAE instructional class periods and involved administrators in the SAE showcase at the end of each course. Therefore, it was concluded that involving administrators in SAE activities may elicit administrative SAE support.

Prior sibling and/or family involvement in SAE and agricultural education may increase student participation. Agriculture students and parents reported that siblings worked together to on SAE program topics. Therefore, siblings are provided an opportunity to begin learning through SAE before their program begins. The participants in this study reported that prior sibling and/or family involvement assisted in the development of a culture for SAE. It was reported that agriculture students who had a sibling involved in an SAE program had a positive perception of SAE and that encouraged to participation. As siblings enter agricultural education courses and engage in SAE a culture for participation was strengthened. This conclusion was similar to the finding of Rubenstein and Thoron's (2014) study with National FFA Proficiency winners.

Based on the findings of this study, the following recommendations for practice are drawn:

1. Agriculture teachers should identify school resources that can be utilized by students when conducting an SAE.
2. Parents should receive information through presentations and printed materials to increase their knowledge of SAE.
3. Agriculture teachers should identify capable parents and community members to serve as SAE supervisors.
4. Community members should receive training when assisting in the supervision of a student SAE.
5. Agriculture teachers should have students develop goals for their SAE programs.
6. Agriculture teachers should engage in the development of a culture for SAE.
7. Agriculture teachers should invite school administration to observe SAE-based lessons and activities.
8. Agriculture teachers should utilize both on-site and classroom supervision.
9. To further engage parents in SAE, The Agricultural Experience Tracker should develop a parent log in. This would allow parents to gain access to student's records and further assist in student participation in SAE.

Based upon the findings of this study, the following recommendations should be considered by teacher preparation programs:

1. Teacher educators should prepare preservice teachers to utilize both on-site and classroom supervision techniques.

2. Teacher educators should provide inservice teachers with professional development to prepare volunteers, parents, and employers to assist with and supervise SAE development and implementation.

Based upon the findings of this study, the following recommendations for future research have been drawn:

1. The development of a model of the SAE development and implementation is warranted.
2. Continued qualitative studies that examine urban and suburban SBAE programs with exemplary SAE programs.
3. Further research should examine the development of a culture for SAE.

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The Effects of an Experiential Approach to Learning on Student Motivation

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Abstract

Student motivation is an often-overlooked product of classroom instruction. Researchers have repeatedly called for broader measures to adequately assess and understand the effects of various instructional methods. This study sought to determine the effects of an experiential approach to learning on student motivation as defined by Keller's (1987) ARCS model. Three research questions were established and it was concluded that: (a) the type of instruction does not impact student motivation, (b) broad performance measures are not related to student motivation, and (c) learning style is related to student motivation. It was recommended teachers vary their instruction to meet all learning styles, be purposeful in designing instruction as guided by Keller's (1987) process questions to embed motivation, be aware of preferred teaching roles to be mindful of meeting all modes, and include motivation as an educational outcome.

Introduction

Education in America is under constant duress to produce high quality, high achieving students who perform well academically (Furgeson, 2004). This expectation can become burdensome for teachers who are accused of producing underperforming, underwhelming students who simply are not equipped academically for life after high school (National Association of Secondary School Principals, 1996, 2004). Because of this pressure, the implication for teachers is to continue cramming additional information down the throats of their students in hopes that the tide will turn on their performance measures (Futrell, 2010). However, the fact that students underperform in school may have more to do with a lack of effort than a lack of ability. Legault, Green-Demers, & Pelletier (2006) stated, "one of the most prominent academic problems plaguing today's teenage youth is a lack of motivation toward academic activities" (p. 567). Lens and Decruyenaere (1991) argued secondary education students simply do not possess the necessary motivation to complete the schoolwork required of them.

Unfortunately, because students lack appropriate motivation to succeed in school, they have been dubbed as underachievers (McCoach & Siegle, 2003). Although today's educational system is designed around measuring student academic performance, Dewey (1938) warned educators to not become overly fixated on performance measures to the point that they forget about the total student. To stress his point, he posed the question,

> "What avail is it to win prescribed amounts of information about geography and history, to win ability to read and write, if in the process the individual loses his own soul: loses his appreciation of things worth while, of the values to which these things are relative; if he loses desire to apply what he has learned and, above all, loses the ability to extract meaning from his future experiences as they occur?" (p. 49)

Students underachieve for a variety of reasons. Chief among them are a low self-perception to attain the requirements, a poor attitude toward the total educational system, and a general lack of motivation to perform (Dowdall & Colangelo, 1982; Reis & McCoach, 2000; Whitmore, 1982). However, the blame cannot be placed entirely on students. Teachers have a role to play regarding their students' motivation. Students in a secondary agricultural education program attributed their lack of motivation as apathy due to "mediocre teaching" and "the absence of learning purpose" (DeLay & Swan, 2014, p. 106).

Understanding what motivates students to perform is imperative to all secondary education teachers, administrators, and policy makers (Legault et al., 2006). Although student intelligence (Sternberg & Gringorenko, 2004) and performance measures (Dweck, 1986) have received the bulk of the attention in the literature regarding student achievement in secondary education settings, motivation is an important construct that has been a forgotten and overlooked (Steinmayr & Spinath, 2009). Though not one of the three core skills, student motivation has been discussed as a key product of teaching for successful intelligence. "Because teaching for successful intelligence reaches more students' patterns of abilities, the students are more likely to be intrinsically motivated to succeed in their own work" (Sternberg & Grigorenko, 2004, p. 277).

Most research on effective teaching and learning analyzes the performance of particular cognitive tasks and skills needed to complete those tasks (Dweck, 1986). This one-dimensional perspective, also referred to as a cognitivist view, fails to account for the notion that "almost all human activity, including thinking, serves not one but a multiplicity of motives at the same time" (Neisser, 1963, p. 195). Motivation is generally defined as, "that which accounts for the arousal, direction, and sustenance of behavior" (Keller, 1979, p. 27). Specifically, Steinmayr and Spinath (2009) opined, "Motivation is one of the constructs thought to cover a share of school performance variance not explained by intelligence" (p. 80). Therefore, the need to study the construct of motivation and its effect on student performance is both necessary and essential.

Theoretical/Conceptual Framework

Keller's (1987) ARCS Model of Motivation serves as the primary theoretical frame of this study. Kolb's (1984) Experiential Learning Theory (ELT) also plays an important role in setting the context for the treatment conditions in this experiment.

Keller's ARCS Model of Motivation

"Seldom do the arguments about the boundaries of teachers' responsibilities, or whether teaching is an art or science, become more animated than when discussing the motivation of students" (Keller, 1987, p. 2). The idea of motivation in the classroom is complex and educators, in general, struggle to move from theory to practice when seeking to improve motivation. As such, Keller (1987) asked two fundamental questions: (a) Is it possible to synthesize numerous concepts and theories of motivation into a simple, meaningful model or schema that would be useful to the practitioner? and (b) Is it possible to develop a systematic approach to designing motivating instruction? These questions led to the development of the ARCS Model (Keller, 1984) in an effort to improve student motivation through the design of better instruction. ARCS represent the four conceptual categories of motivation: (a) attention, (b) relevance, (c)

Categories & Subcategories	Process Questions
Attention	
A.1. Perceptual Arousal	• What can I do to capture their interest?
A.2. Inquiry Arousal	• How can I stimulate an attitude of inquiry?
A.3. Variability	• How can I maintain their attention?
Relevance	
R.1. Goal Orientation	• How can I best meet my learner's needs? (Do I know their needs?)
R.2. Motive Matching	• How and when can I provide my learners with appropriate choices, responsibilities, and influences?
R.3. Familiarity	• How can I tie the instruction to the learner's experiences?
Confidence	
C.1. Learning Requirements	• How can I assist in building a positive expectation for success?
C.2. Success Opportunities	• How will the learning experience support or enhance the students' beliefs in their competence?
C.3. Personal Control	• How will the learners clearly know their success is based on their efforts and abilities?
Satisfaction	
S.1. Natural Consequences	• How can I provide meaningful opportunities for learners to use their newly acquired knowledge/skill?
S.2. Positive Consequences	• What will provide reinforcement to the learner's successes?
S.3. Equity	• How can I assist the students in anchoring a positive feeling about their accomplishments?

Figure 1. Keller's (1987) Motivational Categories of the ARCS Model. Reprinted from "The Systematic Process of Motivational Design" by J. M. Keller, 1987, *Performance and Instruction, 26*(8), p. 86.

confidence, and (d) satisfaction (see Figure 1). The ARCS model is based on the macro theory of motivation and instructional design developed by Keller (1979, 1984), and is grounded in the expectancy-value theory as defined by Tolman (1932) and Lewin (1938).

Expectancy-value theory (Eccles, Adler, Futterman, Goff, Kaczala, Meece, &Midgley, 1983) is built on the work of Atkinson (1957), Battle (1965), Crandall (1969), Feather (1982), and Wigfield and Eccles (1992), and has been one of the most important views on the nature of achievement motivation in the classroom (Wigfield, 1994). The theory explains that people are motivated to engage in an activity if it is perceived to be in alignment with one's personal needs – the *value* aspect. In addition, students have expectancies for success, which is defined, as the individual's beliefs about how well he or she will perform on an upcoming task – the *expectancy* aspect. In the original ARCS model (Keller, 1979), value and expectancy framed the four conceptual categories. Subdividing the value category into two categories called interest and relevance further distinguished constructs dealing primarily with curiosity and arousal and those focusing on a need for achievement. Expectancy remained, and the final category was named outcomes referring to the reinforcing value of instruction. Each category was renamed in the modern ARCS model (Keller, 1984) as to strengthen the central feature of each component and to generate a useful acronym.

The ARCS model defines four major conditions that have to be present for people to become and remain motivated. Keller's (1987) operationalization of the four conditions is depicted in Figure 1. Attention is the first of these conditions and is a prerequisite for learning. The motivational goal is to not only get students' attention, but to sustain their attention over time. Relevance is related to answering the question, "Why do we have to learn this?" This condition can come from the way something is taught, and is not dependent solely on the planned curriculum. Confidence refers to the differences in students' belief that they can achieve. This is connected tightly to Dweck's (1986) research related to entity and incremental beliefs of a person's ability. Confident students believe they can accomplish their goals by means of their actions (Bandura, 1977; Bandura & Schunk, 1981) while students who exhibit low confidence have more of an ego involvement leading to a desire to impress others and avoid failure (Dweck, 1986). Finally, satisfaction incorporates the factors that make students feel good or bad about their accomplishments. Students are more satisfied if the task reward is clear and effective reinforcement is delivered.

Following the development of the ARCS model, Keller (2006) exerted two motivational measurement instruments. The first instrument is called the Course Interest Survey (CIS) and the second is the Instructional Materials Motivation Survey. "Both surveys are situational measures of student motivation to learn with reference to a specific learning condition such as an instructor facilitated learning environment, a self-paced print module, or a self-directed e-learning course" (Keller, 2006, p. 1). The goal of these measures is not to capture students' generalized levels of motivation toward school learning, but rather to find out how motivated students are, were, or expect to be, by a particular course. Keller (2006) expected these measures to be effective in assessing the motivation of secondary education students within the ARCS framework. Student motivation is the final element that is associated with the broader view of achievement purported by Sternberg (1999a) in his theory of Successful Intelligence. These elements of performance are helpful in casting a broader net when seeking to understand the effects of instructional methods better.

Kolb's Experiential Learning Theory

Agricultural education has been uniquely situated to capitalize upon learning through experience for well over 100 years (Baker, Robinson, & Kolb, 2012; Knoblock, 2003; Phipps, Osborne, Dyer, & Ball, 2008; Roberts, 2006). Though experiential learning holds a myriad of meanings, in this study it is operationalized through Kolb's (1984) Experiential Learning Theory whereby all learning is experiential and includes four primary learning modes: (a) concrete experience, (b) reflective observation, (c) abstract conceptualization, and (d) active experimentation. Information is grasped either through apprehension or comprehension, and transformed through either extension or intention (Kolb, 1984). The resolution of this dualistic tension is the impetus of learning (Kolb, 1984). Experiential learning theory is built upon six propositions: (a) learning is a process, not a set of outcomes, (b) all learning is ultimately re-learning, (c) learning involves the resolution of conflicts, (d) learning is a holistic process, (e) as the learner interacts with their environment, learning occurs, and (f) learning involves the process of creating knowledge (Kolb, 2005). Stable and enduring patterns of human individuality arise from consistent patterns of transaction between the individual and his or her environment resulting in learning preferences (Kolb, 1984). Individual preferences can be categorized as accommodating, assimilating, converging, or divergent congruent with the modes of transforming and grasping information.

Purpose of the Study

The purpose of this study was to examine the effects of an experiential learning approach to instruction, as compared to that of direct instruction, on secondary agricultural education students' motivation. Furthermore, the study sought to examine the relationship between motivation and achievement in academic settings, as often discussed in the motivational literature (Dweck, 1986). This research aligns with the National Research Agenda of the American Association of Agricultural Education (Doerfert, 2011) Priority Area 4 – Meaningful, Engaged Learning in All Environments. Most notably, the findings of this study further the examination of the role of motivation in developing engaged learning experiences across all agricultural contexts.

Research Question and Hypothesis

Three research questions framed this study:

1. What differences in student motivation exist, according to the ARCS conceptual framework, between experiential learning and direct instruction treatment groups?
2. What relationship exists between performance measures of successful intelligence and student motivation as defined by the ARCS conceptual framework?
3. What relationship exists between learning styles, as defined by Kolb's KLSI 3.1 (1999), and overall ARCS motivation for a course?

Following the conventions of experimental design (Kirk, 1995), one research hypothesis accompanies research question one:

H_O 1: There is no difference in students' levels of motivation between the experiential learning and direct instruction approaches to learning.

Methods and Procedures

The population of interest in this experimental design (Kirk, 1995) study was all students enrolled in the participating secondary agricultural education program (N = 120). The agricultural education program is situated in a rural community with a population of approximately 46,000 people (*www.city-data.com/city/[city's name]-[state's name].html). The entire program was selected to serve as a representative sample of a typical agricultural education program in [State]. Though this sampling decision is limiting in generalizability, it is intended to reduce bias by reducing the number of nuisance variables associated with varying social contexts of schools and communities. A sample of 87 students completed IRB consents and assents and participated in the full study. Through random assignment, 45 students were assigned to the experiential treatment and 42 were assigned to the direct instruction treatment. Wind turbine design served as the content of which the treatments were designed. This specific subject was chosen for two reasons: (a) it is aligned with current Agricultural Food and Natural Resources (AFNR) standards, and (b) it included adequate agricultural and science, technology, engineering, and math (STEM) concepts.* The goal was to provide a full unit of instruction, which typically, would be taught over the course of one week in an instructional setting, during a four-hour period to maintain the experimental control. Instruction was purposefully designed to create two, high quality, instructional approaches true to both experiential learning and direct instruction practices (see Table 1). Direct instruction, known as the most longstanding and comprehensive instructional approach in schools today (Begeny & Martens, 2006), follows a very scripted five stage process intended to promote sequential development of student competencies (Becker, 1992; Gersten, Carnine, & White, 1984; Joyce & Weil, 2000; Moore, 2007; Pearson & Gallagher, 1983; Rosenshine & Meister, 1992; Vygotsky, 1978). The experiential learning approach to learning moved students through the four stages of ELT (Kolb, 1984) which included stations of experiences related to the course objectives, guided reflection related to the various experiences, abstraction guides that led students to the abstract concepts of interest, and opportunities for experimentation and evaluation of progress (Wurdinger, 2004).

Table 1

Brief Overview of Instructional Plan for Two Conditions of Instruction

Experiential Learning Instructional Approach	Direct Instruction Instructional Approach
Students interacted with six stations related to key concepts of blade design where instructors served as facilitators.	Students received three instructional sessions targeting specific learning goals.
Students were asked to reflect on each station using two questions: (a) What is happening? (b) What does this teach you as you build your own blade design? Instructors facilitated this reflection and provided expertise of subject content.	Instruction was based on a scripted lesson plan focused on developing mastery of the objectives put forth in the plan. This plan included pre-planned discussion questions and learning activities.
Students utilized abstraction sheets to connect their reflective observations to abstract concepts outlined in the objectives. Instructors served as content experts.	Instructors provided critical information followed by a chance for students to practice use of that knowledge in a large group (*N* = ~6), smaller group (*N* = ~2), and then individually.
Students were allowed to experiment actively with their own conclusions by building and testing a number of blade designs. Instructors served as evaluators and coaches.	Instructors provided immediate and constant praise based on student performance.
	KidWind® materials were used to demonstrate key principles.

Successful Intelligence and Learning Style Measures

Though not the primary focus of this study, in order to provide context and confidence in analysis of research question three, brief descriptions of the measures of successful intelligence and learning style measures are warranted. Successful Intelligence, as purported by Sternberg (1999), is a more holistic measure of student achievement and includes three factors: (a) creative intelligence, (b) practical intelligence, and (c) analytical intelligence. Sternberg (1999) explained these four constructs should be measured in the context of which they occur. As such, measures were created to capture the three types of intelligence in the context of the wind energy unit of instruction.

The measurement of creativity followed Torrance's (1974) originality conventions. First, it was important to identify all ways students could be divergent in their blade design. Students could alter their designs by changing the blade length, blade pitch, blade shape, number of blades, and materials used to make the blades. An additional category of *elaboration* was included for divergent design elements not comprised within the five categories making a sixth element. Two pictures were taken of each blade design created by the participants, which were assessed on the six divergent elements. The purpose of this assessment was to create a frequency of each design element choice, determine a percentage of designs sharing that choice, and create a divergent score for each blade design. Ultimately, a statistical scoring process was utilized to determine the level of divergence of each design. Each participant's design was scored on the six elements, and those scores were added to achieve the overall creativity score utilized in the analysis.

Sternberg and Grigorenko (2004) explained that practical knowledge requires students to apply, use, put into practice, implement, employ, and render practical what they know. The practical assessment used in this study was an authentic assessment that represented the most logical extension of the lesson – to design, build, and test a wind blade design using materials provided by the instructors. Each student was given a universal hub and was asked to create a hub design intended to produce the most voltage possible using a common bank of materials in one hour. Each blade design was attached to a model tower containing a small generator, which was placed in front of a fan set at a constant speed. The voltage output was measured using a voltage meter. All variables, aside from the design of the blade, were held constant, and each voltage output was recorded.

Analytical intelligence was measured using a criterion-referenced test based on the selected objectives of the KidWind® blade design curriculum. The Analytical Wind Energy Assessment (AWEA) was collaboratively created by the research team and the KidWind® staff and consultants. The AWEA included 40 questions and was examined for face and content validity by a panel of experts including students, KidWind® staff, and expert educators (Creswell, 2008). The role of reliability indices in criterion-reference examinations has been described adequately in the literature (Kane, 1986; Lang, 1982; Popham & Husek, 1969; Wiersma & Jurs, 1990). The Kuder-Richardson 20 (*KR20*) formula (Cronbach, 1970), a test for internal consistency used commonly with criterion-referenced exams, yielded reliability coefficients of .82 for the pre-test and .90 for the post-test – both meeting the .50 benchmark set by Kane (1986).

Kolb's (1999) KLSI 3.1 is one of the most influential and widely distributed instruments used to measure individual learning preference (Kayes, 2005). The KLSI is based on Kolb's (1984) ELT, where learning consists of four constructs – CE, RO, AC, and AE. This instrument includes twelve sentence stems followed by four possible sentence endings. Subjects rank each of the four endings based on their preference for using the four modes. This procedure results in a 48-response instrument that is self-reported and self-scoring. A total score was tabulated for each learning mode, and then combined scores for each of the dialectically opposing modes of grasping and transforming (Kolb, 1984) were calculated. Kayes (2005) analyzed the current version, KLSI 3.1, for internal reliability and found Cronbach's alphas ranging from .77 to .82 for each of the four-dimensional constructs and .77 to .84 for the grasping and transforming constructs, respectively. Thus, it was determined that the KLSI 3.1 was a reliable and valid measure of learning style in this study.

Instructional Materials Motivation Survey

Keller (2006) developed the IMMS as a "situational measure of students' motivation to learn with reference to a specific learning condition" (p. 1). The instrument was designed in correspondence with the ARCS Model (Keller, 1987) based on current literature on human motivation (Keller, 1979, 1984). "The goal with these instruments is to find out how motivated students are, were, or expect to be, by a particular course" (Keller, 2006, p. 1). The IMMS can be used with adults, college students, and secondary students. The instrument contains 36

statements related to the four conditions that must be met for people to become and remain motivated: (a) attention, (b) relevance, (c) confidence, and (d) satisfaction. Subjects respond using a summated rating scale indicating that each statement is: (1) not true, (2) slightly true, (3) moderately true, (4) mostly true, or (5) very true. The scoring guide indicates which construct each statement measures and notes those statements that are reverse coded.
The instrument can be scored for each of the subscales or added for a total motivation score. Bivariate correlation analysis indicated high correlations between each subscale and the overall motivation score; so, it was decided to use the total motivation score as the indicator of motivation for statistical analysis. The reliability estimates of the attention, relevance, confidence, satisfaction, and total scores, as measured through Chronbach's alpha, were .89, .81, .90, .92, .96 respectively. The internal reliability was determined to be adequate.

Analysis of Data and Potential Threats to Validity

The first research question utilized an omnibus MANOVA to detect differences in motivation between the two treatment groups. The second and third research questions were analyzed as multiple correlation analyses (MCA), rather than multiple regression analyses (MRA), as described by Huberty (2003). The intention of the regression analysis was to identify the *relationship* between a system of variables that should help define a construct (Huberty, 2003). Though SPSS does not make the MCA-MRA distinction, attention to the differences are evident in the method of reporting and interpreting the analyses.

Data were analyzed using Statistical Package for Social Sciences (SPSS©) version 20 for Macintosh computers. Using histograms and P – P plots, as suggested by Field (2009), all dependent variables were normally distributed prior to analysis. Partial eta squared is the reported effect measure in this study. Cohen (1977) characterized $\eta_p^2 = .01$ as a small effect size, $\eta_p^2 = .06$ as a medium effect size, and $\eta_p^2 = .14$ as a large effect size. Campbell and Stanley (1966) identified four categories of threats: (a) statistical conclusion validity, (b) internal validity, (c) construct validity of causes and effects, and (d) external validity. Steps were taken to mitigate each of these threats. Each of the assumptions required when utilizing MANOVA were tenable as each observation was collected independently, data were normally distributed, and Levene's test for the equality of error variances yielded p values less than .05.

Findings

The mean motivation scores, with standard deviations in parentheses, for the experiential learning treatment (n = 45) were 3.41 (.59) for attention, 3.35 (.08) for relevance, 3.72 (.10) for confidence, 3.78 (.11) for satisfaction, and 14.26 (1.82) for aggregate motivation. The mean motivation scores for the direct instruction treatment (n = 42) were 3.37 (.54) for attention, 3.38 (.08) for relevance, 3.72 (.10) for confidence, 3.48 (.11) for satisfaction, and 13.96 (2.03) for aggregate motivation. The omnibus multivariate analysis (see Table 2) yielded no statistically significant differences of motivational measures between the experiential learning and direct instruction treatments. As such, we failed to reject the null hypothesis and analysis related to research question one ceased.

Table 2
Summary of Omnibus MANOVA Analysis Testing for Main Effects of ARCS Motivational Subscales of the Treatment Conditions (df = 86)

Source of Variance	Λ	F	p	η_p^2
Treatment Group	.92	1.70	.16	.08

The MCA analysis for the second research question (see Table 3) yielded a non-significant R^2 value with only seven 7% of variance in motivation explained by performance measures. However, one significant low relationship (Davis, 1971) was found (r = .22, p = .02) between the practical performance measure and student motivation for the content. Semipartial correlations indicated a unique contribution of .18 ($r_{m(p.ca)}$ = .18, p = .11) when controlling for both creative and analytical measures. The MCA analysis for the third research question (see Table 4) yielded a significant R^2 value with 14% of the variance in motivation attributed to a linear combination of learning style measures. Further correlation analysis elucidated the relationship as the Active Experimentation (AE) learning preference was highly correlated to motivational measures (r = .30, p = .00). Semi-partial correlation analysis indicated a unique contribution of .20 ($r_{m(a.arc)}$ = .20, p = .06) indicating that though AE was moderately correlated (Davis, 1971) to motivation measures, it was the collective system of variables that explained the motivational construct.

Table 3
Summary of Multiple Correlation Analysis for Successful Intelligence Performance Measures and Student Motivation

Coefficient of Determination	Performance Measure	r	Semipartial r
$R^2 = .07$; $p = .12$	Creative	.08	.09
	Practical	.22*	.18
	Analytical	.16	.15

* $p < .05$

Table 4
Summary of Multiple Correlation Analysis for Learning Style and Student Motivation

Coefficient of Determination	Learning Style	r	Semipartial r
$R^2 = .14$; $p = .02$	CE	.17	.10
	RO	.07	.14
	AC	.07	.14
	AE	.30**	.20

** $p < .01$

Conclusions, Discussions, and Implications

Conclusion 1: Experiential learning and direct instruction approaches to learning produce similar student motivation outcomes.

This conclusion is not consistent with what motivational effects were expected based on previous research findings. Stout (1996), Weinberg, Basile, and Albright (2011), and Specht and Sandlin (1991) all found students involved in experiential instruction were more motivated by the course, had a more positive outlook on accounting careers, were more interested in content, and had a salutary impact on career specialization. Keller (1987) purported, "relevance can come from the way something is taught; it does not have to come from the content itself" (p. 7). In this study that case was simply not true. So often agricultural education prescribes to the notion that experiential learning, as often conceptualized, is a somehow superior approach. In reference to student performance measures, the superior notion would be true (Baker & Robinson, 2014a); however, in reference to motivation, educators that prefer a more directed and teacher led approach could find the same motivational outcomes as those employing experiential approaches.

Gay, Mills, and Airasian (2009) offered another explanation related to the novelty effect, defined as, "increased interest, motivation, or engagement participants develop simply because they are doing something different" (p. 250). Though the clinical nature of the treatments provided a reduction of bias, it could also have created a synthetic learning environment. Perhaps being conducted in a context outside of the traditional school setting caused this unexpected equalization of motivational effect.

Conclusion 2: Successful intelligence performance measures, as a system, are not related to student motivation.

Though a number of studies concluded motivational measures are related to school achievement (Gose, Wooden, & Muller, 1980; Schicke & Fagan, 1994; Spinath, Spineth Marlaar, & Plomin, 2006), few have investigated the importance of motivation on measures beyond intelligence (Steinmayr & Pinath, 2009). In contrast, a number of studies have concluded that being a high achiever does not appear to relate directly to student motivation (Dweck, 1986). This conclusion supports the latter in that, in this population, motivation does not relate to achievement as more broadly defined by Sternberg's (1999) triarchic approach to intelligence.

At face value this conclusion seems to be encouraging conclusion. In agricultural education there are many opportunities for positive achievement affirmation through Career Development Events (CDE), classroom authentic assessments, proficiency award program, and team projects. There are also an equal number of opportunities for students to experience obstacles, failure, and unrealized potential. In this population, either result should not affect students' motivation for the course. Another plausible rationale, as discussed by Dweck (1986), is that student motivation more cumulative in nature. Though this one-day treatment had no effect on student motivation, what would prolonged exposure to either academic success or failure have on these same ARCS measures? "Our experimental studies may create conditions that good students will encounter fully only in later years but that reveal underlying patterns" (p. 1044). Could it be that the significant, but low, correlation between practical performance and motivation is just that – an indication of a trend that would be fully realized over time. If so, student success in practical tasks, such as supervised agricultural experience programs, independent projects, science projects, job interviews, and contest results, could be related to students motivation for the course content – agriculture.

Conclusion 3: Kolb's learning styles, as a system, are related to student motivation.

JilardiDamavandi, Mahyuddin, Elias, Shafee, and Shabani (2011), in reference to studies of learning styles and performance, explained it was imperative to utilize measures beyond standard examinations because the differences between learning style products are not detectible without broader assessments. Based on the findings of this study, motivation is one such measure. The learning style scales, as a system of measures, explained 14% of the variance in motivation. Extrapolated to the context of this population, students entered the classroom with inherent learning preferences that did not affect their performance (Baker & Robinson, 2014), but did relate to their motivation for the course content. In a subsequent study of this same population, Baker and Robinson (2014) reported that 51.25% of students held an accommodating learning preference and 20.00% held a divergent learning preference. If this population is representative of the general makeup of secondary agricultural education students, a systematic motivational bias is embedded into the system. The implication of this finding points toward variability in instruction to ensure that students of all learning styles remain motivated.

The correlation between the AE learning style and student motivation also warrants discussion. Though the partial correlations seem to indicate all four scales explain a unique portion of variance, the AE scale is the highest performing subscale. One conclusion is that a student's AE score is most related to motivation. However, an additional explanation could be that there is a much larger group of students who prefer to transform via extension. As such, it makes sense that this largest subset of students would be motivated by the nature of both treatments. As discussed earlier, both treatments were designed to be polarizing approaches, but were also carefully crafted to be high quality and engaging. Though the opportunities for application and experimentation were quite different, both treatments included carefully planned and executed application pieces – a practice quite favorable for the AE learning style. Perhaps these students found both treatments a bit more engaging in this application dimension than their normal classroom experiences, and consequently, had a short-term spike in motivation resulting from these high quality instructional approaches. Once again, the concept of good teaching is good teaching seems to be a factor in this conclusion.

Recommendations for Practice and Research

Based on the findings of this study, the following recommendations are made for practitioners in secondary agricultural education:

1. The results of this study seem to support the notion that good teaching, regardless of the approach, results in motivation for a given subject. As suggested by Rosenshine and Furst (1971), the elements of clarity, variability, enthusiasm, task orientation, and opportunities for application might be more important than the specific approach.

Teachers and teacher educators should introduce various methods, but emphasis should be placed on quality delivery of the method.

2. Teachers and teacher education programs should utilize Keller's (1987) process questions, which are related to each of the ARCS elements, to design instruction that is motivational in nature regardless of the method selected. Careful attention was given to designing two high quality treatments that met the tenants of Keller's (1987) model.
3. Motivation should be an important product of interest when measuring the effectiveness of instruction. Assuming motivation for a given subject is related to performance indicators is erroneous. They are two separate educational products.
4. Teachers should be aware of their preferred teaching roles and use that awareness to purposefully design instruction intended to target preferences of different learners.

Though this study provided conclusions related to the stated research questions, a number of additional research questions arose as a product of this research. These research questions include:

1. What motivational effects result from an experiential approach to learning in a typical school context over a longer period of time?
2. What are the cumulative motivational impacts of successes and failures over time?
3. Is there a systematic difference in agricultural educators teaching style that could thus affect student motivation?

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A Historical Examination of the Educational Intent of Supervised Agricultural Experiences (SAEs) and Project-Based Learning in Agricultural Education

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Abstract

Project-based learning has been a core component of agricultural education since before the passage of the Smith-Hughes Act in 1917. In light of the current call for reform of the Supervised Agricultural Experience (SAE) in agricultural education, there is need to revisit the roots of project-based learning. This early historical research study was conducted to examine the underlying educational intent for the use of the project method. The study was developed to determine the circumstances surrounding the origination of the method and what drove Rufus Stimson's original intent for the project method, along with examining events which may have led to shifts in the purpose for integrating project-based learning in agricultural education. Findings substantiate the initiation of project-based learning in agricultural education with Rufus Stimson, who likely intended the method as a way to apply concepts learned in classes. Following the postwar movement and educational reform from the 1950s through the turn of the century, project-based learning has essentially shifted intention and is now viewed as a method for students to acquire new knowledge and learn new concepts in agriculture as well as other academic areas. The historical examination of this topic allows for context with which SAE reform may be considered, and allows a more complete understanding of the driving factors behind the shift in intent for project-based learning both in the classroom and with SAEs.

Introduction

Agricultural education has long been intertwined with project-based learning. The early days of agricultural education were guided through project-based farms (Hurt, 2002) which paved the way for the passage of federal legislation forever linking project-based learning and secondary agricultural education (National Vocational Education Act, 1917). Although agricultural education has included project-based learning as a required component since the passage of the Smith-Hughes Act, there may have been fundamental shifts in the perceived educational intent of supervised projects and project-based learning in agricultural education.

Without a doubt, Rufus Stimson's project method has made a "profound impact on the vocational education profession" (Moore, 1988, p. 51). Essentially, the project method laid the groundwork for what early agricultural educators believed the Supervised Agricultural Experience (SAE) should be. Stimson (1919) described the intent of the farming project by explaining, "a farming project, as the term is here used, is a thing to be done on a farm, which, preparing to do it and carrying it out to a successful result, involves a thoroughgoing educational process" (p. 42). To further describe the method, Stimson (1919) quoted his description of the project method from a booklet he had previously published outlining the plan for Smith's Agricultural School, which touted projects as "…plots of ground at home…where he [the student] will apply the methods taught by the school on the soil he may someday own" (p. 37-38).

The project method and SAEs in agricultural education today bear resemblance to the home-project method outlined by Stimson, but are not an exact replica. Potential shifts in educational intent for the use of projects in this content area are related to one general philosophical question: Should students in agricultural education complete projects as a way to apply concepts they have already learned in the classroom, or should they complete projects as a way to discover and learn new concepts? With each era of educational reform, philosophical shifts have occurred to change the focus of the intent for agricultural projects.

Understanding the historical background of the project method in agricultural education may prove helpful in determining the role of reform in SAEs today and in the future, and thus is directly related to the American Association for Agricultural Education (AAAE) research agenda priority 5 "to develop meaningful, engaged learning in all environments" (Doerfert, 2011). Agricultural education has changed with the landscape of education, the question remains, is the educational intent of the project method still the same?

Review of Literature \ Theoretical Framework

The origination of project-based learning and SAEs has been a topic included in several quality historical studies in agricultural education, perhaps due to its dynamic beginnings (Hyslop-Margison, 2000; Moore, 1985; Moore, 1988; Knoll, 1997). The theoretical beliefs surrounding the origination of the home-project method and SAEs served to provide the theoretical underpinnings of this study.

The turn of the century was a time of great change and advancement in our nation (Hurt, 2002). Educational systems were being criticized for doing little to prepare an able workforce (Hyslop-Margison, 2000). The project method originated within this time of educational upheaval. The timeline for the origination of the project-method is shown in Figure 1.

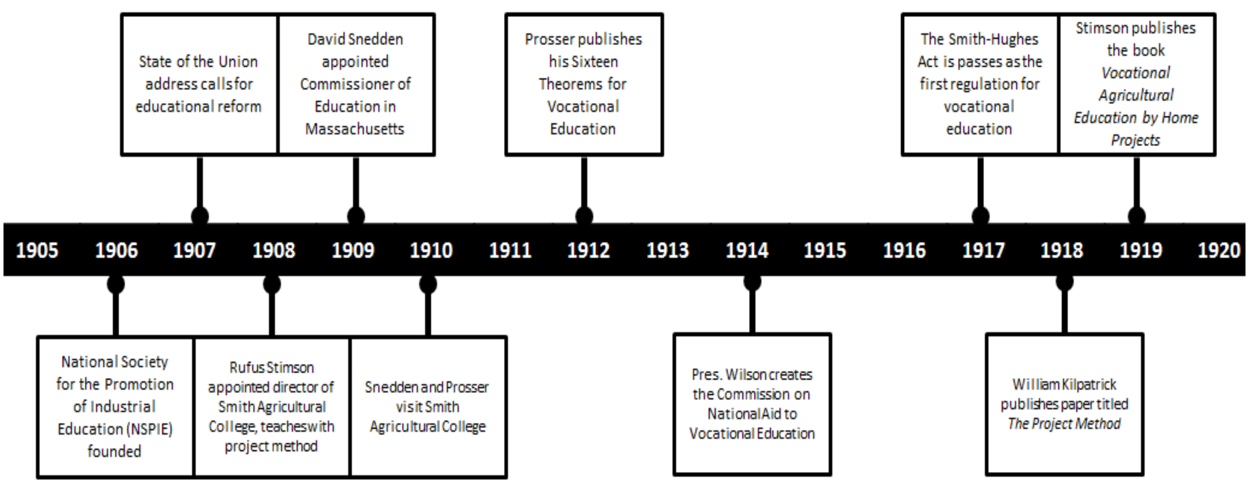

Figure 1. Timeline of major events leading to the development of the project method and SAEs in agricultural education

In the 1907 State of the Union Address (Woolley & Peters, 2014b), Roosevelt urged school reform, saying:

> Our school system is gravely defective in so far as it puts a premium upon mere literary training and tends therefore to train the boy away from the farm and the workshop. Nothing is more needed than the best type of industrial school, the school for mechanical industries in the city, the school for practically teaching agriculture in the country (p. 2).

Roosevelt's statement served as a catalyst to an already mobile educational movement; away from abstract academics toward applied and vocational training. Vocational education in secondary schools became a topic of interest for educational policymakers, primarily for those who were looking for a workforce of highly qualified employees. The National Society for the Promotion of Industrial Education (NSPIE), was developed in 1906 as a group dedicated to providing guidance and impetus for vocational education (Hillison, 1995). Charles Prosser, a steelworker's son turned educator, became the executive secretary of the NSPIE in 1912, and advocated for the strengthening of vocational education for secondary students (Hillison, 1995; Prosser, 1913, 1918). Even the National Education Association, which had previously dictated that high schools should be college-prep oriented, advocated for trade schools as an alternative to students leaving high school without job skills (Ogden, 1990).

In 1914, President Woodrow Wilson created the Commission on National Aid to Vocational Education, which served to determine the need for federal funding of vocational education programs (Hillison, 1995; Hyslop-Margison, 2000, S. Rep. 63-1004, 1914). This commission was chaired by Georgia Senator Hoke Smith, and included Charles Prosser as a member and principle author of the commission's final report. In their report, dated June 1, 1914, the commission concluded that there was urgent need for federal support for vocational education, citing in part:

> It is clearly recognized not only that a stronger vocational element is needed in general education, but that no vocational school is worthy the name with fails to give a considerable amount of general education along with the special preparation for a vocation (p. 16).

Regarding agricultural education, the commission report said, "On some phases of agriculture, exhaustive work has been done…This work should not be neglected, but it should be supplemented by studies of the simpler processes applicable to the more common and every-day problems of the farmer" (p. 56).

The influences of project-based learning on the first guiding piece of legislation for vocational education were profound, and began long before the formation of the commission to determine aid. In 1908, Rufus Stimson became the director of Smith's Agricultural College (Heald, 1929; Moore, 1985, 1988). Stimson quickly began infusing the school with his version of project-based learning, which he deemed the "home-project method". Stimson went on to publically share his successes and philosophy regarding the importance of students engaging in work that was what they would actively be doing when they finished school (Moore, 1988;

Stimson, 1912, 1915, 1919; Wirth, 1972). Stimson's (1919) theory of the home-project method as an application of knowledge served as the foundational theory guiding this study.

As agricultural educators today work to balance the needs of students, most of whom are not going to pursue production agriculture as a career. A standardized curriculum has left teachers to navigate Stimson's model, and the modified interpretation of it, in order to ensure that each student can learn those skills from project-based learning that are directly related to their specific chosen careers.

Purpose of the Study

The purpose of this study was to examine the educational intent of project-based learning as it originated in agricultural education, and events that led to potential historical shifts in intent for this method as driven by educational legislation and policy. To guide the historical examination of this topic, two research questions were developed:

1. What was the original educational intent of project-based learning and SAEs?

2. Have historical events affected the educational intent of project-based learning and SAEs in agricultural education?
   f.

Methods

This study was conducted using historical research methods. Historical research is research conducted for the purpose of understanding the past as it relates to present situations (Ary, Jacobs, Sorenson, & Walker, 2013). Borg and Gall (1996) defined the process of historical research as a systematic search for documents, artifacts, and other sources of information related to specific research objectives. Historical research is considered a type of qualitative research (Ary, et. al., 2013), and as such is guided by the measures of accountability for all qualitative research (Lincoln & Guba, 1985).

Sources included for consideration in this study included library, archival, and digital searches related to the topic and guiding questions of the study. Whenever possible, primary sources were utilized, including digital copies of original works. Primary sources utilized included transcripts of speeches, personal communications, proceedings of conventions and meetings, congressional reports, books, research studies and articles in *The Agricultural Education Magazine* (formerly *Agricultural Education*). Secondary sources of data included books and research articles.

Fulfilling the measures of accountability require qualitative research to establish trustworthiness with the intended audience by ensuring credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). To meet the requirements for credibility, multiple sources were used whenever possible to triangulate data, and sources used for inclusion in this study were subjected to internal and external criticism to determine the value of the material (Creswell, 2012). With regard to transferability, the manuscript was prepared with detailed information related to the sources of data used. This allows the consumer a broad base of information from which to draw conclusions related to the transfer of the findings of this study to other situations (Lincoln & Guba, 1985). Dependability was established through careful notes maintained by the researchers, along with both printed and digital cataloging of data collected and included in this study being. Related to confirmability, the results drawn from this research are directly addressed by the data sources. At all feasible points, original quotes from primary sources have been included, and results and interpretations were gleaned directly from the evidentiary support provided. The use of multiple artifacts from reputable libraries and search engines was used to triangulate data and verify authenticity of information presented. To prevent threats to neutrality as outlined by Lincoln and Guba (1985), reflexive journaling was used throughout the research process to identify and acknowledge researcher bias toward the topic and further establish trustworthiness.

Results/Findings

Question One: What was the original educational intent of project-based learning and SAEs?

Stimson, a philosopher with deep agricultural roots, had previously noticed the high level of retention for abstract concepts when the students had the opportunity to apply concepts through concrete experiences (Stimson, 1915). His work at Smith's Agricultural College had not gone unnoticed and others began to look to Stimson for guidance in the use of what he called the home-project method, the predecessor to the Supervised Agricultural Experience.

Massachusetts appointed Dr. David Snedden to the post of Commissioner of Education in 1909. This marked a change in educational policy in the state and a move toward educational reform consistent with the climate of education at this time period. Snedden (1900, 1910) was concerned with the importance of vocational education, and was a vocal advocate for vocational education that was rooted in workforce needs (Hyslop-Margison, 2000). Shortly after taking his position, Snedden appointed Charles Prosser, who had studied under him at Teachers College within Columbia University, as the Deputy Commissioner for Vocational Education in the state.

Having heard of the success of Stimson's home project method, both men visited Smith's Agricultural College in 1910, and fostered a relationship with Stimson in which he shared his philosophy of project-based learning (Snedden, 1917; Moore, 1988). The three men continued to refine the concepts of the home-project in agricultural education when Stimson took post as Supervisor of Vocational Agriculture in the Massachusetts Department of Education in 1911. In a letter dated April 15, 1918, Snedden wrote to Stimson, "I am quite sure that the use of the words 'project' and 'home project' both began in the early days of the work of yourself, Mr. Prosser, and myself in Massachusetts" (Stimson, 1919). Of the home project method, Stimson (1919) said, "certain it is … that the home-project plan benefited from the close collaboration and stout support of both Mr. [Charles] Prosser and Dr. [David] Snedden, in the earlier days…" (Stimson, 1919, p. 40).

As a result of the collaboration of Stimson, Snedden, and Prosser, Prosser's (1912) sixteen theorems of vocational education emerged. Similarities in the wording of Prosser's sixteen theorems, Stimson's home-project method, and the Smith-Hughes Act of 1917 are very apparent, and not surprising given Prosser's significant contributions to the writing of the bill

(Moore, 1988; Wirth, 1972; Wonacott, 2003). As outlined in the Smith-Hughes Act (S. Res. 374), in order to receive federal funding "schools shall provide for directed or supervised practice in agriculture, either on a farm provided by the school or other farm, for at least six months per year" (p. 934); and so, project-based learning and agricultural education were forever intertwined.

Perhaps as important as the initiation of the project method was the intent behind it. To understand the intent of the method is to understand something of the philosophies of the men who originated and refined the method in its relation to agricultural education.

In a presentation later published in *The School Review,* and again printed in his book *Vocational Agricultural Education by Home Projects,* Rufus Stimson (1915, 1919) outlined his idea of what he believed was typical of a high school in the early 1900s, which focused instruction in the "cultural subjects". Stimson (1915) also described the turn of the century vocational school as a place where boys would go because "they saw in the high school courses nothing that would be of use to them" (p. 474). Stimson's (1915, 1919) illustrated view of these two types of schools are shown in Figure 2, with traditional high school being shown depicted as a capital "C" and vocational school being shown as a capital "V". Stimson noted that his figure depicted the concept that cultural education was held in a higher regard than vocational school.

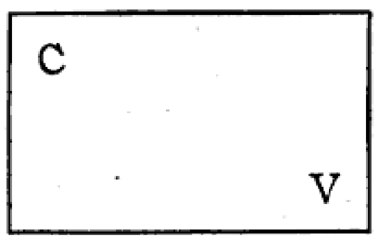

Figure 2. Stimson's (1915, 1919) outline of the traditional view of high schools (C) and vocational schools (V)

Stimson (1915) continued to outline his thoughts on what he believed to be a better model for schooling in and around that time, as shown in Figure 3. In the figure, Stimson represents cultural high schools shown with a capital C for the cultural subjects but with a smaller v to illustrate that high schools at the time had "at least some recognition given to direct training for the career the pupil is likely to follow" (p. 475). His view of vocational schools at the time was that they still prepared students for careers, but were infused with "decided civic or cultural values… in Massachusetts at least" (p. 475). It is important to note the positioning of the two schooling systems in Stimson's model, as Stimson believed both had equal value to society.

Figure 3. Stimson's (1915, 1919) desired outline of differentiated high schools (Cv) and culturally infused vocational schools (Vc)

One might wonder why Stimson was content with the concept of two school types, each having a different focus, rather than one school which taught concepts in general education through applied vocational projects, Stimson (1915) wrote:

> In view of this development, there have been those who have urged the desirability of a balanced type of training—not so much time as in the cultural type school to general studies, not so much attention given to direct preparation for a calling as in the vocational type school—a type of school, in short, which might be symbolized by a rather large C superimposed upon a V drawn to the same scale. So far as the Board of Education is concerned, we erase from consideration this middle type (p. 475).

Speaking about the home project method, Stimson seemed to show support for the method as support and application of concepts. In the 1908 brochure for Smith Agricultural College, Stimson wrote "students will learn agriculture at the school, but apply what they have learned to their home farms" (Stimson, 1919). On many occasions, Stimson stated that the application of concepts was a key component for the home project method. (Stimson 1912, 1914, 1919, 1922, 1942).

The theory of using home projects as an application of concepts fit well with the background of Stimson, who studied under philosopher William James. Stimson wrote an article about James for *Agricultural Education* in January 1933 and described his mentor's philosophy as follows, "…his passion for stripping the subject of 'analytical technicality' in the interest of being 'concrete' and 'practical', in order to, as he said 'to satisfy the more genuine public need'" (p. 99). It appears as though Stimson picked up on his mentor's pragmatic philosophical view, and was likely indoctrinated with thoughts about finding the value in an educational endeavor. Certainly using the project method as a means to gain vocation, or a practice of concepts learned in the classroom would fit with Stimson and James' philosophical views.

David Snedden and Charles Prosser were also vocal advocates for using the project method as an application of the concepts learned in the classroom. According to Drost (1967), Snedden outlined a plan for vocational education that would allow the students who lacked the ability to grasp abstract concepts, a group Snedden estimate as high as 80% of the students in high school. Snedden (1910, 1917, 1920, 1929), went on to explain that vocational education, including the use of home projects, provided methods by which vocational type students could understand basic concepts required for employment. His concept was to use vocational education as a method of creating what he called "social-efficiency", whereby all students could gain employment (Snedden, 1910, 1917, 1929; Gordon, 1999).

Charles Prosser seemed to echo his former instructor's views on the intent of project-based learning and the home project method. Prosser believed that vocational training should be separate from general education, and be instructed by teachers who were trained specifically to administer the project method as a way to apply vocational skills (Lewis, 1994; Prosser, 1912, 1913, 1918, 1939; Prosser & Quigley, 1949).

After analyzing the artifacts surrounding the original intent of the project method in agricultural education, it appears as though Stimson, Snedden, and Prosser were all of a similar belief that the intent of the project method, and what we now call SAE projects, was to enforce skills learned in their agricultural classes. Although those directly involved in development of project-based learning felt that application was the core function of this method, opponents to this philosophy existed.

Two of the most outspoken advocates for a conflicting use of the project method as a way for students to learn and discover new concepts through experimentation were John Dewey and William Kilpatrick (Drost, 1977; Hyslop-Margison, 2000; Labaree, 2010). Stimson. Roberts and Ball (2008), outlined the different philosophies of opposing sides of the issue. These gentlemen found themselves polar opposites on the issue of why project-based learning should be used in schools. Dewey believed that the project method should be used as a component of an integrated comprehensive curriculum which allowed students to pursue their individual interests (Dewey, 1909, 1915, 1916). Kilpatrick based his philosophy of project-based learning on Dewey's theory (Knoll, 1997), and spoke in opposition to Snedden and the project method as originated by Stimson.

Question 2: Have historical events affected the educational intent of project-based learning and SAEs in agricultural education?

Passage of the Smith-Hughes Act essentially married the concepts of project-based learning and agricultural education. The newly intertwined concepts seemed to be coexisting well for a time. The tumultuous climate of education in the 1950s led to massive educational reform, especially in vocational education, in the sixties. Those events, along with more recent events like the push for more integration of core academics through the 1980s and even current shifts in educational policy, have all had a potential influence on the educational intent of project-based learning in agricultural education.

Throughout the 1920s and '30s, reports of project-based learning and the application of concepts learned in classes through home projects were favorable. In March, 1929, *Agricultural Education* printed a tribute to Rufus Stimson, authored by F. E. Heald. In part, the article read:

> Professor C. B. Gentry, state supervisor in Connecticut, recently said publically:
>
> > I believe that Mr. Stimson has been the means of saving millions of dollars to this country…I think we all now see that the establishment of vocational agriculture in

> a comprehensive high school using the home project for supervised practice is highly superior (p. 4)

A slight shift in the intent from application to learning was seen in the remarks of G. A. Schmidt in 1934:

> In most states, point of view regarding project work have recently changed. Projects are now regarded as the most important part of a farmer-training program…The new point of view regards projects as important training devices by means of which pupils acquire experience and skill in the execution of the jobs involved in such enterprises (p. 86).

Ten years after the passage of the Smith-Hughes Act, the National Education Agency saw some opposition to the use of project-based learning in education (Washburne, 1928). In postwar 1943, the National Education Association proposed *Education for ALL American Youth,* a document which hinted at an attempt to integrate core subjects into vocational training into general education. The book described what the authors felt was a model educational system. In relation to vocational education, the NEA wrote that vocational education should be:

> Shop or laboratory practice, related science and mathematics, field trips to observe the occupation in action… are all taught in the same course at the times deemed best for learning. Much of the work is done on individual and small-group learning schedules, thus making it possible to adapt students' programs to their particular interests and to adjust their progress to their learning abilities (p. 297).

The document also discussed the importance of project-based learning as used for training and understanding of vocational concepts in the simulated school system, and was a foreshadowing of the educational reform related to vocational education and agricultural education to come.

As the launching of Sputnik highlighted that the United States was falling behind in areas related to science and engineering, many policymakers looked for solutions within public education reform. The early 1960s were marked by high unemployment and a period of time when job skills required and skills available in the workforce were vastly mismatched (Ray, 1968). President Kennedy called for changes to education in his 1961 State of the Union Address when he stated that "we lack the scientists, the engineers and the teachers our world obligations require" (Woolley & Peters, 2014a). Kennedy urged Congress to review educational appropriations in order to prepare a nation of workers who could compete on a global level.

Agricultural education professionals noticed the changes. The July 1961 issue of *The Agricultural Education Magazine* included special focus on the impending educational reform. Editor Alfred Krebs wrote "teachers have become uneasy regarding the future" (p. 3). J. C. Atherton, a teacher educator from Arkansas, brought to light the underlying discussion:

> The national emphasis on science… has and is having a noted impact upon high school programs in agriculture. It seems that someone has overlooked the fact that agriculture is a field of science and needs scientists in a wide variety of categories (p. 6).

The change which had the profession so concerned occurred with the passage of the Vocational Education Act of 1963. This legislation essentially replaced the Smith-Hughes Act as the regulatory piece of legislation guiding vocational education in the United States. Related to agricultural education, the act allowed for several specific changes related to the project method in agricultural education.

First was a change in the requirement for a home project set forth by the Smith Hughes Act. The verbiage changed from "farm-project" to "field, shop, laboratory, cooperative work, apprenticeship or other occupational experience" in an effort to incorporate the expanded scope of vocational education. The length of time required for completion of the project also changed to "sufficient duration to develop competencies necessary for the student to achieve objective." Additionally, funding was available for "any occupation involving knowledge and skills in agricultural subjects…and such education may be provided without directed or supervised practice on a farm." This line effectively broke the required bond between the project method and federal funding for vocational agriculture.

A second change for agricultural education was related to the expanded content in agricultural education. By allowing agricultural educators to broaden courses and allow more vocational students to pursue academic areas, a multitude of new agriculture courses were developed and offered to a wider range of students (Ray, 1968).

Responses to the legislation were overall positive, as highlighted in a special issue of *The Agricultural Education Magazine* dedicated to the new regulations in July 1965. Among comments regarding the change came a statement highlighting the shift in focus "the purpose of vocational classes should be the application of scientific principles" (Petticord, Christensen, & Butler, p. 10, 1965). The shift for project-based learning is further evident in the statement "the project done by a student should no longer be considered the criterion for complete evaluation of progress in a vocational education class. However, there are many skills and understandings that can be derived from projects" (Golden, p. 5, 1966)

The apparent shift continued to progress from project for application to project for learning over the course of the next 10-15 years, until project-based learning became a term associated with a method for learning information. The theme of the March 1983 edition of *The Agricultural Education Magazine* was the "Supervised Occupational Experience" a term used as an updated version of "the home project". In this edition, Colleen Kaczor wrote, "SOE programs are the instructional component that makes vocational agriculture different from the non-vocational school courses offered. They make agricultural instruction meaningful and practical, by educating through experience" (p. 9).

Changes continued to occur in vocational education, and the early 1980s saw another move in agricultural education that had an indirect influence on project-based learning. The National commission on Excellence in Education published *A Nation at Risk* (Gardner, 1983), which gave a woeful update on the academic competency of American students. The report also stressed the importance of integrating science concepts into agricultural courses. The National Academy of Sciences echoed the call for science concepts in agricultural education in 1988. This time period led many in the profession to make a call for revisiting the original philosophies of Stimson, Snedden, and Prosser as a way to evaluate the new direction agricultural education, including project-based learning, was taking (Camp, 1982, 1983; Camp & Hillison, 1983; Moore, 1985, 1988).

Project-based learning has continued to change this century. Roberts and Harlin (2007), compared the changes to projects as they were initiated and used and found the use of projects had changed considerably from those guiding principles originally set forth by Stimson (1919). Project-based learning remained rooted within agricultural education as a method for students to gain knowledge, rather than apply it.

Conclusions and Recommendations

The importance of project-based learning and SAEs in agricultural education cannot be overlooked. Interwoven in the very fabric of our foundation is the method developed by Rufus Stimson. There is no doubt that project-based learning, in the context of agricultural education emerged from the mind of Stimson. His collaboration with other great vocational education leaders in Massachusetts helped to develop a strong concept that greatly influenced the wording of the Smith Hughes Act. Although project-based learning still exists in agricultural education, there have been changes to the way leaders in agricultural education feel students should use the method.

It is likely the philosophical views instilled in Stimson by William James led him to view the intent of the project method as simply a way for concepts to be applied and practiced. Stimson (1919) outlined the home project as a way for students to take their knowledge out of the classroom and into the real-world. Stimson's outline for two types of schools; one cultural with some vocation and one vocational with some culture, is telling as well. Perhaps the biggest indicator that Stimson never intended for the project method to be the means to acquire knowledge is the fact that he would not entertain a school in which cultural subjects and vocational training were given the same emphasis. This, combined with the outspoken philosophical views of Charles Prosser and, to a greater extent, David Snedden lead to the conclusion that the original educational intent of project-based learning was simply an extension of concepts which had already been learned in a vocational agriculture class. The vehement opposition of Dewey and Kilpatrick highlight that these gentlemen likely saw the project-method through a different lens. This core examination of philosophies in the past has implications for our profession as we determine how the original intent has changed.

It appears as though the educational intent of project-based learning and SAE in agricultural education has shifted from the original intent. The postwar era brought concerns about the lack of core academic concepts being taught through vocational education, and the project method was brought into the shuffle during the educational reform of the Vocational Education Act of 1963. Both of these events helped to move the intent of project-based learning from an application of concepts already learned to a method by which information could be acquired. Understanding this shift allows current agricultural education professionals to better examine the intent for project-based learning and SAEs today.

The changes found in the Vocational Education Act of 1963 combined to further shift the focus of project-based learning for agricultural education. No specific time requirement for projects allowed students to spend less time focusing on the project as an application of the concepts learned in class. The increased focus on science allowed project-based learning to become more prevalent in the agriculture classroom as a used more as an instructional method, whereby students could take in information. The deep roots of the project-based learning method in agricultural education allow our profession to take a leading role in using this method as a model for other educational disciplines. Continued research in the area of project-based learning in agricultural education is recommended to more completely examine how years of using this instructional method have affected its use in agricultural classrooms. This examination may allow us to further develop a model for project-based learning that translates to other branches of education.

It is interesting to note, that even through the changes of the Vocational Education Act, which essentially provided funding for vocational agriculture programs even without the requirement for project-based learning for every student, we could not find any artifacts suggesting that projects simply be removed from the program. This leads us to believe that the use of projects is so deeply rooted in agricultural education that those in the profession inherently recognize the need for it to stay, in whatever form the educational climate dictates. Unfortunately, although project-based learning and SAEs are foundational to agricultural education, there are less than optimal guidelines to help relate these projects to the broader educational spectrum.

With federal shifts toward increased focus on math and science in the 1980s, it appears as though project-based learning continued to evolve to more closely fit the model of agricultural education. As education started to shift again at the end of the 20th century toward the paradigm of learner-centered instruction (Elmore, 1996; Forrester, 1992; Lezotte, 1997), with a heavy emphasis on the concepts of science, technology, engineering, and mathematics (Hillison, 1996: Myers & Dyer, 2004), project-based learning again came into play as a method of instruction. (Blumenfeld, et. al., 1991; Helle, Tynjala, & Olkinuora, 2006).

Agricultural education has been seen as a possible solution to teaching STEM concepts, and research has been conducted to support the instruction of STEM concepts through agricultural education (Clark, Parr, Peake, & Flanders, 2012; Johnson, 1996: Myers & Thompson, 2006: Ricketts, Duncan, & Peake, 2006; Shinn, et al., 2003; Thoron & Myers, 2012; Thompson & Balschweid, 2000; Warnick, Thompson, & Gummer, 2004). Agricultural education has been asked to answer the challenge of instructing students in core academic subjects. One can only guess the thoughts that Stimson, Snedden, and Prosser might have on this request.

The shift in educational intent in project-based learning in agricultural education toward the use of project-based learning for instruction of concepts may help with the task. Based on this updated intent, agricultural educators may be able to integrate these core concepts seamlessly using project-based learning. This has implications for agricultural educators who may be able to draw from both the original intent of project-based learning as an application of concepts learned in agricultural education courses, and as the vehicle through which students learn.

The SAE reform movement is, in part, a call for agricultural education to return to our roots, and Stimson's project method. It appears as though the agricultural education profession believes there may be a totally different reason for us to use the method in today's agricultural education classroom. Stakeholders should carefully examine the balance between the two intents as the future of project-based learning in agricultural education, and student involvement in SAEs is explored.

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The Interaction of Learning Style on Measures of Successful Intelligence in Secondary Agriculture Students Exposed to Experiential and Direct Instruction

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Abstract

Understanding the teaching and learning paradigm is a relentless search for educators. Because individual students bring their own learning style preferences to the learning environment, teachers are asked to consider and even adjust their teaching to these preferences to improve student learning. These considerations have implications for impacting students' success or lack thereof in the classroom. This study determined the interactions that existed between learning style and successful intelligence of secondary agricultural education students. No statistically significant differences were found regarding teaching approaches and students' preferred method of grasping information. However, statistically significant interactions were identified related to students' preferences for transforming information and performance on an analytical assessment. Recommendations point to infusing variability in the classroom, especially in how students are asked to transform information they have grasped previously. Further research should focus on the motivational outcomes resulting from experiential instruction delivered to students of varying learning styles.

Introduction

Agricultural education has prescribed to an experiential philosophy of learning since the inception in the early 1900's (Baker, Robinson, & Kolb, 2012; Knoblock, 2003; Phipps, Osborne, Dyer, & Ball, 2008; Roberts, 2006). Research in agricultural education (Anyadoh & Barrick, 1990; Baker & Robinson, 2014, Cheek, Arrington, Carter, & Randell, 1994; Cheek & McGee, 1985; Kotrilik, Parton, & Leile, 1986), as well as in other educational domains (Abdulwahed & Nagy, 2009; Eyler & Giles, 1999; Eyler & Halteman, 1981; Markus, Howard, & King, 1993; Specht & Sandlin, 1991; Steinke & Buresh, 2002), has provided evidence that experiential learning improves academic performance, retention, satisfaction, complexity, and meta-cognitive process development. Though this research has been promising, Kirschner, Sweller, and Clark (2006) argued sufficient research, including controlled experiments, has not been conducted to warrant such a strong faith in experiential learning. Moore (1999), a supporter of experiential learning, echoed this sentiment and suggested that supporters of experiential learning must be willing to admit that learning experientially does not always work.

One such area of concern is the effect of learning style on the effectiveness of experiential learning approaches. Learning style can have a dramatic effect on an individual's learning process, and as such, "experiential learning techniques per se are not preferred by everyone" (Kolb, 1984, p. 71). So often it is purported that when students are taught in ways that align with how they prefer to learn, they outperform students who are not afforded these same opportunities (Sternberg & Grigorenko, 2004). However, research indicating that a student's learning preferences have an effect on learning outcomes has produced conflicting messages. Previous research has concluded that a relationship exists between academic achievement and the converging learning style (Boyatzis & Mainemelis, 2000; Rutz, 2003). Other research, however, has suggested that students improve their academic performance when both converging and assimilating learning styles are evident (Kolb, 1984; Lynch, Woelfl, Steel, & Hanssen, 1998; Malcom, 2009; Newland & Woelfl, 1992). In agricultural education, research on learning styles and student outcomes has refocused heavily on the use of the Group Embedded Figures Test (GEFT) assessment, focused on post-secondary populations of interest. Unfortunately, the GEFT assessment has produced conflicting messages. In some studies (Brown & Kelsey, 2013; Garton, Spain, Lamberson, & Spiers, 1999; Marrison & Frick, 1994), it was concluded that learning styles had no relationship to student achievement. Conversely, in other studies, statistically significant interactions were found between learning style and achievement, as defined by a multiple-choice examination (Dyer & Osborne, 1996), as well as between students' creative output and self-reported GPA (Friedel & Rudd, 2006).

A controlled experiment seeking to identify the effects of an experiential approach to learning concluded that, when compared to Direct Instruction (DI), it yielded higher creativity in context performance and statistically significantly higher practical use of information, while DI yielded higher analytical scores (Blind Authors, 2014). Though the results were encouraging, it can be questioned whether the learning style preferences of certain students benefitted greater from this more constructivist approach to learning than others. Research has demonstrated, through both exploratory and confirmatory factor analysis, that there is an underlying two-factor ipsative structure of how students transform educational experiences, congruent with Kolb's (1984) theory of experiential learning (Kayes, 2005).

Theoretical and Conceptual Framework

The theoretical framework utilized in this study was Kolb's (1984) Experiential Learning Theory (ELT). Kolb's ELT (1984) provided the congruence between the theoretical basis and the context of which the learning orientation inventory had value, as called for by Price (2004), to bring clarity to research on learning preferences. The concept of learning styles is embedded within the ELT framework. Alireza, Mahyuddin, Elias, Shafee, and Shabani (2011) explained that it was imperative to utilize measures beyond standard examinations because the differences between learning style products are not detectible without broader assessments. Sternberg's (1999) Theory of Successful Intelligence defined achievement in this broader sense and served as the conceptual frame for the outcome variables.

Kolb's Experiential Learning Theory

Experiential learning, defined often by Kolb's (1984) ELT, presents learning as a cyclical process composed of the resolution of two dialectically opposed modes of thinking. ELT is a synthesis of work from key theorists (Dewey, 1934, 1938, 1958; Freire, 1974; James, 1890; Jung, 1960, 1977; Lewin, 1951; Rogers, 1961) that is built on the foundational definition of learning as the "process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). ELT is built on six propositions: (a) learning is a process, not a set of outcomes, (b) all learning is ultimately re-learning, (c) learning involves the resolution of conflicts, (d) learning is a holistic process, (e) as the learner interacts with their environment, learning occurs, and (f) learning involves the process of creating knowledge (Kolb, 2005).

Agricultural education has always been in a unique position to embrace this epistemological approach due to its experiential nature (Baker et al., 2012). ELT has been shown to increase student satisfaction in the course, improve retention of information as measured on examinations, develop a deeper, more complex understanding of concepts, improve practical use of information, and develop meta-cognitive skills useful in all domains (Abdulwahed & Nagy, 2009; Eyler & Giles, 1999; Eyler & Halteman, 1981; Markus, Howard, & King, 1993; Specht & Sandlin, 1991; Steinke & Buresh, 2002).

The learning structure purported by ELT (Kolb, 1984) is grounded in four learning modes – concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Any one mode, or combination of modes, can govern learning at any given moment (Kolb, 1984). This complex learning process is not identical for everyone. As an individual seeks to resolve the conflicts associated with various experiences, there are preferences in the tools or learning modes that are used. "The dilemma for the scientific study of individual differences is how to conceive of general laws or categories for describing human individuality that do justice to the full array of human uniqueness" (Kolb, 1984, p. 63). Kolb (1984) warned of the formist epistemology of learning *types* that are viewed as *reality*. In practice and research, there is a marked tendency to view these learning styles as fixed traits (Garner, 2000). An alternative epistemological approach, of which Kolb (1984) subscribes, is contextualism, where the person is examined in the context of the event by which both the person and the event are shaped.

Drawing from Tyler's (1978) possibility processing structures, Kolb (1984) explained that,

> The implication of the contextualist worldview for the study of human individuality is that psychological types or styles are not fixed traits but stable states. The stability and the endurance of these states in individuals comes not solely from fixed genetic qualities or characteristics of human beings; nor, for that matter, does it come solely from the stable, fixed demands of environmental circumstances. Rather, stable and enduring patterns of human individuality arise from consistent patterns of transaction between the individual and his or her environment. The way we process the possibilities of each new emerging event determines the range of choices and decisions we see. The choices and decisions we make, to some extent, determine the events we live through, and these events influence our future choices. (pp. 63-64)

Individual learners create *programs* for how they choose to process experiences. These programs include apprehension and/or comprehension preferences, as well as intention and/or extension preferences.

These preferences for grasping and transforming experiences have been captured psychometrically since 1971 through the Kolb Learning Style Inventory (KLSI) (Kolb, 1985, 1986; 1999, 2007). A four learning style model, as well as a nine learning style model, has been utilized in previous studies. In this study, the emphasis was placed on the four learning style approach of the KLSI 3.1 (Kolb, 1999) due to the psychometric stability of the instrument resulting from more widespread use and confirmation. The KLSI 3.1 (1999) results in one of four learning styles: diverging, assimilating, converging, and accommodating. An individual with the *diverging* style prefers to learn primarily through feeling (CE) and reflecting (RO). This style is known as the *creator* (see Figure 1). A person with this preference is best at viewing concrete situations from a myriad of perspectives. Divergent learners prefer to observe rather than to take action, and enjoy situations that call for a wide range of feelings and ideas. In formal learning situations, a learner of this preference would prefer to work in groups and needs to receive personalized feedback and attention regarding their efforts and progress or lack thereof (Kolb & Kolb, 2009).

Learners with an *assimilative* style prefer to learn through thinking (AC) and acting (AE) and are referred to in Figure 1 as the *planner*. They like to make decisions based on logical reasoning, and prefer to deal with technical tasks rather than social and interpersonal issues. These individuals prefer that a theory be elegant and logical rather than practical. Assimilators may prefer to work alone, and do not make quick decisions but spend adequate time thinking through a problem before taking action. In formal settings, these learners prefer lectures, readings, exploring analytical models, and having adequate time to think and plan (Kolb & Kolb, 2009).

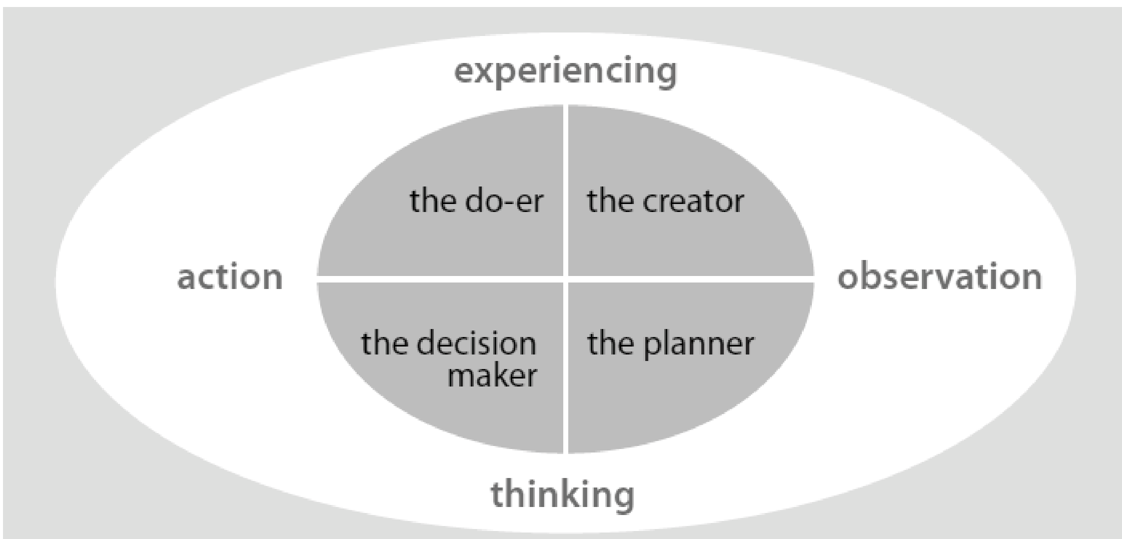


Figure 1. KLSI 3.1 Model of Experiential Learning Process. Reprinted from *The Kolb learning style inventory – Version 3.1: LSI workbook*. (p. 3), by David A. Kolb, 2007, Boston , MA: Hay Learning Transformations. Copyright 2007 by Haygroup. Reprinted with permission.

Learners with a *converging* style emphasize thinking (AC) and acting (AE), and are referred to in Figure 1 as the *decision maker*. Those who prefer to learn in this way find practical uses for ideas and theories. Like assimilators, they prefer to solve problems and make decisions based on finding logical solutions. Interpersonal and/or ambiguous situations are not an area of strength, since feelings and reflection are not a mode of learning indicative of this style. In formal learning settings, a converging learner prefers to experiment with ideas. This includes simulations, laboratory based learning, and practical applications (Kolb & Kolb, 2009).

Finally, learners with an *accommodating* style learn primarily through acting (AE) and feeling (CE). They are referred to as the *doer* (see Figure 1). This learning preference seeks hands-on experiences and is comfortable in ambiguous learning situations. Setting goals and meeting challenges is indicative of this learning style. These learners tend to proceed in situations according to gut feelings over a logical analysis of issues. They can act before thinking and be disorganized because of their lack of preference for reflection. In formal learning settings, accommodators prefer to work in groups and find ways to accomplish the group goals. Fieldwork is preferred over theoretical discussions (Kolb & Kolb, 2009).

Sternberg's Theory of Successful Intelligence

Sternberg's (1999) Theory of Successful Intelligence framed the outcome variables for this study. Sternberg (1999) listed three factors of learning that should be considered: a) analytical intelligence: skills used to analyze, evaluate, judge, or compare and contrast, b) practical intelligence: skills used to implement, apply, or put into practice ideas in real-world contexts, and c) creative intelligence: skills used to create, invent, discover, imagine, suppose, or hypothesize. Sternberg (1999) theorized that a construct of successful intelligence "better captures the fundamental nature of human abilities" (p. 292). This concept of intelligence stands in contrast to the conventional general ability views of intelligence that Sternberg (1999) described as narrowly based and incomplete. At times, the method of experiential learning has been a difficult treatment to understand fully (Roberts, 2012), which led to the broader perspective of learning utilized in this study.

Purpose of the Study

This study is the second element of a four-stage research project intending to understand better the effects of experiential learning in developing successful intelligence and motivation of secondary agricultural education students. The first study (Blind Authors, 2014) focused on the effects of an experientially (Kolb, 1984) designed curriculum compared to that of direct instruction (Becker, 1992; Gersten, Carnine, & White, 1984; Joyce & Weil, 2000; Moore, 2007; Pearson & Gallagher, 1983; Rosenshine & Meister, 1992; Vygotsky, 1978) regarding students' successful intelligence (Sternberg, 1999). It was found that an experiential curriculum led to statistically significant gains in creative and practical performance, while direct instruction led to statistically significant gains in analytical scores (Blind Authors, 2014). Therefore, the purpose of this second study was to determine what interactions existed between learning style and successful intelligence of secondary agricultural education students. This study addresses research priorities four and five of the National Research Agenda of the American Association of Agricultural Education (Doerfert, 2011), as they specifically addresses: (a) a deepening of understanding of effective teaching and learning processes, (b) assessment of various learning interventions, and (c) documenting the outcomes of an experiential approach to learning.

Two research questions framed this study:

4. What are the preferred learning style indicators of secondary agricultural education students in the selected agricultural education program, as measured by the KLSI 3.1?
5. What interaction exists between learning style and measures of successful intelligence?

Methods and Procedures

The population of interest in this complete random factorial (CRF – 22) experimental study (Kirk, 1995) was all students enrolled in the participating secondary agricultural education program ($N = 120$). The agricultural education program is in a rural community with a population of approximately 46,000 people (*www.city-data.com/city/Stillwater-Oklahoma.html)*. The entire program was chosen to attempt to acquire a representative sample of a *typical,* holistic, agricultural education program in Oklahoma. This somewhat isolated population, though limiting in generalizability, provided additional control of nuisance variables associated with varying social contexts of communities and schools. From this population, a sample of 80 participants completed IRB consent and assent forms and participated in the full study. Of the 80 participants, 38 were assigned randomly to the treatment group and 42 to the comparison group. Descriptive statistics were used to answer research question one. Research question two was answered through the CRF – 22 design employing two omnibus MANOVA analyses – one focusing on the grasping dimension, and one focusing on the transforming dimension. Simple main effects were of particular interest in this study to determine if interactions existed between learning style and other dependent measures of successful intelligence (Stevens, 2009).

Wind turbine blade design was the content of interest for the experiment. This content was chosen purposefully as it was congruent with course objectives for agricultural education and included adequate science, technology, engineering, and mathematics (STEM) concepts. The goal was to provide a full unit of instruction, which typically would be taught over the course of one week in an instructional setting, during a four-hour period to maintain the experimental control. Instruction was delivered in two different treatments – direct instruction and experiential learning designs. To reduce teacher effect, eight instructors were assigned randomly to the two experimental conditions so that each condition had a lead instructor and three assistant instructors (Weiss, 2010).

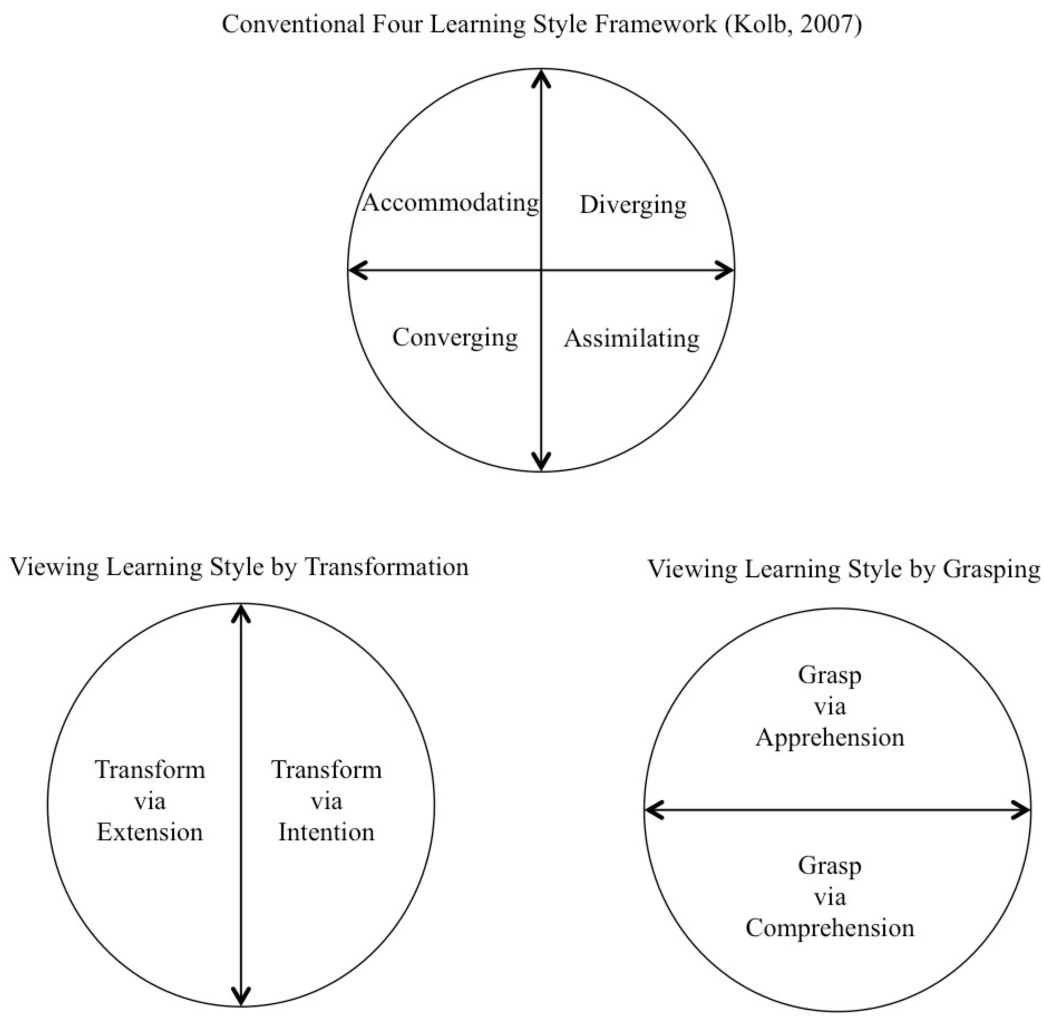
Kolb's Learning Style Inventory 3.1

Kolb's (1999) KLSI 3.1 is one of the most influential and widely distributed instruments used to measure individual learning preference (Kayes, 2005). The KLSI is based on Kolb's (1984) ELT, where learning consists of four constructs – CE, RO, AC, and AE. This instrument includes twelve sentence stems followed by four possible sentence endings. Subjects rank each of the four endings based on their preference for using the four modes. This procedure results in a 48-response instrument that is self-reported. We tabulated a total score for each student's learning mode. In addition, combined scores for each of the dialectically opposing modes of grasping and transforming (Kolb, 1984) were calculated. Research has generally supported the internal reliability of the LSI-2, the previous version of the instrument, with Cronbach's alphas ranging from .80 to .87 (Geiger, Boyle, & Pinto, 1993; Loo, 1996; Willcoxson & Prosser, 1996). Kayes (2005) analyzed the current version, KLSI 3.1, for internal reliability and found Cronbach's alphas ranging from .77 to .82 for each of the four-dimensional constructs and .77 to .84 for the grasping and transforming constructs, respectively. In addition, research (Kayes, 2005; Loo, 1999a, 1999b; Yahya, 1998) has confirmed the internal construct validity of a two-factor structure proposed originally by Kolb (1984). Thus, it was determined that the KLSI 3.1 was a reliable and valid measure of learning style in this study.

Approach to Analyzing the Effect of Learning Styles

One week prior to the experiment, Kolb's (1999) Learning Style Inventory Version 3.1 (Kolb, 2007) was administered to each of the students who agreed to participate in the study. This instrument was scored, and a data source of subjects with the specified learning style was identified. It was found that certain learning styles had inadequate sample sizes to achieve adequate statistical power (see Figure 2). Research has demonstrated, through both exploratory and confirmatory factor analysis, that there is an underlying two-factor ipsative structure of how

Figure 2. Visual Representation of Learning Style Interpretation and Sample Sizes for Each Distinction Achieved in the Study



students transform educational experiences congruent with Kolb's (1984) theory of experiential learning (Kayes, 2005). A procedure was employed to view learning style in a two-dimensional way rather than the standard four-dimensional manner outlined by Kolb (2007). This procedure required that participants be classified based on their preferences for grasping information and their preferences for transforming information. Each participant was assigned two learning preferences. The statistical analyses included results for participants identified by a grasping preference and for participants identified by a transforming preference. This analysis not only provided procedural checks (Stevens, 2009), but also allowed the examination of the role of learning style with adequate sample size and power.

Successful Intelligence Assessments

The full description of the measurement models, including discussions of validity and reliability, can be read in previous works (Blinded Authors, 2014; Blind Author, 2012). However, a brief review of each measure is provided. The AWEA, a criterion-referenced test based on the selected educational objectives the blade design instructional unit, served as the main analytical assessment for the study. The assessment was created as a collaborative effort by the researchers and the KidWind® staff and consultants, experts in the field of wind energy engineering, and pedagogical experts in agricultural education. Wiersma and Jurs (1990) suggested eight specific methods to increase the reliability of criterion-referenced examination, of which the AWEA conformed. The AWEA produced Kuder-Richardson 20 (*Cronbach, 1970*) reliability coefficients, which were as follows: (a) .82 for the pre-test, and (b) .90 for the post-test. Based on these coefficients, it was determined that the AWEA was a reliable measure of students' analytical knowledge for this study.

Sternberg (1998) explained that practical knowledge requires students to apply, use, put into practice, implement, employ, and render practical what they know. The practical assessment used in this study was an authentic assessment that represented the most logical extension of the lesson – to design, build, and test a wind blade using materials provided by the instructors. Each student was given a universal hub and asked to create a hub design intended to produce the most voltage possible using a common bank of materials in one hour. Each blade design was attached to a model tower containing a small generator, which was placed in front of a fan set at a constant speed. The voltage output was measured using a voltage meter. All variables, aside from the design of the blade, were held constant, and each voltage output was recorded.

Creativity, the ability to produce something that is both novel and useful (Sternberg, 1998), was also a variable of interest for the study. Based on Guilford's (1950) proposal that creativity could be measured with a psychometric approach, Torrance (1974) developed the Torrance Tests of Creative Thinking (TTCT). The TTCT (Torrance, 1974) operationalized creativity as statistical infrequency, which can be calculated and scored objectively. As such, two pictures were taken of each blade design created by the participants, and they were assessed on the six chosen divergent elements: (a) number of blades, (b) blade length, (c) blade pitch, (d) blade shape, (e) blade material, and (f) blade elaboration. A statistical scoring process was utilized to determine the divergence of each design in order to quantify the creative intelligence in the context of wind turbine blade design.

Findings

Research question one sought to determine the learning styles of the secondary agricultural education students participating in this experiment. Under the conventional four learning style framework depicted in Figure 2 (Kolb, 2007), it was determined that 41 (51.25%) students were classified as accommodating, 16 (20.00%) diverging, 12 (15.00%) converging, and 11 (13.75%) assimilating. It was thus deduced that 53 (66.25%) students transform via extension and 27 (33.75%) students transform via intention. Also, 57 (71.25%) students grasp via apprehension while 23 (28.75%) students grasp via comprehension.

Research question two sought to determine what interactions existed between students' learning styles, their successful intelligence, and the instructional approach chosen. Two omnibus multivariate analyses of variance were utilized (see Table 1).

Table 1

Summary of Two MANOVA Analyses Testing for Simple Main Effects of the Treatment Conditions by Learning Style (*df* = 73)

Source of Variance	Λ	*F*	*p*	Power
Group x Transform	.85	3.16	.02	.80
Group x Grasp	.95	.84	.50	.26

Using Wilk's statistics, there were statistically significant simple main effects between the treatment group and the transformation learning style, $\Lambda = .85$, $F(3,76) = 3.16$, $p = .02$. Viewing the simple main effects from the grasping learning style distinction, non-significant interactions were found $\Lambda = .95$, $F(3,76) = .84$, $p = .50$. As described by Stevenson (2009), once the significant simple main effect was identified in the group by transformation analysis, focus turned solely to the nature of that interaction.

Each interaction is depicted visually in Figure 3. Further analysis of the simple main effects found a non-significant interaction between both the practical intelligence voltage measure, $F(1,79) = 2.86$, $p = .10$, $\eta_p^2 = .04$), and the creative intelligence measure, $F(1,79) = .05$, $p = .82$, $\eta_p^2 = .00$. Analysis of the interaction between treatment group and analytical intelligence, named test gain in the graphs, yielded a statistically significant interaction, $F(1,79) = 11.41$, $p = .00$, $\eta_p^2 = .14$, with a large practical effect (Cohen, 1977).

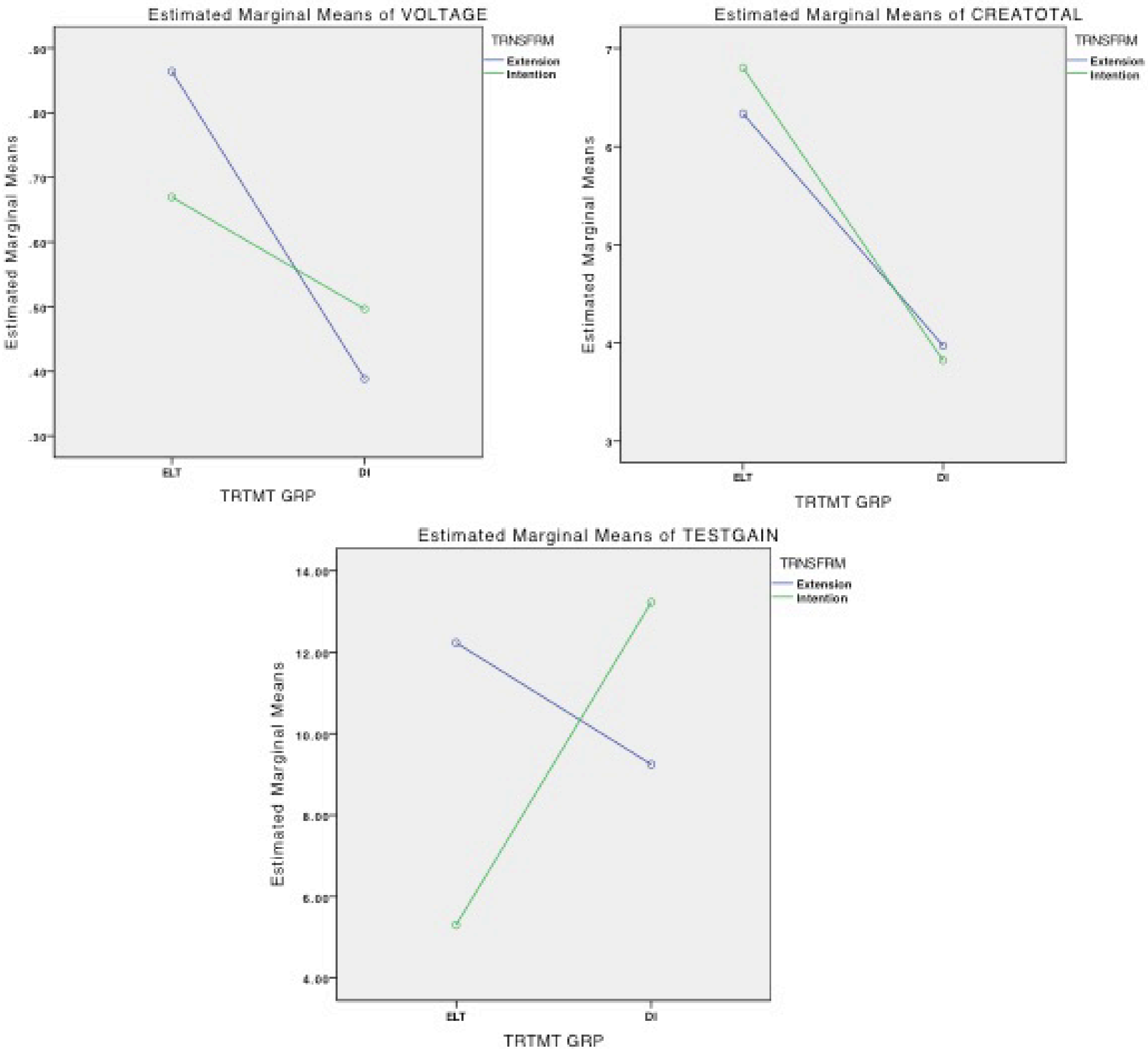


Figure 3. Graphs of Simple Main Effects for Each of the Measures of Successful Intelligence within the Transformation Analysis

Conclusions, Discussions, and Implications

Conclusion 1: Agricultural education students in this study were predominantly accommodators. As such, students generally preferred to transform via extension and grasp via apprehension.

The trend of homogeneity in learning styles within selected settings has emerged in a number of studies (Kolb & Kolb, 2005). A similar study of learning styles found the majority of students in the same college program and major, pursuing similar passions, and involved in a common activity were quite similar in learning style, as defined by the KLSI (Kolb, 1999). In agricultural education, Brown (2013) found this same trend, as 60% of students attending a leadership camp were extroverted in their learning style – another perceived match of a learner and environment.

Kolb (2007), in the KLSI workbook, described an accommodator as a "doer" (p. 4). This description, juxtaposed with the FFA Motto of *Learning to Do, Doing to Learn, Earning to Live, and Living to Serve* (National FFA Organization, 2008), calls to question whether agricultural education, as operationalized by the FFA program of interest in this study, strongly favors this preference for apprehension and extension. If agricultural education is naturally experiential (Baker et al., 2012), how does the program in Oklahoma recruit and retain students with a preference toward grasping through comprehension and transforming through intention?

Conclusion 2: Students' ability to perform analytically is dependent on their preferred method of transforming an experience.

The results of this study support the claims of differences (Dyer & Osborne, 1996; Kolb, 1984; Lynch, Woelfl, Steel, & Hanssen, 1998; Malcom, 2009; Newland & Woelfl, 1992 Rutz et al., 2003; Sternberg & Grigorenko, 2004) in student outcomes based on learning preferences, and further clarifies where exactly these differences occur. Though differences were found between all three categories of successful intelligence, learning style played a role only in the analytical measure – which would align most closely to secondary schools' traditional view of achievement on an examination. This finding appears to refute literature on a battery of learning style assessments that found they rarely play a significant role in formal learning processes (Brown & Kelsey, 2013; Cano, Garton, & Raven, 1992; Garton, Spain, Lamberson, & Spiers 1999; Thornton, Haskell, & Libby, 2006; Whittington & Raven, 1995).

Analyses of the graphed interactions highlight a very obvious and consistent treatment effect whereby experiential learning yielded higher gains in both practical and creative intelligence measures – congruent with findings reported by Baker and Robinson (2014). However, Baker and Robinson (2014) reported also that direct instruction yielded higher analytical intelligence scores. The interaction in this study elucidates the more complicated relationship between analytical performances, type of instruction, and preference for transformation. Students who prefer to transform via intention perform better analytically if taught in a more abstract way as prescribed in the methods of direct instruction. Students preferring to transform via extension performed better analytically when exposed to curriculum allowing active experimentation – an element of experiential learning. Kolb (1984) explained that, "the learning process is not identical for all human beings. Rather, it appears that the physiological structures that govern learning allow for the emergence of unique individual adaptive processes that tend to emphasize some adaptive orientations over others" (p. 62). Educators should consider both types of transformation that aid in the development of all students' unique cognitive processes are occurring, especially when an analytical task such as an examination is of particular interest.

The non-significant interactions are also of interest. Though a large percentage of students preferred to grasp information through concrete experiences, this preference did not have an effect on any of the three measures of successful intelligence. Agricultural education often boasts the benefits of a *hands-on* approach. However, this study seems to support the premise that all students can grasp information through either apprehension or comprehension – sensory or cognitive. The focus of instruction should be on how students are guided to transform those grasped experiences. Whether students learn in the classroom or in the field, there should be opportunities for both intentional reflection and extension through experimentation.

Recommendations for Practice

5. Agricultural educators should be reminded that an experiential approach to teaching and learning implies a balanced delivery of both methods of grasping and transforming information. Failure to maintain balance in the four modes could systematically place students with certain learning preferences at a disadvantage. As often explained, variability remains a powerful element of quality instruction (Rosenshine & Furst, 1973).
6. Special attention should be afforded to methods of transformation when an analytical measure, such as an examination, is of specific interest. In the high stakes test climate of public education, of which agricultural educators play a important role, this could be of specific importance.
7. Agricultural educators should be comforted by the fact that students of all learning styles can grasp information from both concrete experiences and abstract conceptualization in a formal, *traditional* classroom setting.
8. Teacher educators should purposefully model both the intention and extension dimensions of learning to pre-service teachers by demonstrating and providing methods of transformation.
9. Teacher educators should utilize the Educator Role Profile (ERP; Kolb, 2012) to help teachers identify their preferred teaching role in relation to the experiential learning cycle. An awareness of teacher preferences is important in purposefully designing instruction that completes the experiential learning cycle.

Recommendations for Research

1. Studies exploring the cause of the homogeneity of learning style in agricultural education could expose potential strategies for recruitment of a more learning diverse student body. Is there a trend related to learning styles of students choosing to not participate in agricultural education?
2. Research related to learning styles should utilize a broader array of assessments to capture the effects that learning preferences have on various student outcomes.
3. Further research should explore the relationship between learning styles, methods of instruction, and motivation for the subject taught. Sternberg (1999) included motivation as an important construct to be measured in addition to measures of successful intelligence.

4. The clinical nature of this experiment required a non-traditional setting, which introduced the potential for bias to occur due to a novelty effect (i.e., students in the study were displaced from their usual classroom to a dissimilar learning environment in a different part of town). Research should be replicated in a less controlled, more typical secondary school setting.

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The Chasm Between Beliefs and Practice: A Case Study of the Epistemological Positions of Pre-Service Agricultural Education Teachers

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Abstract

Recent trends in epistemological research suggest that teachers' epistemological beliefs influence the approaches he or she employs in both teaching and learning. Therefore, the purpose of this instrumental case study was to understand the initial epistemological positions of pre-service agricultural education teachers at Oklahoma State University. The study's findings are reported through five themes. Themes one, two, three, and four align with Perry's (1970) four epistemological positions. However, the fifth theme represents an interesting departure from the theory. This theme showcases the lack of continuity between participant's articulated views and how they propose to operationalize those beliefs as an agricultural educator. As such, we recommend examination into the following questions, "Does the chasm exist beyond first year pre-service teachers?" and "How can the chasm be bridged?"

Introduction

Philosophical debates have quietly raged throughout history (Gage, 1989). This endless sparring of minds known as the *battle of snails* can be traced to the times of Aristotle and Plato (Gage, 1989; Anderson & Herr, 1999). Agricultural educators have not escaped the dustups of this war (Drost, 1977). For instance, vocational education became a flashpoint in the *Dewey vs. Snedden* debate of whether the curriculum should be content centered or an amalgamation of content and contextualized experience (Drost, 1977; Snedden & Dewey, 1977). This discrepancy *may* very well be the first formal epistemological point of contention in agricultural education.

Epistemology is a branch of philosophy concerned with how individuals perceive knowledge is best attained (Hofer, 2004; Rodriguez & Cano, 2006; Schommer-Alkins, 2004). Personal epistemological beliefs are theorized to influence many aspects of an individual's daily life including how they learn (Brownlee, Purdie, & Boulton-Lewis, 2001; Cano, 2005; Peng & Fitzgerald, 2006; Pintrich, Hofer, & Pintrich, 2002; Tolhurst, 2007), reason (Bendixen, Schraw, & Dunkle, 1998; Klaczynski & Robinson, 2000; Yang, 2005), as well as, how they make decisions (King, 2000; Weinstock & Cronin, 2003).

Upon a broad reading of the empirical evidence associated with episteme research, we discovered the terms used to classify personal epistemologies differ from study to study yet often have parallel meanings. In a similar vein, epistemology research has all but forgotten the classical notion that assumes that knowledge is absolute (Schommer-Alkins, 2004; Hofer, 2001, 2004). Instead, contemporary research has expanded to following areas: accuracy of knowledge, organization of knowledge, the attainment of knowledge, and how individual's defend their beliefs regarding the acquisition of knowledge (Falmagne, Iselin & Todorova, & Welsh, 2013;

O'Siochru & Norton, 2014; Porsc & Bromme, 2011; Stahl & Bromme, 2007; Stahl, Pieschl, & Bromme, 2006; Wang, Zhou, & Shen, 2014).

Epistemology-based studies scale an array of disciplines. For instance, mathematics (Schoenfeld, 1983; Weber, Inglis, & Mejia-Ramos, 2014; Rigo-Lemini, 2013), science (Mason, Boscolo, Tornatora, Ronconi, 2013;) and physics (de Ataide & Greca, 2013; Zwickl, Hirokawa, Finkelstein, & Lewandowski, 2014) typically conceptualize studies in hopes of offsetting students' learning difficulties. Conclusions from these studies describe struggling students as those that view knowledge as a phenomenon in which they have no control (Mason et al., 2013; Rigo-Lemini, 2013; Schoenfeld, 1983). On the other hand, elaborate constructs have been developed to explain how personal epistemologies can develop and mature over time (Belenky, Clinchy, Goldberger, & Tarule, 1986; Perry, 1970).
Empirical evidence regarding personal epistemologies is ripe with assertions that teachers' epistemological beliefs influence the approaches he or she employs in both teaching and learning (Buehl & Fives, 2009; Cheng, Chan, Tang, & Chen, 2009; Fives & Buehl, 2008; Jacobson et al., 2010; Tanase & Wang, 2010). However, there is a lack of appreciation within teacher preparation programs for the consideration of students' personal epistemological stances (Brownlee et al., 2001; Buehl & Fives, 2009; Cheng, et al., 2009; Fives & Buehl, 2008). For instance, numerous scholars contend pre-service teachers' beliefs about knowledge structures the learning experiences they will provide their future students; yet, their initial convictions are rarely addressed (Alexander, Schallert, & Hare, 1991; Brownlee et al., 2001; Gill, Ashton, & Algina, 2004; Muijs & Reynolds, 2002; Tanase & Wang, 2010). Therefore, investigating the personal episteme of pre-service teachers at various stages in teacher preparation could yield powerful insight into their future practices (Brownlee et al., 2001).

Epistemic research has recently began to shift its focus towards the use of interventions to shape pre-service teachers' epistemological stances in a manner deemed desirable by teacher preparation programs (Cheng, et al., 2009; Fives & Buehl, 2008; Tanase & Wang, 2010). Findings from intervention-based studies show promising results (Brownlee et al., 2001; Cheng, et al., 2009; Tanase & Wang, 2010). Therefore, probing pre-service teachers' initial epistemological beliefs could serve as a key to learning how to initiate the process (Tenase & Wang, 2010).

Glimpses of the epistemological dogmas of agricultural education can be seen in the literature (Baker, Robinson, Kolb, 2013; Roberts & Ball, 2009). For instance, Roberts and Ball (2009) postulated the focus of agricultural education has become a merger of Snedden's "rigid application model" with Dewey's holistic approach (p. 87). This assertion suggests agricultural education prescribes to an epistemological stance where knowledge is acquired through a process of learning experiences (Roberts & Ball, 2009). More recently, Baker et al. (2012) conflated agricultural education's three-circle model with Kolb's (1984) Experiential Learning Theory. This proposed enrichment suggests the tenets of agricultural education support the acquisition of knowledge through purposeful experiences (Baker et. al., 2012). Despite these glimpses of epistemological progression, however, this area of research remains relatively unexplored in the agricultural education literature base.

Convergence of the Case

The aim of this instrumental case study (Stake, 1995) was to understand the initial epistemological stances of pre-service agricultural education students using Oklahoma State University's entry-level Foundations and Philosophies of Teaching Agricultural Education course as a bounded case. The study aligns with Priority Two, New Technologies, Practices and Product Adoption Decisions of the National Research Agenda for the American Association for Agricultural Education (Doerfert, 2011). To best probe the phenomenon under investigation, we followed Hofer's (2004) recommendations to contextualize epistemologies to help make the concept relevant for participants. Using an emic perspective we described 1) pre-service teachers' expressed beliefs of how knowledge is best created, and 2) how pre-service teachers plan to operationalize these beliefs as an agricultural education instructor.

Methodology

We agreed that employing an instrumental case study approach (Stake, 1995) would best guide understanding the initial epistemological perspectives of pre-service agricultural education teachers. This qualitative approach can offer unique insight into how a phenomenon influences a bounded system (Creswell, 2013; Stake, 1995). Further, instrumental case studies offer utility to qualitative researchers who hope their investigations are transferable to other circumstances (Creswell, 2013; Merriam, 2009; Stake, 1995).

Participants

All participants were enrolled in the fall 2014 Foundations and Philosophies of Teaching Agricultural Education course at State University. This introductory class is the first exposure pre-service teachers experience related to pedagogical and theoretical perspectives in agricultural education coursework. As such, the participants ($N = 42$) were purposefully selected (Patton, 2002; Stake, 1995). The pre-service teachers lack of teacher training was the reason for their selection as participants. Moreover, we saw the structure of this bounded system as closely mirroring other introductory-level courses in agricultural education programs across the United States. In all, there were 22 male and 20 female participants ranging from sophomore to junior in classification level.

Data Sources, Collection, and Analysis Strategies

Written statements generated by the pre-service teachers was the principle source of data collection. In order to attain the *initial* epistemological stance of pre-service teachers, data was collected at the beginning of the semester. According to Stake (1995), "gathering data by studying documents follows the same line of thinking as observing or interviewing" (p. 68). As such, students responded to following two prompts:

> 1) After accepting a position as an agricultural educator in State, you are charged with designing five new courses that allow students to acquire knowledge about agriculture. Provide a minimum of three quality paragraphs describing how a typical day in your classes would appear from an outsider's perspective. 2) Using your response from section

one as a frame, provide three quality paragraphs defending your stance of how knowledge is best acquired.

Through analysis of these two writing prompts, we were able to extract the pre-service teacher's epistemological beliefs and how they planned to operationalize those beliefs. The use of written statements to probe participants' epistemological stances has arisen as a preferred technique (Brownlee & Chak, 2007; Roberts, 2001; Tigchelaar, Vermunt, Brouwer, 2012). The writing prompts were constructed using Hofer's (2004) recommendations to contextualize epistemologies in a way that participants can apply this abstract concept to a real-world scenario. Since the research team was comprised of the lead instructor and two laboratory instructors for the course, it was also possible to conduct multiple observations.

Data was analyzed using the NVivo® software program throughout the process of coding, categorization, and generation of themes through the constant comparative method (Corbin & Straus, 2007). This strategy began with open line-by-line coding. Then, through recognizing segments of relevant data, notations of their value to the study were recorded (Cohen, Manion, & Morrison, 2007; Corbin & Straus, 2007). After all documents were analyzed, we independently presented initial codes to the research team (Corbin & Straus, 2007). Then an intense process of code negotiations occurred. After negotiations, we initiated a second cycle of coding through an axial coding technique (Cohen et al., 2007; Corbin & Straus, 2007). To attain a holistic view of our findings, documents were re-read (Miles & Huberman, 2005). Then, a focused exploration of the relationships among axial codes occurred in which they were further inspected (Corbin & Straus, 2007). After this process, the axial codes were further evaluated to determine the credibility of our understandings of the data (Miles & Huberman, 1994). Through this process of critical analysis, we made the decision to revise and reconfigure our codes in a way that we felt represented participant's views better. Finally, we entered a theoretical coding cycle in which we scrutinized our codes against relevant theoretical bases. Ultimately, five themes were agreed upon and utilized for data interpretation.

Reflexivity

We used self-reflexivity to assist with first understanding the biases' we brought to the study and ultimately to set aside these predispositions while interpreting the data (Tracy, 2010). As Tracy (2010) explains, "self-reflexivity encourages writers to be frank about their strengths and shortcomings" (p. 842). This technique compelled us to release the following information regarding our agricultural education experiences and epistemological beliefs.

We have multiple years of experience as school-based agricultural educators in four different states. Further, we individually completed a bachelor's degree in agricultural education from a land grant institution. Currently, two of us are seeking doctoral degrees in agricultural education where we are employed as graduate assistants. The remaining researcher received his doctoral degree in agricultural education and is currently employed as an assistant professor at Oklahoma State University. One researcher was the primary instructor for the course while the other two served as his graduate teaching assistants. Because of our positions, we were allowed to have direct contact with participants numerous times per week. Written statements were collected at the beginning of the semester; consequently, researchers had only minimal contact with the participants at the time of data collection.

In reference to Perry's (1970) developmental scheme, each member of the research team held a unique position. Two researchers most closely aligned with the tenets of relativism, where knowledge is attained through a deductive process aimed at attaining a greater understanding of the phenomenon holistically (Perry, 1970). The other saw himself within the lineage of relativism commitment where knowledge is actively constructed by the individual (Perry, 1970). We realize these experiences and worldviews might have influenced our interpretation of the data; however, through Tracy's (2010) recommendations attempts were made to bracket out these biases whenever possible.

Building Quality into the Study

Creating rigor in the qualitative research process is imperative. Merriam (2009) elucidated, "To have any effect on either the practice or the theory of a field, research studies must be rigorously conducted; they need to present insights and conclusions that ring true to readers, practitioners, and other researchers" (p. 210). To give clarification to how qualitative researchers can attain both rigor and trustworthiness in their investigations, Lincoln and Guba (1985) promoted four key principles: (a) credibility; (b) transferability; (c) dependability; and (d) confirmability.

Credibility encourages the purposeful addition of "trustworthiness, verisimilitude, and plausibility" (Tracy, 2010, p. 7). Furthermore, Miles and Huberman (1994) recommended the use of *thick description* to ensure participants were accurately represented. To operationalize the concept of credibility, whenever possible, we used direct quotes from participants in the theme generation process to produce a "*vicarious presence"* of the participants (Miles & Huberman, 1994, p. 279). To further ensure we achieved credibility, the following strategies were integrated into the study: (a) thick description; (b) triangulation of data; and (c) releasing our predispositions (Creswell, 2013; Merriam, 2009; Miles & Huberman, 1994).

Uncertainty surrounding the generalizability of data is a popular critique of the qualitative research paradigm (Merriam, 2009). Nevertheless, Merriam (2009) maintains that generalizability only allows "teachers and other clinicians to be more informed gamblers" (p. 224). Although it has been argued that qualitative research can be generalized (Stake, 1995) we elected to present our data in hopes of it being *transferable* to other similar situations (Lincoln & Guba, 1985; Merriam, 2009), namely other agricultural education teacher preparation programs. To augment the possibility of our findings being transferable, Miles and Huberman's (1994) advice was followed where data from multiple informants was used for both coding and theme formation.

Dependability is the third tenet researchers should consider when building quality into qualitative research (Lincoln & Guba, 1985). Although we chose to use an emergent design, Miles and Huberman (1994) accentuated that regardless of the design of the study it should be "consistent, reasonably stable over time and across research methods" (p. 278). To ensure the highest standards of dependability were met in this study we: (a) devised a study that met the purpose; (b) ensured the findings reflected the dominant views expressed by numerous participants; (c) aligned findings with basic paradigms and logical constructs; (d) negotiated findings and themes (Miles & Huberman, 1994).

Confirmability is the final principle purposed by Lincoln and Guba (1985) to ensure quality. This notion relates to whether "the conclusions depend on the subject and conditions of the inquiry, rather than the inquirer" (Miles & Huberman, 1994, p. 278). We made every attempt to ensure the results reflected the views of the participants; however, we realize that researcher's brings numerous biases' and assumptions into studies (Creswell, 2013; Licoln & Guba, 1985; Merriam, 2009; Miles & Huberman, 1994). Although we attempted to bracket out these biases, we felt ethically bound to release a statement of reflexivity so that readers would understand the biases we brought to the study when interpreting the findings (Creswell, 2013).

Limitations of the Study

Because we served in instructional roles over participants in this bounded system, participants could have been influenced to develop statements they felt we desired (Miles & Huberman, 1994). Another limitation relates to how the two prompts were presented to participants. For instance, participants were first asked to contextualize how they would construct knowledge for their future students when developing curriculum for a new agricultural education course. Then, they were asked to defend their beliefs of how knowledge is best created using the first section as a frame of reference. We speculate that if the two sections were reversed, the data yielded from this study might have been different. Despite these limitations, however, we made every attempt to ensure this case could be transferrable to other agricultural education teacher education programs (Lincoln & Guba, 1985; Merriam, 2009).

Emergent Epistemological Lens

Perry's (1970) work regarding the personal episteme is recognized as the first empirical-based study in the field of epistemology. In this longitudinal study, Perry (1970) and his associates interviewed over 700 males from both Radcliffe and Harvard Universities to probe their personal epistemologies. As a result, Perry (1970) developed an epistemological continuum with four primary positions: (a) dualism; (b) multiplism; (c) relativism; and (d) relativism commitment. Individuals with dualistic views believe knowledge is passively received from an authority figure (Perry, 1970). Moreover, they view knowledge as unchanging (Perry, 1970). Meanwhile, multiplism is when one begins to question the passive acquisition of knowledge (Perry, 1970). They believe that individual's uniquely receive knowledge; therefore, multiplist view knowledge as a subjective phenomenon (Perry, 1970). On the other hand, relativism represents beliefs that an individual dynamically forms knowledge, however, the individual must follow a set of procedures to accomplish this task (Perry, 1970). In relativism commitment, individuals view knowledge as a flexible progression of self-construction (Perry, 1970). Therefore, they do not believe knowledge has to be acquired through a fixed set of procedures (Perry, 1970).
Perry's (1970) four primary epistemological positions are empirical-based constructs verified through numerous studies over the past three decades (Belenky et al., 1986; Brownlee et al., 2001; Magolda, 1994; Mansfeld & Volet, 2014). Moreover, these constructs have shown consistency among various disciplines (Brownlee et al., 2001; Mansfeld & Volet, 2014).
After provisional themes had been negotiated in the data analysis process, we sought to

understand the relationships of our findings. During this process, Perry's (1970) four primary epistemological positions emerged as an epistemological lens that assisted with extracting the epistemological stances of pre-service agricultural education teachers.

Findings, Implications, Conclusions, & Recommendations

We chose to present the finding, implications, conclusions, and recommendations of this study through five themes. Themes one, two, three, and four align with Perry's (1970) four epistemological positions. It is important to note these four positions should be considered on a continuum of epistemological beliefs (Perry, 1970). However, the fifth theme represents an interesting departure from Perry's (1970) theory.
Although the subsequent section seems rather straightforward and easily interpreted, arriving at this coherence was not an easy task. This section is the result of hours of reading, re-reading, sorting themes, re-sorting themes, mapping thoughts, and multiple rounds of theme negotiations. As a result of our struggles, we hope our reader may glean valuable insight into how pre-service agricultural education teachers view and operationalize the nature of knowledge.

Dualism

Many pre-service teachers depicted agricultural educators as wise and in a position of power. Moreover, they were portrayed as experts of their content and delivered knowledge to students through teacher-centered approaches such as lecture-based instruction. Students were perceived as passive learners who received knowledge, rather than actively engaging in learning experiences. Perry (1970) characterized this epistemological stance as dualism, which is the belief that one must hear the truth from those who know.

Pre-service teachers who prescribed to dualism emphasized classroom instruction with statements like: "Classroom instruction through lectures is the basis of all learning in agriculture" [Participant 33, 1587]. Numerous statements illuminated that learning is received passively from someone of authority. Intently planned classroom experiences allowed the pre-service teacher to maintain this authority. For instance, Participant 8 illustrated a dualistic epistemology with the following statement, "Students will learn the basic and important facts about agriculture by staying in the classroom setting and learning about the different things involved with agriculture" [357:359].

Pre-service teachers illustrated a student dependence on the teacher for knowledge. For instance, modeling was defined as one of the primary responsibilities of the teacher. Participant 11 demonstrated this perspective with the statement: "I think for them to get the most out of their education they need to be shown how to do what you are teaching" [518:519]. Further, those who personify the epistemological belief of dualism purposefully use direct instruction. Participant 32 epitomizes the dualistic view through the following passage regarding her future teaching behaviors:

> I started off the class by reading off what I was lecturing over that day. On this particular day, [I] was lecturing over animal digestion, so I was showing a video of a dairy farmer checking his cannulated cows. After the video was over I then began [the] lecture for that day. [1539:1542]

For dualists, active participation and conversation between students are of little value, as knowledge is gained from experts, not friends or classmates (Belenky et al., 1986). Pre-service agricultural education teachers have been shown to adhere to more teacher-centered approaches early in their teacher preparation courses (Robinson, Kelsey, & Terry, 2013). Perhaps the reason underpinning their decision to use these methods is an adherence to a dualistic epistemological stance. Teacher education programs desire pre-service teachers to transition into more student-centered approaches (Robinson et al., 2013). To address this issue, perhaps teacher education programs should begin to develop interventions that could encourage these individuals to advance into a more sophisticated epistemological position.

Multiplism

Not all pre-service teachers championed the notion that knowledge should be passively received. Instead, many *actively* desired their future students to be open to the ideas and thoughts of others since "everyone's opinion is of equal value" (Perry, 1970, p. 324). They expressed their primary goal was for students to see the world has multiple truths and sometimes there is no right or wrong answer. Perry (1970) explained that individuals operating in the multiplism epistemological position no longer saw knowledge as a set of facts that had to be memorized or emanating from a great authority figure. In its place, the idea is exchanged with a concept where individuals consider knowledge as being uniquely acquired through questioning the validity of others opinions (Perry, 1970).

One way pre-service teachers expressed how they planed to operationalize the idea of multiplism is the through deep classroom discussion. Just learning from a book is not enough, according to Participant 12. He explained, "I believe letting students voice their opinions is the best way to allow them to learn" [Participant 12, 545:546]. Empowering students to weigh in on the topic is important to those adhering to multiplism (Brownlee, Walker, Lennox, Exley, & Pearce, 2009). The pre-service teachers simply do not want their students to mimic their behavior; instead, they hope to empower students to see their beliefs are just as relevant as everyone else. Participants also expressed the deeper meaning behind teaching in this manner. "My hope by using this method is that I can reach out to these particular students in order for them to retain the knowledge that I am teaching to these future agriculturalists" [Participant 35, 1727:1728].

Multiple pre-service teachers mentioned that teaching with a multiplism-type style would allow their students to attain deeper levels of cognition. Some even suggested this might help them be able to test at a higher level. Participant 9 illuminated:

> Having a conversation is the best way these students are able to learn. Having detailed discussion over animal science, horticulture, or food science, they are able to make connects and able to remember the information to a great level. In this way they are able to make a personal connection with the topic and relate it back when it is time for a quiz or test. [360:365]

A number of other pre-service teachers rationalized the acquisition of knowledge as teaching one to be able to defend their knowledge verbally. As Participant 22 stated, "Allowing the students to form their own opinion and discuss the subject teaches them to defend their decisions, and to become an advocate for agriculture" [1034:1036]. The empowered voices of the multiplism position feel they are preparing students for the real world by training them to question everything.

This finding aligns with Perry's (1970) theory. Also, the tenets of multiplism could naturally align with agricultural education quality indicators of instruction where the teachers "actively engage students" (Jenkins, Kitchell, & Haines, 2010, p. 57). Teacher preparation programs should be cognizant that some pre-service teachers are drawn to use methods of instruction that allow for the open questioning of theories and topics being discussed through multiplism. However, Perry (1970) explained those adhering to multiplism can often let their passion interfere with making progressive advancements. Therefore, we encourage teacher educators to stress caution when a pre-service teacher's multiplistic epistemological stance begins to influence their instructional practices.

Relativism

The third of Perry's (1970) epistemological stances represents a pivot in thinking. No longer is knowledge handed down or the result of a sparing of viewpoints, but rather it is contingent upon the conditions surrounding the attainment of said knowledge (Perry, 1970). Therefore, relativism can be thought of as procedural in nature where the individual attempts to attain a holistic understanding through a process of learning techniques (Perry, 1970).

In relativism, participant's attitudes toward learning were very optimistic. Knowledge was not a phenomenon that was unattainable, but rather a calculated process that simply needed to be boiled down so that students could more easily understand the concept. Also, many participants expressed the need to start teaching from a theoretical level and then progressively move to the application of the concept. Participant 42 eloquently explained, "I like to discuss what we are learning in depth and then show the students a real life example that they can see, feel, and learn from. This is also very beneficial for keeping the students engaged every day in class" [2056: 2059]. As noted by Participant 42, engagement was important to those adhering to this stance. Many expressed that only using theory-based discussions made learning boring, therefore, they needed to spice up the learning process with an activity that was more practical.

Although many participants emphasized that the engagement of learners was a major benefit to procedural-based learning, they also expressed a much deeper meaning behind their reasons for adhering to this epistemological stance. Participant 30 described using only experience-based learning as an almost disservice to learners. For example, when justifying his beliefs about how knowledge is best-gained, he elucidated:

> By doing this I feel as if students are able to see how the building process of knowledge is used and how they are able to benefit. Students do not like to walk into darkness; they like to know why what they are doing is benefitting them. [Participant 30, 1469: 1472]

Some participant's noted the learning *process* continued even after one obtained a hands-on experience. For instance, it is imperative to reflect upon the process individuals use to acquire knowledge. Participant 14 described how this process would unfold in his classroom, "I have also learned they like to see how it matters to them now. They are very in the moment type. So they need to reflect on what they just learned to connect it to what they already know" [Participant 14, 647:649].

As expressed by participants in this study, at the heart of relativism is the idea of employing critical thinking skills to attain knowledge. Relativist's take in multiple views across theoretical bases and then attempt to form their beliefs and understanding based upon a well-executed procedure. For the relativist, learning is all about the journey to understanding.

The principles underlying this epistemological stance could be considered consistent with indicators for quality instruction in agricultural education where teachers should use variability in instructional practices (Jenkins et al., 2010). Since relativists believe learning is a process, using a variety of instructional practices naturally lends itself to this epistemological belief.

Relativism Commitment

Relativism commitment, as described by Perry (1970), maintains elements of relativism but includes a greater element of fluidity of *truths.* This epistemology is typified by students making choices and affirming their roles and responsibilities within a relativistic world (Perry, 1970). Congruent to this concept, students repeatedly discussed a very fluid, experiential, learning process whereby students each make meaning in their own unique way. One student shared, "in the Ag leadership class, by sharing their own opinions, the students learn to agree and disagree, but they also learn to support and defend their views and opinions on the agriculture industry" [Participant 21, 1010: 1012].

Similar in nature, Participant 34 shared, "sometimes not everything can be taught in the classroom. We can give students information they need, but they may not actually learn it until they discover it themselves" [1673: 1674]. This dominant perspective seems to connect to Perry's (1970) conclusion that at this stage in the epistemological continuum, the learner holds knowledge, and as such, sources are evaluated and meaning is ever changing and context specific.

Perry (1970) refers to commitments as "affirmations: in all the plurality of the relativistic world – truths, relationships, purposes, activities, and cares, in all their contexts" (p. 150). This cognitive complexity was evident as students described their plans for a new agricultural education program.

> I believe the best way of students learning is by hands on training and one on one time with your advisor. Growing up through the FFA I was lucky enough to have a teacher who taught this way. Whether it was fitting cattle, writing speeches, or welding he was always by all our or sides teaching us one on one how to work smarter and not harder. [Participant 10, 454: 458]

Furthermore, Perry (1970) explained that *disorientation* is an important element of the learning process as viewed through a relativism commitment lens:

> I believe that in order to accommodate all learning styles and reach all students, I, as a teacher, can't just read off a PowerPoint and expect my students to truly learn anything. I believe in rolling your sleeves up and truly EXPERIENCING agriculture. After all, a "SAE" is a SUPERVISED (as in teacher guided) AGRICULTURAL (it is AG. ED.)

EXPERIENCE (key to the learning). Next is letting the students make mistakes. In my life experience, I learned the most from making mistakes. I can't hold every student's hand every step of the way. If I did, they wouldn't learn anything. It would be robbing them of an education because, as teachers, we are preparing students for a job life after high school and hopefully a higher education, and we can't do their job or studies for them. [Participant 19, 889: 905]

This finding is consistent with current research. For example, numerous scholars postulate that teachers should act as more of a facilitator of the learning process rather than providing a step-by-step set of procedures or simply telling students how to find the answer (Calderhead & Robson, 1991; Kagan, 1992; Pajares, 1992). Through this process, the learner is better able to connect the experience and apply it to his or her own life (Kagan, 1992). These experiences place the learner as the "*agent* and *chooser* of his life in which he invests his energies, his care, and his identity (Perry, 1970, p. 149-150). "I look for opportunities to engage my students in interaction with fellow classmates and me. I believe this approach is better received than lecture based teaching" [Participant 25; 1222: 1224].

The Chasm Between Beliefs and Practice

The final theme diverges from Perry's (1970) theory. This theme showcases a lack of continuity between participant's articulated views and how they propose to operationalize those beliefs as an agricultural educator. For example, when participants were asked to defend their epistemological stance through a written statement, an overwhelming majority of participants indicated that knowledge is rooted in experience. For instance, "I think kids learn best from hands on experience" [Participant 18, 865].

However, participant 18 had a different story in her earlier response when asked to put her beliefs about knowledge into practice. She explained, "[Participant 18] began the lecture by showing the students different agriculture based companies and the different jobs at that certain company. [Participant 18] then lectured on how these businesses needed to have business plans to be a successful company [830: 832]. As demonstrated by Participant 18, many pre-service teachers claim to believe in learning from contextualized experiences, but instead choose to present new information to there future classes in a detached, abstract manner.

Analogously, Participant 40 indicated learning should be assessed experientially. She stated, "The best [way] to tell if student's really learned what you teach them is to ask them to preform the skill in a hands-on way" [Participant 40, 1970:1971]. However, this statement starkly contrasts from her earlier stated intended classroom practices.

> Typically my class would start of with me being very prepared with a power point presentation. I would make sure that every student took notes because they would need them to learn for the test later on. I would also make sure to review at the end of the day so that they would really learn what we talked about [Participant 40, 1949:1952]

This chasm between pre-service agricultural education teacher's beliefs and practice inundates much of the data collected in this study. Time and time again, participants clung to experiential-grounded dogmas when describing the roots of their ideologies about how knowledge is reached by individuals. However, when asked to put these beliefs into practice, participants often reverted back to technique's they had witnessed throughout their educational careers.

This lack of congruency begs the question, "Do pre-service teachers enter programs with an accurate understanding of experiential learning?" If agricultural education discipline truly is based in experience, teacher educators should perhaps devote more attention in the curricula to teaching pre-service teachers how to operationalize this method of instruction. If a more clear understanding of this educational approach is attained, perhaps this clarity will help pre-service teacher bridge the chasm between their beliefs and their intended practices.

Discussion

This search for understanding led to a somewhat conflicting conclusion – the epistemologies of pre-service agricultural education teachers did not necessarily extend and/or match chosen teacher practices. We, as researchers, submit two possible explanations for this incongruence. First, could it be that there is a social value connected to an epistemology in line with hands-on learning propagated in our rich history and culture of experiential learning? Students may be conditioned, or feel socially pressured, to prescribe to a more relativism commitment approach in word, but expose their true beliefs when describing their classroom practices – which are more passive and dualistic. The second explanation could be that students truly prescribe to a more relativistic view of knowledge formation, but cannot connect this more complex belief to specific teaching strategies. It seems logical that as the epistemology becomes more complex, so do the methods subsumed within that belief system.

So what? Regardless of the reasoning behind the epistemological and practice *chasm*, epistemologies should be explicitly explored, and then linked to praxis. Fives and Buehl (2008) warned that teacher education often becomes a methods factory model where the focus lies almost exclusively in the *what* rather than the *why*. As such, Brownlee et al. (2001) recommended that teacher education focus more on teacher beliefs to facilitate changes in teaching. Though research has purported that a focus on epistemological perspectives will ultimately influence performance in the classroom (Buehl & Fives, 2009; Cheng et al., 2009; Fives & Buehl, 2008; Jacobson et al., 2010; Tanase & Wang, 2010), we contend there is one vital step absent in that assertion – purposefully bridging the chasm by explicitly connecting epistemological beliefs to practical methods of teaching. Agricultural educators cannot hide behind the socially valued veil of experiential learning without committing to an in-depth understanding of the epistemological roots, bridged to practical methods intended to facilitate the process. The *why* is important, but equally important is adequate preparation in the *what.*

What exactly is experiential learning? Is it a teaching method or an educational framework? Does the chasm exist beyond first year pre-service teachers? What effect does a teacher education program have on bridging the chasm? These are important questions warranting exploration in future examinations.

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Barriers Affecting the Balance of Texas Agricultural Science Teachers' Home and Work Life, by Gender

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Abstract

Establishing an equilibrium between the home and work life domains continues to be a chronic problem amongst the nation's agricultural science teachers. Barriers exist in both the family and work life domains, which have the propensity to affect the other prospective domain.
This study sought to identify the responsibilities of Texas agricultural science teachers in the work and family domains, which posed as barriers to establishing balance, by gender. An online survey instrument was utilized to attempt a census on the population of agricultural science teachers in Texas. With a response rate of 30.8%, 567 Texas agricultural science teachers, participated in this study. In regard to teachers' perceived barriers to completing work responsibilities, no legitimate barrier was found, and the highest perceived barrier in the family domain differed between genders. Female teachers viewed extended family as their largest perceived barrier, and male teachers indicated spouse's desire for couple time was their largest perceived barrier. Both genders identified all work responsibilities to be legitimate barriers to establishing balance at home. Female teachers perceived work fatigue to be their largest barrier to balance, while males indicated spending weekends away from home to be the largest barrier in striking a balance at home.

Introduction

Educators in the field of agricultural education have constantly faced the struggle to strike a balance between their family and careers (Bruening & Hoover, 1991; Coughlin, Lawrence, Gartin, & Templeton, 1988; Murray, Flowers, Croom, & Wilson, 2011; Odell, Cochran, Lawrence & Gartin, 1990). Barriers and challenges existing in both the home and work life domains have the propensity to impede the teachers' ability to fulfill responsibilities and obligations in each domain. In regard to balance in agricultural education, balance can be interpreted as the time and effort between family and work, between FFA activities and classroom instruction, or between what is enjoyable and what is obligatory (Crutchfield, 2009).

The chronic inability for agricultural science teachers to develop a balance between their family and career responsibilities, has resulted in a profession which "literally devours its young and forces them to look elsewhere for professional and personal satisfaction" (Osborne, 1992, p. 3). When teachers in agricultural education are leaving the profession, some degree of job dissatisfaction is implied (Jewell, Beavers, Kirby, & Flowers, 1990). The notion of job dissatisfaction has long been cited as a symptom of burnout (Cherniss, 1980; Clark, 1985; Igodan 1984; Maslach, 1982).

Attrition rates in the teaching profession, are significantly higher than for other professions (Ingersoll, 2003). Teacher attrition is also noted as the largest factor determining the demand for additional teachers in all subjects in the United States (Croasmun, Hampton, & Herrmann, 1999). Along with all other subject areas, agricultural education has also experienced a teacher shortage over the years (Camp, Broyles, & Skelton, 2002). A shift in teacher demographics (e.g., higher rates of females employed in agricultural education) have further exacerbated this issue of balancing the home and work life domains (Camp et al., 2002; Kantrovich, 2007). Past research in agricultural education indicated females face a gender bias in the profession, and are naturally tasked with certain family responsibilities (Johnson, 1997; Kelsey, 2006).

In order to improve agriculture teacher retention and reduce the occurrence of burnout, the profession must continue to examine the challenges teachers face in balancing their home and work lives. The purpose of this study was to identify the perceived barriers and challenges of Texas agricultural science teachers, to balancing their home and work life domains.

Theoretical Framework/ Literature Review

The concept of the spillover theory was first introduced by Engels (1892) who observed the work environment in which a worker encounters, spills over into their leisure time. The spillover theory was coined by Wilensky (1960) who implied the nature of one's work experience transmits over into the non-work domain, affecting the behavior and attitude of the worker in their home life. This concept was later defined as the attitudes, feelings, and behaviors which potentially could emerge in one domain, which are then carried over into the other domain (Googins, 1991). Along with the spillover effects' impact on a person's behavior and attitude, other studies indicated teacher attrition, burnout, marital dissatisfaction, job dissatisfaction, and psychological distress are also a result of this phenomena (Googins, 1991). Crouter (1984) argued the spillover effect is not limited to physiological attributes; this phenomena can also be observed in the context of education.

The initial research on the spillover effect implied the presence of conflict or interference exiting between career and family life domains, but the terms enrichment, enhancement, and facilitation have been developed in attempt to describe a positive relationship (Greenhaus, Collins, & Shaw, 2002: Kelloway, Gottlieb, & Barham, 1999; Staines, 1980). Further research elaborated on positive spillover suggesting one domain can potentially have a positive effect on the other (Pajak & Blasé, 1989; Voydanoff, 2002).

A multitude of factors play a role in the work to family spillover of agricultural science teachers. One factor which implicates the ability of teachers to fulfill family responsibilities is long work hours. Research over the past years has indicated agricultural science teachers work an average of 55 hour a week (Cooper & Nelson, 1981; Murray et al., 2011), which substantially exceeds the average 40 hour workweek. Agricultural science teachers' primary job responsibilities are comprised of three structural components including: classroom and laboratory instruction, leadership development through participating in activities and programs of the National FFA Organization, and supervised agriculture experiences (SAE) programs (Phipps, Osborne, Dyer & Ball, 2008; Talbert, Vaughn, & Croom, 2006).

Findings from Blasé and Pajak (1986) indicated around two-thirds of their collected data on family and home life balance, showed a negative pattern of factors from work spilling over into the home life, and having objectionable effects. The researcher considered the teachers' work demands to be "excessive" (p. 310), and attributed the objectionable effects to the over load factor. Blasé and Pajak (1986) defined the over load factor as the difficulty and amount of work, which depletes the available energy the teacher has to exert in the family domain. The effects of spillover into the family life domain have a higher magnitude when a spouse or children are involved (Lawver, 2007). Aside from having family, Cho, Tay, Allen and Stark (2013) found one's disposition is a factor of work to family spillover, indicating certain people are more susceptible to the negative effects of spillover.

Murray et al.'s (2011) study on family and work life balance of Georgia agricultural science teachers indicated all of their work obligations served as a legitimate barrier to fulfilling family responsibilities. Spending weekends away from home, acquiring fatigue from work, working long hours, participation in night meetings and activities, having excessive work demands, lack of flexibility to leave work, and taking work home, are the job responsibilities which the participants perceived to be legitimate barriers in fulfilling home responsibilities. Although both genders perceived all the barriers to be legitimate, the females in Murray et al.'s study perceived all job responsibilities to be larger barriers to fulfilling family responsibilities, compared to men.

Along with factors at work affecting the family life domain, conversely, extensive research indicated variables in the teachers' home life also have the propensity to spillover to the work life domain. Odell et al. (1990) indicated attributes from the family life domain, such as spouse's marital satisfaction and the presence of children in the household, influenced a teachers' job satisfaction. Pujak and Blasés' (1989) found that 71% of the participants in their study indicated areas of their home lives exude a positive influence on their career. The researchers also specified teachers could ascertain certain attributes (e.g., compassion, empathy, dedication) through parenthood (Pujak & Blasé, 1989). Further research indicated family cohesion enhanced positive family-to-work spillover (Stevens, Minnotte, Mannon, & Kiger, 2007). Along with family cohesions' effect on spillover, Stevens et al. (2007) also indicated a differentiation exist between genders perception of positive spillover. Positive family-to-work spillover for males was associated with relationship satisfaction; females' positive spillover was associated with satisfaction with the housework arrangement.

Family-to-work spillover has also been identified to be negative in nature. Murray et al.'s (2011) findings indicated spouses' desire for family time, spouses' desire for couple time, and extended family responsibilities served as legitimate barriers to fulfilling job responsibilities. Research by Stevens et al. (2007) indicated the presence of preschool-aged children in the household equated to increased negative family-to-work spillover.

Regardless of the spillover direction, the balance of the two domains has continued to be a lingering problem in the profession. Kelsey (2006) indicated the disequilibrium between the family and work life domains could potentially lead to burnout and teacher attrition. Although a myriad of reasons exist for agricultural science teachers leaving the field, a multitude of teacher attrition studies identified working long hours as a factor contributing to teacher attrition (Cole, 1984; Dillon, 1978; Foster, Pikkert, & Husmann, 1991; Froehlich, 1966; Kelsey, 2006; Knight & Bender, 1978; Mattox, 1974; Moore & Camp, 1979). Furthermore, the number of hours worked by a teacher was found to be the strongest predictor of high teacher stress (Torres, Lawver, & Lambert, 2009).

The agricultural science teachers' ability to balance the work and family life domains, could potentially be dependent on the gender of the teacher. Stereotypes and gender bias are still present in the field of agricultural education (Kelsey, 2006), amplifying the struggle of female teachers to balance their career and home life. Although the responsibility of parenting is shared by males and females, mothers are the major caregiver in the household and provide nurturing to their children (Johnson, 1997). Keene and Reynolds (2005) furthered this argument by indicating females make "more adjustments to their workloads such as refusing overtime or turning down assignments, for the sake of family" (p. 275). The gender bias and heightened home life responsibilities for women could be a culprit of the under-representation of women in agricultural education. The 2013 Vocational Agriculture Teachers Association of Texas teacher report indicated 27% of the state's teaching positions were currently held by women. In response to the under representation of females, Kelsey (2006) conducted a study to determine the reason for this phenomena. Kelsey's study indicated gender bias, being place-bound, and lack of commitment to teaching agricultural education were the factors influencing female teacher attrition.

Devoting time to family and children, battling the feeling of guilt, spousal support, single parent concerns, choosing not to have, and the fear of having a family are the six factors and responsibilities identified by Foster (2001) to be unique to females. Along with the roles and responsibilities unique to female teachers, other factors play a role in female agricultural science teacher attrition, such as the eminent factor of childbirth. Historically, females entered the workforce, then leave to care for their families, and then return to work later in life (USDL Women's Bureau, 2000), but a recent shift in the women's workforce indicates a similar work configuration to the traditional male workforce. Foster (2001) indicated female agricultural science teachers face the challenge of maintaining the traditional family role, and developing a niche for their role as a mother and professional. Foster also investigated the barriers which females faced in agricultural education, and the most populous responses were "acceptance by peers and other males in the industry" (p. 392) and "other ag teachers (male) view the female teachers as hobby advisors" (p. 392).

Purpose and Objectives

The purpose of this study was to identify the barriers existing in the home and work life domains of Texas agricultural science teachers, which had a bearing on the teachers' ability to satisfy the other domain. The following research objectives were utilized to guide this research study:

1. Describe the family obligations of the Texas agricultural science teachers in this study.

2. Describe the barriers related to family which impede on the teachers' ability to fulfill job expectations.
3. Describe the barriers related to job expectations which hinder the agricultural education teachers' ability to fulfill family commitments.
4. Describe the perceived challenges of Texas agricultural science to balance career and family.

Methods and Procedures

Population

A census was attempted, which encompassed all agricultural science teachers in Texas, during the 2013-2014 calendar school years. The Texas Agricultural Teacher Directory on judgingcard.com was used to determine the frame of the assessable population (N = 1,921). The directory is not considered to be a comprehensive list but it is the best list available. The non-high school teachers (e.g., teacher educators), duplicate names, and undeliverable email addresses were removed, resulting in frame of 1,876.

The demographic characteristics (i.e., gender, age, number of years teaching, & marital status) of the Texas agricultural science teachers in this study, were outlined in a previous manuscript (Hainline, Ulmer, Burris, & Ritz, 2015). In regard to the gender of the participants, there were 385 (67.90%) males, and 182 (32.10%) females. Male teachers most populous age range was the 41-50 (n = 104, 27.23%), while over 60% of females (n = 109, 60.22%) belonged to the 22-30 age range. The highest reported frequency for years of teaching was five years or less for females (n = 117, 64.64%), and 21 years or more of teaching experience (n = 105, 27.56%) for males (Hainline et al., 2015).

In comparison of marriage rates amongst agricultural science teachers in this study, male teachers (n = 286, 76.88%) had an 18.7% higher marital rate as compared to their female counterparts (n = 96, 58.18%). Less than 15% of agricultural science teachers reported they have never been married, and 13.41% (n = 72) of teachers indicated they had previously experienced a divorce at one time (Hainline, Ulmer, Burris, & Ritz, 2015). The divorce rate was slightly higher for female teachers (n = 23, 13.93%) in comparison to male teachers (n = 49, 13.17%).

Design

This quantitative study on family and career balance was descriptive explanatory in nature. Descriptive studies can be defined as a "quantitative research that involves making careful descriptions of educational phenomena" (Gall, Gall, and Borg, 2007, p. 300). This study sought to distinguish the barriers existing in the home and work life domains which serve as a barrier to fulfilling the other domain. Identifying the perceived challenges of agricultural science teachers was another objective for this study.

Gender was the independent variable and the barriers in both the family and work life the perceived challenges were the dependent variables in this study. Utilizing the Qualtrics Survey

Platform, an online survey instrument was created and distributed to the participants to collect descriptive data for this study. All participants in this study received the same survey instrument.

Instrumentation

Murray et al.'s (2011) survey instrument was utilized in this research study which contained a total of thirty-one items. Murray et al.'s (2011) original questionnaire was comprised of Likert-type scales, short answer responses, and multiple choice questions. The demographic questions in this study sought to identify the participants' gender, age, years of agricultural education teaching experience, marital status, (reported in Hainline et al., 2015) number of children in the household, and use of daycare.

To understand the barriers agricultural science teachers endure in balancing their home and work life domains, teachers were asked to gauge certain family and career responsibilities in respect to their perceived barrier to fulfilling obligations in the other respective domain. A ten-point Likert-type scale was used to inquire about teachers' perceived barriers, with one being "no problem" and ten being "impossible". Any mean scores which exceeded the five-point threshold were considered to be legitimate barriers (Murray et al., 2011). A total of two Likert-type scales were included in this study to examine the perceived barriers for responsibilities in the home and family domains.

Lastly, the instrument included a short answer item which asked the participants to list their largest perceived challenges in balancing their home and work lives. This item included a total of five blanks for the teachers to include their top challenges.

Validity and Reliability

The validity for the career and home life survey instrument was established by the original creator of the instrument (Murray et al., 2011). According to Gall et al. (2007) face validity is the "subjective inspection of the test items to judge whether they cover the content that the test purports to measure" (p. 196). In order to establish validity on the original instrument, Murray et al. sent the instrument to be reviewed by "agricultural education professors at three universities, as well as by professors with expertise in family life and the Department of Family and Consumer Sciences at North Carolina State University" (Murray et al., 2011, p. 31). Due to similar populations, no significant changes were made to the original instrument, therefore validity is implied for the survey instrument used in this study.

In regard to establishing reliability, Murray et al. (2011) conducted a pilot test on North Carolina agricultural science teachers (n = 11), utilizing the test-retest approach to establish reliability. The test-retest approach is defined by Gall et al. (2007) as "an approach to estimating test score reliability that involves examination of the occasion of test administration" (p. 201). At the conclusion of the pilot test, Murray et al. (2011) found "no significant differences" (p. 32) between the initial and subsequent test, therefore the researcher concluded the instrument was "stable over time" (p. 32). Cronbach's alpha was calculated to determine the internal consistency of the career and family life balance instrument. The composite reliability coefficients were .60.

Data Collection

A recruitment email which included a link to access the survey instrument, was sent to the accessible population of Texas agricultural science teachers, on April 30th 2014. The recruitment email included an explanation of the study, information about the instrument, a link to access the instrument, and a clause of confidentiality. On May 6th, 13th, 21st, and 27th 2014, subsequent emails were disseminated to the non-respondents, to encourage participation in the study. Dillman, Smyth, and Christian's (2009) survey delivery schedule was utilized in order to develop the survey instrument dissemination schedule used in this study. Dillman et al.'s (2009) original schedule was designed for mail-based surveys; therefore alterations were made to account for expedited delivery time of online-based instruments. To control for non-response error, 30 randomly selected non-respondents were contacted and were asked the questions on the instrument. Gall, Borg, and Gall (1996) recommend a random sample of 20 non-respondents should be contacted, if a study's response rate is less than 80%, to control for non-response error. This procedure sought to determine if differences existed in between the non- respondents and respondents. No differences were identified between the respondents and non-respondents. Warner (2013) defined statistical power as the probability of obtaining a value large enough to reject the null hypothesis when the null hypothesis is actually false. Instead of conducting a post hoc power analysis, Cumming (2012) recommended the utilization of G*Power3 (Buchner, Erdfelder, Faul, & Lang, 2013) as a tool for calculating statistical power. A post hoc analysis of power was conducted on all comparison items between the respondents and non-respondents. Results of the G*Power3 analysis indicated the statistical power of the sample was below the recommended .80. In response to the statistical power estimates, it can be concluded the responding sample may not represent the population. A total of 567 agricultural science teachers participated in this study, accounting for a 30.8% response rate.

Data Analysis

The Statistical Package for Social Sciences (SPSS), version 20.0, was used to analyze the descriptive parameters of the data, percentages, frequencies, and measures of central tendency and variability. In order to identify the influence of gender on career and home life balance, data was reported collectively as well as separately by gender.

Results and Findings

Objective one sought to identify the family obligations of the Texas agricultural science teachers in this study. When the participants were questioned about the number of children in their household, 62% (n = 240) of male teachers and 46% (n = 84) of female teachers, reported having children in their residence (see Table 1). Although females (n = 47, 45.63%) were more likely to utilize daycare compared to men (n = 86, 31.73%), almost 65% (n = 241) of teachers reported not using daycare at all.

Table 1
Percentages and Frequencies of Family Obligations of Agricultural Science Teachers in Texas

	Male			Female			Total		
Characteristic	*n*	*f*	%	*n*	*f*	%	*N*	*f*	%
Children Living at Home	240			84			324		
1		78	32.50		38	45.24		116	35.80
2		112	46.67		33	39.29		145	44.76
3		36	0.15		10	11.90		46	14.20
4		12	0.05		2	2.38		14	4.32
5		2	0.83		1	1.19		3	0.93
Use of Daycare	271			103			374		
Yes		86	31.73		47	45.63		133	35.56
No		185	68.27		56	54.37		241	64.44

Objective number two sought to analyze the barriers related to family which impede on the teachers' ability to fulfill job expectations, by gender. Female teachers identified extended family (*M* = 4.97, *SD = 2.66*) as the greatest perceived barrier to completing work obligations (see Table 2). With a mean of 4.86 and a standard deviation of 2.88, male teachers viewed the family responsibility of spouses' desire for couple time to be the largest barrier to fulfilling work responsibilities. Comparable mean scores were reported by both genders with the largest variance being meal preparation, where males (*M* = 3.10, *SD = 2.23*) reported almost a whole mean score lower than females (*M* = 4.03, *SD = 2.39*). Although the family responsibilities of time spent with the family and extended family were close to the legitimate threshold of five, no barriers were identified to be legitimate by either gender.

Table 2
Mean Scores of Family Responsibilities as Perceived Barriers to Completing Work Responsibilities

	Male			Female		
Responsibility	*n*	*M*	*SD*	*n*	*M*	*SD*
Spouse Desire for Couple Time	368	4.86	2.88	167	4.69	2.90
Spouse Desire for Family Time	367	4.63	2.79	166	4.31	2.95
Extended Family	372	4.46	2.75	170	4.97	2.66
Children's Extracurricular	366	3.14	2.56	158	3.00	2.51
Poor Health of Family Member	366	3.10	2.56	165	3.47	2.84
Responsibility for Meal Prep	373	3.10	2.23	173	4.03	2.39
Sick Children	369	3.10	2.48	160	3.26	2.71
Other	73	3.58	3.33	38	2.97	2.74

Note. *$\mu \geq 5$= legitimate barrier in this study; 1 = barrier was perceived to be no problem in striking a balance, 10 = barrier made it impossible to strike a balance.*

Objective three sought to describe the barriers related to job expectations which hinder the agricultural science teachers' ability to fulfill family commitments, by gender. Female teachers perceived fatigue from work (*M* = 7.10*, SD* = 2.42), spending weekends away from home (*M* = 6.80*, SD* = 2.41), involvement in night meetings (*M* = 6.73*, SD* = 2.20), excessive work demands (M = 6.69, SD = 2.32), long work days (M = 6.59, SD = 2.21), and taking work home (M = 5.86, SD = 2.78) to be larger barriers to fulfilling family responsibilities in comparison to male teachers (see Table 3).

Table 3
Job Responsibilities' Mean Scores as Perceived Barriers to Fulfilling Family Responsibilities

	Male			Female		
Perceived Influence	*n*	*M*	*SD*	*n*	*M*	*SD*
Weekend Away	374	6.64	2.52	176	6.80	2.41
Fatigue from Work	374	6.39	2.76	177	7.10	2.42
Long Work Day	374	6.35	2.52	176	6.59	2.21
Night Meetings/ Activities	375	6.37	2.49	176	6.73	2.20
Excessive Work Demands	373	6.29	2.67	175	6.69	2.32
Inability to Leave During School Day	373	5.63	3.00	175	5.41	2.85
Taking Work Home	373	5.08	2.85	174	5.86	2.78

Note. *$\mu \geq 5$= legitimate barrier in this study. 1 = barrier was perceived to be no problem in striking a balance, 10 = barrier made it impossible to strike a balance.*

The only barrier which males perceived to be a greater barrier to fulfilling family responsibilities compared to females, was the inability to leave during the school day (M = 5.63, SD = 3.00). Females indicated the job responsibility with the largest perceived barrier to fulfilling family responsibilities was fatigue from work (M = 7.10, SD = 2.42), for male teachers the highest was spending weekends away from their home (M = 6.64, SD = 2.52). All job responsibilities' mean score exceeded the five point threshold, therefore each perceived barrier is considered to be legitimate (Murray et al., 2011).

Objective four was to describe the perceived challenges of Texas agricultural science teachers to balance career and family, by gender. The participants in this study were asked to identify their top five challenges for balancing their career and family lives. The challenge which was most frequently identified by male (n = 277, 89.64%) and female (n = 93, 76.22%) teachers was experiencing a lack of time (see Table 4).

Table 4
Frequencies and Percentages of Perceived Challenges to Balancing Family and Career

	Male (n = 309)		Female (n = 122)		Total (N = 431)	
Perceived Challenges	*f*	%	*f*	%	*f*	%
Time	277	89.64	93	76.22	370	85.85
Excessive Work Responsibilities	227	73.46	84	68.85	311	72.16
Family responsibilities	169	54.69	67	54.92	236	54.76
SAE/ Livestock	51	16.50	17	13.93	68	15.78
LDE/ CDE Training	30	9.71	12	9.84	42	9.74
Travel/ Weekends	28	9.06	14	11.48	42	9.74

Excessive work responsibilities (n = 311, 72.16%) which encompasses long work days, after school meetings, and demanding management, was the second most identified challenge among both genders of agricultural science teachers. A greater percentage of male teachers indicated time (*n* = 277, 89.64%), excessive work responsibilities (*n* = 227, 73.46%), and SAE/ livestock shows (*n* = 51, 16.50%) posed a greater challenge in balancing their family and career. The perceived challenges which were higher for females were dealing with family responsibilities (*n* = 67, 54.92%), LDE/CDE training (*n* = 12, 9.84%), and travel on weekends (*n* = 14, 11.48%).

Conclusions, Implications, and Recommendations

Identifying the challenges and barriers existing in the home and work life domains of Texas agricultural science teachers, which had a bearing on the teachers' ability to satisfy the other domain, was the purpose of this study.

In regard to the presence of children in the household, male teachers were 16% more likely to have a child living in their residence, in comparison to their female counterparts. The disproportionate number of children in the household between genders may indicate the male teachers have more children due to their higher average age. Another implication can be made that female teachers have fewer children in their household due to sacrifices they have made for their career. The utilization of daycare was reported by only 35.56% of the agricultural science teachers, and a greater percentage of females reported having their children in daycare. With over 60% of the females in this study belonging to the 22-30 age range, an implication can be made that they might have younger children, which might warrant a greater necessity for daycare.

When the participants were questioned about perceived barriers related to family responsibilities which impede on the work life domain, no family responsibility was reported to be a legitimate barrier (Murray et al. 2011). Murray et al.'s (2011) study on Georgia agricultural science teachers had contrasting findings, where both genders of teachers identified spouse's desire for family time and spouses' desire for couple time to be legitimate barrier to fulfilling work obligations.

With no family responsibility identified as a legitimate barrier, it can be implied agricultural science teachers in Texas do not feel that aspects of their home lives have a negative impact on their work life. Furthermore, the low perceived barriers on family responsibilities may suggest areas of the teachers' home life could potentially have a positive influence on their career (Pajak and Blasé, 1989; Odell et al., 1990). The findings of this study also coincide with Stevens et al. (2007) explanation of gender differentiation on positive family-to-work spillover. Stevens et al. indicated positive family-to-work spillover for men was related to relationship satisfaction, and females' positive spillover was linked to housework arrangement satisfaction. Male teachers' highest indicated perceived family barrier in this study was spouses' desire for couple time, which is in agreement with Stevens et al.'s assumption. Furthermore, females indicated housework arrangement items to be larger perceived barriers to fulfilling work obligations.

Both genders indicated all job responsibilities listed in the instrument were legitimate barriers to fulfilling family responsibilities. The job responsibilities which the participants viewed to be the largest perceived barriers were involvement with night meetings, spending weekends away from their home, and enduring fatigue from work. Past research indicated working extensive hours is the causation for teacher attrition in the field of agricultural education (Birkenholz, 1986; Froehlich, 1966). With both genders perceiving the job responsibility barriers to be larger than barriers associated with family responsibilities, an implication can be made that the agricultural science teachers in this study feel their work life has a strong bearing on their home life. It appears the teachers felt overwhelmed by their job obligations compounded with fulfilling family commitments as well. It can also be implied teachers felt torn between what their job required, and what they felt their family deserved. It is recommended teachers set prior limits to work activities in order to find balance, and reduce teacher burnout and attrition.

With an exception of the inability to leave during the school day, female teachers viewed all other job responsibilities to be larger barriers to fulfilling family obligations, compared to male teachers. This finding aligns with Murray et al.'s (2011) study where female teachers perceived all job responsibility barriers to be larger than their male colleagues. The females' higher perceived barriers might imply the job responsibilities make it difficult to complete their inflated percentage of family responsibilities.

Among the participants' perceived challenges to striking a balance between their family and work lives, lack of time to fulfill all commitments in both domains was the largest identified challenge to attaining a balance. In comparison to Murray et al.'s (2011) study the Georgia agricultural science teachers indicated their largest perceived challenge was neglecting their family. Past research indicated long work hours and extensive evening responsibilities are influential factors in agricultural science teacher attrition (Birkenholz, 1986; Cole, 1984; Dillon, 1978; Froehlich, 1966; Knight & Bender, 1978; Mattox, 1974; Moore & Camp, 1979). Along with long work hours' effect on teacher attrition rates, research also indicated long work hours are the largest predictor of high teacher stress (Torres et al., 2009). With a lack of time being identified as the largest challenge to striking a balance, it is reasonable to assume time management techniques need to be developed to mitigate agricultural science teacher attrition rates. Workshops for agricultural science teachers addressing time management and career and family life balance should be developed and implemented to aid agricultural science teachers manage their time more efficiently.

Recommendations for Further Research

A replication of this study should be conducted on agricultural science teachers in other states to increase the generalizability of this study. In order to progress the body of knowledge surrounding the influence of gender on agricultural science teachers' ability to balance their home and work lives, further studies should be conducted on this matter. Other factors which have the propensity to impact the agricultural science teachers' ability to strike a balance (e.g., marital status) should be studied.

In order to mitigate teacher attrition rates in agricultural education, a study should be conducted to determine the spillover effects' bearing on career commitment. A year-long career commitment study would be valuable to our profession, to identify the stressors and lack of balance experienced by agricultural science teachers throughout the year. By measuring the teachers perceived career commitment each month, the study could control for the covariate of alternating workloads teachers endure in different parts of the year. Research should also be conducted on the effect of time management workshops on teachers' ability to balance their work and family life domains.

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A Case Study of Learning, Motivation, and Performance Strategies for Teaching and Coaching Career Development Events Teams

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This intrinsic case study examined the case of students on CDE (Career Development Event) teams preparing for state competitive events and the teacher preparing them in a school with a previous exemplary track record of winning multiple state and national career development events. The students were interviewed multiple times during the 16-week preparation period before, during, and after the district and state CDEs. From the interview data it was found the teacher used a variety of motivation strategies when preparing CDE teams. The teacher shifted the use of both extrinsic and intrinsic motivation strategies based on students' needs. The teacher also utilized performance strategies including both coaching and learning strategies, to develop students' competitive drive and content knowledge. From the findings it is recommended that CDE coaches assess students' needs and utilize the successful coaching behaviors and strategies accordingly.

Introduction

Career Development Events (CDEs), which allow students to develop career related and problem solving skills through competitive events, are an integral component of an FFA program. McNally and Harvey (2001) state, "The student organization (FFA) complements a technical education by offering co-curricular activities and opportunities for students to assess their skill development" (p. 114). Currently, the National FFA Organization offers 24 individual and team CDEs, with three-fifths of the entire FFA membership participating in CDEs at some level (National FFA Organization 2014; Talbert & Balschweid, 2004). Given the national scope of CDEs within school-based agricultural education (SBAE) and the number of student participants purported to build both career and problem solving skills via CDE participation, research is needed to investigate what strategies teachers use to help students become successful within CDEs.

A number of studies have been conducted on CDEs within agricultural education. This empirical body of work has extended from outlining the purpose of CDEs (Phipps, Osborne, Dyer, & Ball, 2008; National FFA Organization 2014; Talbert & Balschweid, 2004; Marx, Simonsen, & Kitchel, 2008; Russell, Robinson, & Kelsey, 2009), resources utilized by teachers/coaches (Murphy, Miller, & Roberts, 2009; Harris, 2008; Poskey, Igo, & Waliczek, 2003), motivators for students to compete in CDEs (Russell, Robinson, & Kelsey, 2009), teacher stress related to coaching CDEs (King, Rucker, & Duncan, 2013), and professional development needs for teachers regarding CDE preparation (Torres, Ulmer, & Aschenbrener, 2008; Harris, 2008). Current research most directly related to the student outcomes associated with CDEs indicates students who participate in CDEs develop career related confidence (Marx et al., 2008), and teachers motivate students to participate due to the perceived benefits of life skill development as a result of participation (Russell et al., 2009). Given the perceived benefits of participating in CDEs as indicated by the research, it is no wonder that research in CDEs has also indicated a high degree of teacher stress and need for teacher professional development in CDE preparation. King et al., (2013) determined CDEs are one of the top five stressors for female agricultural educators in the southeast region of the United States. Further, experienced teachers spend more time on CDE preparation than first year teachers or student teachers and research indicates that providing time management workshops or professional development could help decrease teacher stress and increase preparation time (Torres et al., 2008). Finally, teachers indicate a very high level of interest in participating in professional development workshops or summer courses related to CDEs (Harris, 2008).

Research on teaching and coaching strategies for CDEs has indicated a number of interesting findings. Teachers are using different forms of technology such as iPods (Murphy et al., 2009), to prepare the students for their specific event, the Internet to gather resources about and gain student interest in CDEs (Harris, 2008; Poskey et al., 2003), and volunteers to help coach CDE teams and broaden student knowledge of CDEs (Seevers & Rosencrans, 2001). Research on CDE coaching has indicated that teams experience more success when teachers consider students learning styles as a part of coaching strategies (Poskey et al., 2003). Four studies have investigated the specific coaching, teaching, or preparation strategies that agriculture teachers utilize to influence student performance in CDEs. First, Russell et al. (2009) determined that teachers use tradition and success of the chapter, opportunities for students to compete, life skill development, opportunities for fun, active recruitment, CDEs integration as strategies for CDE coaching. Bowling & Torres (2010), utilizing a coaching framework from Wooden's Pyramid of Success to clarify specific behaviors for coaching a Floriculture CDE, found the top five coaching behaviors teachers utilized were friendship, confidence, enthusiasm, team spirit, and cooperation. Falk, Masser, & Palmer (2014) investigated the perceived coaching behaviors used for the National Parliamentary Procedure CDE, and determined teachers used positive feedback, social support, training and instruction, and situational consideration (Falk et al., 2014). Finally, Voigt, Talbert, & McKinley (2013) investigated promising coaching practices of dairy, horse, and livestock CDE coaches and determined that coaches tended to utilize strategies associated with: expectations, effective coaching, experience, goals, support, foundational knowledge, positive environment, and youth development. The prior research on CDE coaching indicates that teachers perceive that they utilize specific strategies and techniques when coaching CDE teams. While the studies lend some insight into the fact that coaching and preparation for CDEs happen in purposeful ways, a need exists to identify how that preparation happens, and what specific motivational strategies influence the learning environment within a CDE team.

Purpose and Objectives

The purpose of this intrinsic single-case study was to explore the coaching strategies used related to learning, motivation, and competition within a previously successful environment. This study was guided by the following research questions as they pertain to exemplary CDE teams:

1. How are CDE team members motivated to succeed?
2. What role does competition play within a learning environment?

Theoretical Framework

Given CDE's as an intra-curricular entity, involving both competition and classroom learning a need exists to better understand the impact of coaching behaviors related to competition and motivation on learning. Early research has indicated conflicting findings between competition and classroom learning. Some research indicates competition can stimulate effort and increase some performance based on the task provided (Strong, 1963; Vaughn, 1936). Additionally, competition along with an external reward can foster better performance (Clifford, 1971). Other research indicates competition has little to no effect when coupled with complex problem solving tasks (Clifford, 1972; Clifford, Cleary, and Walster, 1972). According to Creswell (2013) it can be appropriate to identify a theoretical perspective to frame one's thinking in the analytic process. It is important to note, this framework merely *guided and informed but did not dictate* or pre-determine findings, which were emergent. Due to the classroom learning and competitive nature of CDEs, Self-Determination Theory (SDT) as well as literature around extrinsic and intrinsic motivation, provided the theoretical framework for this study.

Russell et al. (2009) found teachers use extrinsic motivation to encourage students to participate in CDEs. They also discussed the need for further research into how intrinsic motivation can be used for CDE participants. Deci & Ryan (2002) utilized the Self-Determination Theory (SDT) to describe how intrinsic and extrinsic factors motivate people. The theory also describes what roles intrinsic and extrinsic motivation plays in developing people both cognitively and socially. "SDT begins by embracing the assumption that all individuals have natural, innate, and constructive tendencies to develop an ever more elaborated and unified sense of self" (p. 5). SDT focuses on the assumption people make connections within themselves and with other people and social groups; and on whether motivated actions are self-determined and controlled internally or if actions are forced by compliance (Deci, Vallerand, Pelletier, & Ryan, 1991). It is important to study CDE coaching from a motivation lens, because research has indicated that the source of motivation, whether internal or external, influences the quality of motivation (Kusurkar, Ten Cate, Vos, Westers, & Croiset, 2012). Further, within sports and coaching, motivation represents one of the most important factors for individual and team success and the use of motivation as a coaching strategy greatly increases outcomes (Vallerand, 2004). Thus, CDEs, as both an intra-curricular and competitive entity could benefit from a theoretical focus in motivation based coaching strategies.

Students who are extrinsically motivated behave based on rewards or expected outcomes. Although extrinsic motivation tends to have external causes, if these causes can be internalized the quality of motivation increases (Ryan & Deci, 2000). Students face many educational tasks in school settings whereby they lack internal interest and enjoyment, and are therefore more extrinsically influenced. The problem with extrinsic motivation is that an individual can perform behaviors or learning tasks with resentment, resistance, and disinterest. Russell et al. (2009) found CDE participants were motivated by rewards and success. Coaches use extrinsic motivation strategies such as verbal communication to encourage, reinforce, and self-regulate players behaviors (Iachini, Amorose, & Anderson-Butcher, 2010). Given the literature base on utilizing extrinsic motivation in both teaching and coaching, and the intra-curricular nature of CDE's as both a teaching and a coaching (competitive) entity, it stands to reason that CDE coaches can utilize extrinsic rewards and extrinsic strategies such as verbal communication and reinforcements to help motivate students to participate in CDEs and to encourage behaviors within CDEs.

Intrinsic motivation is the internal desire to perform a task or behavior for its inherent satisfaction. Students are intrinsically motivated when activities are fun, challenging, or interesting, although not all students will be interested in the same activity and not all activities will interest a particular student. Intrinsic motivation is linked to high quality learning and creativity. Teachers can foster intrinsic motivation through specific autonomy strategies including: identifying and nurturing students needs, letting internal thoughts guide student behavior, encouraging active participation, providing structured guidance, providing challenges, positive, and constructive feedback, providing emotional support, acknowledging students' negative thoughts, communicating value in uninteresting activities, providing choices, and utilizing language such as "can, may, could" (Kusurkar, Croiset, & Ten Cate, 2011). Intrinsic motivation is also widely used in extracurricular activities and sports. Research indicates democratic behaviors displayed by coaches positively affects player autonomy and thus increases intrinsic motivation (Hollembeak & Amorose, 2007). Coaches use the following intrinsic motivation strategies: verbal communication through positive praise and public encouragement (Iachini et al., 2010); constructing scenarios to allow players to hone skills and allow them to fail, for the sake of personal growth; and autonomy strategies to provide players opportunities in games, training, and practice to make personal choices, provide input to their team or captain, or develop personal responsibility. Vallerand (2004) found the use of self-determined motivation or intrinsic motivation by coaches increases player performance.

Research indicates youth are more motivated toward and focused or attentive while participating in extracurricular activities as compared to the standard academically based school activities (Larson & Kleiber, 1993). Students focus better on challenging tasks when they have higher levels of attention and intrinsic motivation (Larson & Kleiber, 1993). Higher levels of attention also lead to prolonged experiences in the same extracurricular activity, which, in turn lead to mastery of the specific task or activity. Over time students adapt to ever challenging activities by adding layers of complexity to the activity (Larson, Ham, & Raffaelli, 1989). Ultimately, students are able to develop initiative to set immediate goals that transfer to motivated, goal setting behaviors in future endeavors (Larson, 2000). Involvement in CDEs could provide students with the same outcomes as other youth development activities (Larson, 2000). For instance, students with high intrinsic motivation and increased level of attention can progress from novice to mastery level learners in one CDE season. Achieving mastery level of a particular CDE content could help students develop initiative and goal setting behaviors for future applications. Thus, if CDE participation can lead to goal directed behaviors and intrinsic motivation, a need exists to further understand what coaching, learning strategies and motivational components lead to successful CDE outcomes.

This study was also analyzed with the theoretical perspective of Schunk's (2004) Model of Motivated Learning in mind. The model is a general model for learning and motivation that indicates pre-task, during-task, and post-task processes that impact motivation within a learning environment. During the pretask phase the focus of motivation surrounds setting goals and expectations and determining values, affects, needs, and social support (p. 331). During the task phase the focus is on instructional variables, contextual variables, and personal variables (p. 331). The posttask phase is a period of self-reflection and focuses on reflecting about the attributions, goals, affects, values, and social support related to the task (p. 331). This model follows the continuous task for preparing CDE teams, thus added to the theoretical perspective of the researchers.

Methods

This study directly aligns with the Agricultural Education's National Research Agenda for 2011-2015. Priority 3: Sufficient Scientific and Professional Workforce that Addresses the

Challenges of the 21st Century, call for, "developing the models, strategies, and tactics that best prepare, promote, and retain new professionals who demonstrate content knowledge, technical competence, moral boundaries, and cultural awareness coupled with communication and interpersonal skills" (Doerfort, 2001, p. 9). This qualitative study was an intrinsic case study (Stake, 1995), which sought to better understand the particular case of students on CDE teams preparing for state competitive events in a school with a previous exemplary track record of winning multiple state and national career development events. Each researcher was formerly an agriculture teacher and FFA advisor, and began the study by acknowledging the multiple realities and potentially contradictory viewpoints associated with their prior experience, and the experiences of the participants.

The case of interest was the Biltmore High FFA chapter, a large, Midwestern, suburban multi-teacher, agriculture program, which was chosen as a purposive sample to best inform researchers about the probability of mastery level learning occurring during CDE involvement (Creswell, 2013). Biltmore High is located in a town with over 110,000 residents and offers over twenty-five courses with traditional animal, plant and mechanics emphasis. The agriculture courses at Biltmore High are stand alone, semester units, with students moving in and out of the program every semester. Some students enter agriculture courses their senior year, with no previous involvement in the agriculture program or FFA. The program maintains a roster of approximately 500 students between two high schools and a career center in courses and approximately 100 students in the FFA program. For this case study, the researchers conducted in-depth interviews and field observations with one of the four teachers who were in the process of preparing several different CDE teams for state-level competition. This particular teacher was selected based on their years of experience, continued success through their years of teaching, and various types of CDE teams they prepare. The teacher prepared four CDEs in the spring after school three nights per week and took students to approximately eight practice CDEs on the weekends. Over the past ten years, the program has accumulated 31 state CDE titles. The researchers investigated CDE preparation methods, events, and experiences to explore the learning process of preparing for CDEs.

Each researcher individually researched a separate CDE team, they separately interviewed six students and the agriculture teacher multiple times from January until May. Each student was interviewed three to five times for a total of 46 student interviews, each lasting 5 to 30 minutes. The agriculture teacher participated in three interviews and the school administrator one interview, each lasting 45 to 60 minutes. The researchers conducted 10, 8, and 23 interviews for all three rounds respectively. All interviews were audio recorded and transcribed verbatim, with 36 hours of field observations typed as logs. Two program documents and an online CDE scoring system were also analyzed. Finally, the researchers conducted reflective observations of the student teams during the state level CDEs.

The researchers utilized the constant comparative method for data analysis (Glaser & Strauss, 1967). The total data analysis process included three rounds of analysis, transforming data into categories, themes, and sub-themes. The researchers began the data analysis process by reading the data sets and identifying emergent themes. The researchers separately analyzed the interviews and observations they conducted, and then collectively analyzed the categories and themes which emerged. The purpose statement guided the open coding phase. This open-coding phase produced seven emergent themes. Two emergent themes were identified for further investigation: learning and motivation. The researchers then constructed two research questions that reflected the emergent themes. Semi-structured interview questions for each of these themes were used during the second set of interviews. Researchers began round two of data analysis after the second round of interviews. The researchers looked for evidence of student learning and student motivation throughout the entire data set. Categories were developed which reflected the emergent themes. Five categories were agreed upon by the researchers and used to formulate questions for round three of interviews. Researchers independently analyzed the full data set and recoded for each category. Representative examples and sub-themes were identified and later agreed upon by the research team, and the resultant findings consisted of two broad themes each with two sub-themes. Trustworthiness was upheld through triangulation of data sources, comparison of emerging themes and subthemes, and maintaining a continuous coding audit trail. Credibility was established through peer debriefing and investigator triangulation at various stages in the research (Lincoln & Guba, 1985).

Results

From the data, two major themes Motivation and Performance Strategies were identified as the ways in which the coaching/learning environment transpired. In addition, the Motivation theme was shaped into two sub-themes (external and internal influences), and the Performance Strategies theme was divided into two sub-themes (coaching and learning strategies).

Theme 1: Motivation

Throughout the course of the CDE season, the use of both external and internal motivation was the key to the success of the teams. At the beginning of the season, external motivators helped to encourage participation and as the season progressed a shift occurred within the CDE team members where more internal determination was driving their actions and learning.

Subtheme 1A: External Influences

Students at Biltmore High School experienced multiple external influences throughout the course of their CDE experience. Many of these external influences were physical rewards students could receive from being successful. One of these rewards only came if the team could achieve the ultimate success, winning a state championship, and thus receiving a state champion jacket. Another external benefit students received, were $1000 scholarships, if the students placed high enough within the state individual rankings. Ann stated, "...there's a lot at stake as far as top three in the state get $1000 (scholarship). If we win state, we get a jacket". Additionally, external influences such as the desire to make the cut of the final four team members (who were allowed to compete at the district and state levels), participating in resume building activities, and being recognized at the annual chapter banquet each motivated students to participate and be successful within their respective CDE teams.

In addition to tangible rewards, students were also motivated to maintain performance during the CDE season by other external motivators. A considerable amount of external motivation came from the people associated with the CDE team including teachers, friends, family, the FFA chapter, and other members of the CDE team. Regarding the people who influenced her Tracy said, "I would say Mr. Hanley (the teacher) and my brother, because Steve won it two years ago and he went to nationals too". Members on the current year’s CDE team were driven to be successful by the desire to outscore or out achieve the prior year’s team. Other team members had siblings on former CDE teams and wanted to out perform them, as well. As the CDE season progressed, members monitored how other teams in the same competitive area were scoring across the state, and this drove them to continually strive to out score those schools. Members of the Biltmore CDE team also compared their individual scores to the other members of their team, to achieve the highest individual score within the team. Thus, it was interesting to note the ways in which these winning CDE teams were motivated by the human external forces. Namely, trying to out-perform another school, a sibling, the past year's team within the same school, or even individuals on the same team, students preparing for competition on these highly successful CDE teams kept past performances in mind.

It was clear from the interview data, that Mr. Handley played an integral role in motivating the team members. Furthermore the types and nature of the motivation he drew upon transformed as the CDE preparation season progressed. For example during the early practices, it was observed that he hooked members and got them enthused about the team through more external rewards and factors related to scores, jackets, and winning trophies. Once the teams began experiencing success, and had achieved those external rewards such as district and even state titles, his motivational style progressed to a more internally oriented manner of motivation, as explored in subtheme 1B.

Subtheme 1B: Internal (Personal) Determination

As the students progressed through the CDE season and became more comfortable with the content, the interview data reflected a shift in their sources of and strategies for motivation. The teacher focused less on the external motivating factors, and began developing students' internal motivation. During this process, the teacher and team members focused on rewards, but more on rewards that could be internalized by each member. Some of these internal rewards consisted of developing their abilities to try something new, interacting with new people, forging new friendships, and developing expertise in the CDE content. Kasey said, "Like everybody might have that background knowledge, but when you take one of these teams, that's when you become an expert on these topics". Pride, accomplishment, glory, ego, and personal growth were other internal rewards that developed within each student individually as the team became more successful. To be true to the core values of CDEs, members of CDE team saw internal rewards related to their career interests including: developing science related knowledge, gaining practical knowledge for everyday life, increasing job potential, and developing skills connected directly to future career goals. Kasey stated, "I knew I wanted to do something kind of involved in Ag, but I didn't quite know what. And I knew I liked being creative, and [the CDE content area] fits that".

For CDE teams to be successful individual team members must devote a focused and sustained effort for study and practice time. Through the interviews and observations it was noted that the Biltmore teacher developed that internal motivation within all team members to dedicate time outside of practice or class to develop their skills. Ann discussed why she studied outside of practice, "...because I want to be successful on the team and I know if I do this I will...". Mr. Handley was also able to motivate students by creating a fun, yet challenging team centered environment. Kasey said, "You learn an overwhelming amount of information, but its such a fun way that you don't even realize it's happening." He also sought out students who were already highly motivated and driven to succeed. These highly motivated and driven individuals helped to push and motivate the other members to work just as hard as the rest of the group. In that manner peer motivation enhanced the internal motivation of students to sustain goal-driven behaviors.

Theme 2: Performance Strategies

In regard to performance strategies interview data revealed the successful Mr. Handley employed coaching and learning strategies to influence the performance of his CDE teams. These not only included developing learning strategies for all members of the team, but also using the competitive environment to increase performance.

Subtheme 2A: Coaching Strategies

It was revealed from the findings from these highly successful CDE teams, that strategic planning and development was a critical element of creating a competitive environment and competitive team members. This finding was parallel to the many strategies that coaches in the athletic professions utilize, and was reflected in a team member's comment. Ann said regarding the feel of CDEs, "In contests, it's equivalent to sports in the FFA world". To create a competitive environment Mr. Handley recruited more than four members for each team and then reduced the number down to four before the district contest. The members who were recruited all had previous sports experience and/or other competitive experiences. In short, his strategy was to recruit highly competitive individuals to the team in the first place, and to recruit more members than the final group so that much like with a sports team, the highest performers were competing. Mr. Handley also developed focused and engaged practices, was serious when needed, and dedicated much of his time to preparing and running CDE practices. Carrie said, "I like that it's very focused and serious. We joke and goof around, but it's very central and you learn this stuff. You go away knowing more than when you came." Even though practice was focused and serious, a non-stressful environment was created for CDE members to fail and not be ridiculed. Although members were not ridiculed, the coach pointed out when students were not working hard or studying outside of practice. Mr. Handley also focused on having the students create individual and team goals for the season. Finally, he had a specific strategy for completing the contest, and he taught his students this strategy explicitly. Ann said, "...he said a few times that you don't need to rush, but he's not 'be the last one done' type of deal. He always says, "*You have plenty of time*". Mr. Handley entered a "Contest Zone", when working with his CDE teams. The team members discussed how his strategies would shift and he would become more focused and driven during the course of the CDE season. Successful teams and their coaches have a game plan, and it was clear from the findings of this case, that Mr. Handley had a very clear and explicit game plan for success as illustrated in the way he ran practices, the nature of the content he delivered, and even in how he encouraged individual team member development.

Although strategy was very important to competition, creating relationships with CDE members was just as important to Mr. Handley. To develop these relationships he showed he cared about the members, about their success during the CDE season, about their success after they leave high school, and about the total school-based agriculture program. Ann said, "He cares a lot about the Ag program and about your success as a student and about preparing you for the real world". The environment was a comfortable and caring one, where personal connections between the teacher and team members were fostered. Through this comfortable environment students developed feelings of mutual pride, respect, and confidence. Even though cutting the team down to only four members was a strategic move, Mr. Handley emphasized a team effort and after the cuts were made the team members became closer. Ann said, "We are a team now, we are not competing against each other, we are competing together and so your team is only as good as your weakest player".

Subtheme 2B: Learning Strategies

Though competition can become of the focus of CDE teams, the learning experience of the students was a key component of the performance strategies noted for teaching and coaching this highly successful CDE team. At the beginning of the CDE season the locus of control for the team practice was through the teacher himself. He centered the team around him to shape the learning environment. He directed the learning, so in order to transfer his extremely high content knowledge to the novice team members. Even though Mr. Handley was an expert in the subject, he was able to make the details and thinking behind the concepts visible to the novice students. Kasey stated regarding Mr. Hanley's expert knowledge, "He really helps you look at the smaller details to everything and helps you break it down and narrow it down to what the plant would actually be or what anything would actually be". He also developed connections among different concepts, related these concepts to real life, and then related them to the students through the content. Mr. Handley utilized a wide range of learning and teaching strategies to help transform students as more experts in their knowledge of the subject matter. As students made this transition he noted these changes, and made changes to his teaching and coaching methods including shifting to more repetition and review. The data revealed a number of ways he shifted the locus to internal motivation and a student-driven learning environment. Mr. Handley encouraged team members to work and learn together. Team members relied on each other, to help either catch students up who were not able to make a practice or during extra practice time when he was not available. Ann stated regarding teaching another member of the team:

> Like we'll bring the bucket in here, and I'll just repeat what Mr. Hanley had said and give her my notes. So that's kind of more practice for her, just going through the twigs one more time. You can only memorize so many things, but once you have it in front of you, you start to adapt and remember what the twig looks like.

The teams also prepared for the competitions together, in something similar to a cooperative learning environment. Much of the learning responsibilities were placed on the team members toward the end of the season, although Mr. Handley did check in with the team the night before the state competition. It was interesting to note that even though the team members felt competent enough about the CDE content to teach each other and even after they won the state CDE competition, all team members still did not feel like experts. Ann stated:

> I think there is always more that you can learn and more you can remember and I feel like the moment I take a break and that I don't look at, at least one contest or I don't look at, at least one test or at an ID (plant identification) I'll struggle the next test that we do.

The feeling of not being an expert was crucial to ensure the CDE team members would continue to focus on developing their knowledge up to and through the state competition. With this shift in the locus of control, students became more responsible for their learning and more connected to the success they wished to achieve. Finally, they consistently recognized that there was more to learn, never felt entirely "expert" in the process, and thus became continual learners about the CDE content.

Conclusions/Recommendations/Implications

It was concluded that motivation was inherent to coaching and teaching exemplary CDE teams. First, the Biltmore teacher used external motivation to initially encourage students to participate and enhance interest in the CDE content. After students developed a deeper desire to succeed, he shifted to more internal motivation strategies. The use of intrinsic motivation to increase positive outcomes is consistent with previous athletic research (Vallerand, 2004). The shift in motivation from extrinsic to intrinsic is reflective of Self-Determination Theory (Ryan & Deci, 2000). Within this model human motivation tends be begin at the level of amotivation without some external force. Then as one develops motivation, a shift occurs from amotivation to a higher level of external motivation, through more internally driven motivation and finally ends in autonomy.

Even though CDEs are competitive events, it was concluded teaching and learning, in addition to coaching, were major motivators for these CDE teams. One of the primary learning strategies used by Mr. Handley was instruction and the transfer of knowledge. This is consistent with previous CDE coaching literature (Falk et al., 2014 & Voigt et al., 2013) and athletic literature as well (Iachini et al., 2010). Previous studies found both exemplary CDE teachers and athletic coaches utilized instruction as a key coaching strategy. As this transfer of knowledge occurred during the CDE competition season, the teacher shifted the coaching and learning process from a more teacher directed to a more learner directed experience. This transition reflected Schunk's (2004) Model of Motivated Learning. The model for motivated learning is a cognitive model, which focused on the motivation of the learning during pretask, task, and posttask (Schunk, 2004). During the pretask phase the focus of motivation surrounds setting goals and expectations and determining values, affects, needs, and social support (p. 331). During the task phase the focus is on instructional variables, contextual variables, and personal variables (p. 331). The posttask phase is a period of self-reflection and focuses on reflecting about the attributions, goals, affects, values, and social support related to the task (p. 331). As indicated in the model, the pre-task or prior variables to CDE preparation included sibling rivalry, prior CDE successes and reputation, pride, and peer support systems. Once CDE preparation began, the during task variables included teaching, rapport, commitment to team, individualized learning strategies, and student becoming content experts.

In addition to motivation learning strategies, it was further concluded that multiple parallels to coaching strategies shaped this successful CDE team. Initially, the SBAE teacher created a competitive environment for members, where students were competing against one another to earn a spot on the team. As the CDE team formed and began competing with other schools, Mr. Handley shifted to a more cooperative environment. Throughout the CDE preparation process he created focused and engaged practices, had the team and individual members set achievement goals, and established a mutual caring and positive environment. All of those strategies are consistent with previous CDE research on the strategies utilized by CDE coaches (Bowling & Torres, 2010; Voigt et al., 2013).

Finally, it was also concluded, that a combination of approaches and strategies led to the success of the Biltmore CDE teams investigated in this study as articulated via the following conceptual model, CDE Coaching Strategies Model (Figure 1). This conceptual model illustrates the use of motivation and performance strategies through a continuum to prepare a successful CDE team. Within this model motivation and performance strategies work simultaneously to encourage student success. Within the motivation component of the model, the student's motivation can be shaped by external influences, however as the student progresses through the competition process, motivation shifts to more internal influences and drive to succeed. Teachers working with CDE teams can observe where their students are within the external/internal motivation continuum and adjust their teaching and coaching strategy accordingly. Within the performance strategies component of the model, teachers utilize specific strategies for performing the tasks related to mastering the CDE or it's content. Through this process, as students are more novice to the content and have less mastery, teachers should be more focused, knowledge driven, and teacher directed. As students master the content, coaches can employ more cooperative, and learner centered strategies for practice sessions.

From these conclusions and implications it is recommended further research be conducted on the behaviors used by this exemplary teacher and CDE coach to see if similar behaviors exist in others using the CDE Coaching Strategies Model as the framework. Research is also needed to examine specific strategies and/or patterns among successful teams across all CDE areas. Previous research focuses either on specific CDE areas and/or specific teacher perceptions, yet little is known about whether such strategies are content and context specific or if they can be translated to working with CDE teams in general. Research studies should also investigate student variables, which could contribute to CDE success. Finally, studies should be conducted to more clearly articulate the intersection of student and teaching and/or coaching variables to CDE team success. In other words, how much of CDE team success relies on students or on the teacher's ability to use motivation and performance strategies? Findings from current and future CDE coaching studies can inform SBAE teacher practices through teacher development workshops on research based teaching and coaching strategies.

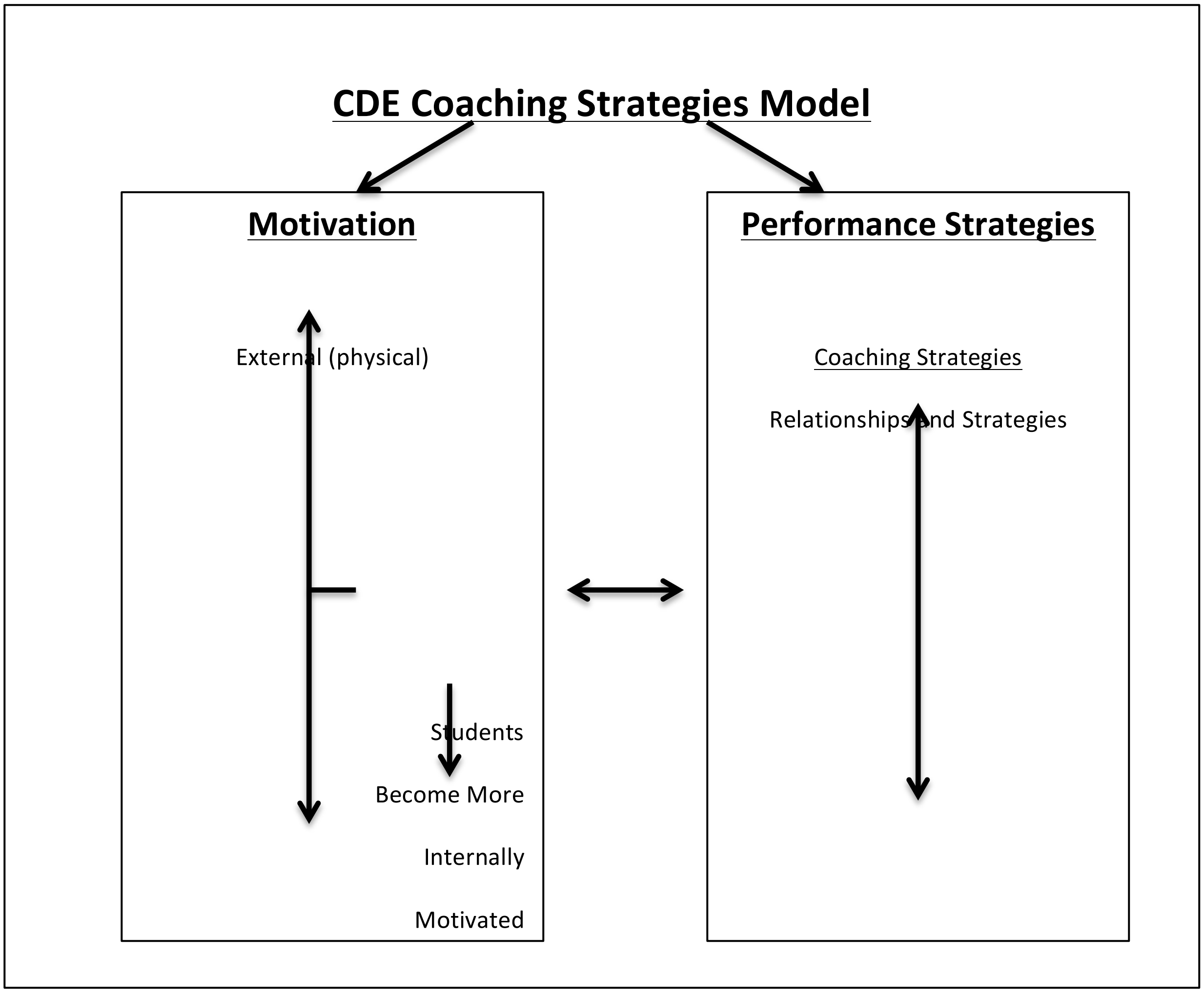

Figure 1. CDE Coaching Strategies Model

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Laboratory Safety Practices of New Mexico Agricultural Science Teachers

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Abstract

To properly assess the application of safety in the agricultural mechanics laboratory, research must be conducted on what safety practices are being used, methods of teaching safety and investigation of safety equipment being used. The purpose of this study was to identify the practices of New Mexico agricultural mechanics teachers for teaching safety and managing a laboratory environment. It was found that at least 30% of all instructional time was devoted to safety. Teachers were found to be the most confidence when administering first aid in an emergency. The most common safety equipment found in the agriculture laboratory was items related to eye protection and fire safety. Safety exams and safety demonstrations were the most used instructional tools for teaching safety. The highest level of importance was placed on teaching eye safety and power tool use. The least was put on making safety posters and safety inspections. Teacher felt the most prepared to teach eye safety and the use of welding systems. They felt the least prepared to teach safety laws and develop safety posters. This information is important to the future development of teacher training and in-service which should also be disseminated to campus administrators.

Introduction

Agricultural education and agricultural mechanics teachers have many different types of responsibilities, the most important of which is maintaining laboratory safety. According to previous research, laboratory activities have shown to be a large part of most agricultural education programs (Franklin, 2008; Phipps, Osborne, Dyer & Ball, 2008). In agricultural mechanics labs students are exposed to metal working, wood working, agricultural machinery, chemicals and other processes which could pose serious injury to the students, teachers and other stakeholders. When utilizing such environments teachers have a responsibility to the students and all stakeholders to teach and maintain a high regard for safety of all who enter the learning laboratory. This is not only a moral obligation for the teacher, but also a legal one (Gliem & Hard, 1988).

Construction, one of the largest industries in the world, is also one of the most dangerous industries in the world (Brunette, 2004; Cheng, Lin & Leu, 2010). A thorough understanding of safety practices and what causes accidents is important for those interested in construction and agricultural mechanics to perform tasks safely. These industries are especially dangerous because they are continually changing; use many different resources and many workers lack the appropriate safety training (Schoonover et al, 2010). A 2011 study illustrated that there was a perceived lack of safety culture and occupational risk assessment (ORA) in these industries that future employees (i.e. CTE students) need to be familiar with (Pinto, Nunes & Ribeiro, 2011).

Identifying and cultivating a culture of safety in students early is a key to reducing injuries and accidents (Gillen et al, 2013). A Swedish study 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 (Torner & Pousette, 2009). As Career and Technology Educaiton (CTE) instructors, agriculture science teachers have a unique opportunity to cultivate a climate of safety within their students. This early exposure culture to safety will allow those students entering the construction industry with safety competencies and lead to reduced accidents in the workplace.

Lawver (1992) found that, while teachers were using recommended safety practices, they were not providing them to the extent warranted when working in such a dangerous environment. This is representative of other studies with similar results of teachers' lack of safety training or appropriate laboratory environments (Johnson, Schumacher & Stewart, 1990). The results of the previously mentioned research help to exhibit the likelihood of unsafe conditions for students that must be addressed. Areas where agricultural education laboratories and have been found to be lacking include the posting of appropriate warning signs, conducting safety inspections and working with student's proper use of personal protective equipment (PPE) (Walter, 2002).

To properly assess the application of safety in the agricultural mechanics laboratory, research must be conducted to identify safety practices are being taught and implemented, methods of teaching safety and investigation of safety equipment available to students and teachers (Bear & Hoerner, 1986). Students have been found to be more safety conscious when teachers demonstrated appropriate safety practices and demonstrated an understanding of safety (Harper, 1984). Instructional practices implemented in both the classroom and laboratory settings are partially based on how teachers choose to teach the curriculum content with the resources allocated to them (Knobloch, 2008). Stressing safety and demonstrating proper safety in an educational laboratory is essential (Burris, Robinson & Terry, 2005). Despite the recognized importance of safety, multiple studies have documented unsafe conditions in agricultural mechanics laboratories (Lamb, 1984; Swan, 1992; Dyer & Andreason, 1999, Saucier, Vincent & Anderson, 2011). According to past research, teachers have been shown to teach based on their past experiences and personal beliefs (Borko & Putnam, 1996; Knobloch & Ball, 2003). Shinn (1987) reinforced the point that agricultural mechanics laboratories must be safe and well organized environments for the highest levels of student learning to take place.

Teachers have been found to use multiple forms of teaching methods when it comes to the instruction of safety practices. The most common has been found to be demonstrations, worksheets and videos (Lawver, 1992; Dyer & Andreason, 1999). Teachers were found to place priority teaching of power tools, hand tools and eye protection (Lawver & Fraze, 1995). The personal protective equipment most commonly found in the agricultural education laboratory is industrial quality eye protection, welding hoods and welding gloves (Swan, 1993). While teachers have rated teaching safety as a high priority, their knowledge concerning the management of an agricultural mechanics laboratory has shown to be low.

The majority (85%) of New Mexico agriculture education programs have been found to include an agricultural mechanics component in their courses (Chumbley & Russell, 2011). There has been limited research on the safety and laboratory management practices of New Mexico agricultural mechanics teachers. A recent study on teacher professional development needs (Saucier, Stair & Rosencrans, 2012) concluded that professional development needs were highest for New Mexico agriculture science teachers in the areas of laboratory safety and safety instruction. A review of literature found a similar lack of findings in reference to how safety is taught within these programs (McKim & Saucier, 2011; Saucier et al., 2009). Based on this lack of research it was determined that a need existed to examine the agricultural safety and laboratory management practice of New Mexico teachers. Being able to determine how teachers provide safety instruction and the ways they manage laboratory environments will assist state leaders and teacher educators in providing appropriate training and in-service to their stakeholders. The ultimate benefit from this research will be a safer learning environment for students and others who work with agricultural mechanics programs in the state of New Mexico. Furthermore, this study follows the National Research Agenda, Priority 5: Efficient and Effective Agricultural Programs (Doerfert, 2011).

Theoretical Framework

The theoretical framework for this study was based around the theory of planned behavior (Azjen, 1985), which is an extension of the theory of reasoned action (Fishbein & Azjen, 1975; Azjen & Fishbein, 1980). The theory of reasoned action depicts the psychological process by which attitudes cause behavior (Fishbein, 1967). Both were designed to exhibit the relationship between informational and motivational influences on behavior (Connor & Armitage, 1998). The theory of planned behavior suggests that behavioral intentions can be best viewed as consequences of an individual's attitude. The theory of planned behavior suggests that demographic variables and knowledge influences values and beliefs. These in turn affect attitude, intention, and behavior. The theories impact the study of confidence levels and the factors that influence agriculture teacher success in teaching safety in the agricultural education laboratory. The theory of planned behavior represents behavior as a function of behavioral intentions and perceived behavioral control (PBC) (Azjen, 1991). Motivational factors are considered to be indications of how hard people are willing to try and how much of an effort they are planning to exert in order to perform the behavior.

Teacher confidence is routinely linked to Bandura's concept of self-efficacy. This can be described as a teacher's judgment of their capabilities to organize and execute courses of action required to types of performance (Bandura, 1984). Self-efficacy can enhance or impair performance through their effects on cognitive, affective, or motivational intervening processes. It is important to note that a person's beliefs about their capabilities are not the same as actual ability, but they are closely related. If a person has low efficacy or confidence in a task, then their performance in that task is expected to be low (Bandura, 1997). Conversely, higher ability levels would tend to increase their confidence levels and as a result, their level of performance.

As adapted for this study, these theories suggest that agricultural mechanics teachers past experiences and characteristics influence their decisions to teach specific safety standards in their courses. This may also have an effect on how teachers deliver instruction on these specific topics. By understanding teacher confidence and perceptions of teaching safety researchers will more likely be able to determine how confident there are to successfully implement these concepts into their courses and agriculture programs

Purpose/Objectives

The purpose of this study was to identify the practices of New Mexico agricultural science teachers for teaching safety and managing an agricultural mechanics laboratory environment. The following objectives guided this study:

1. To determine demographic and safety characteristics of New Mexico agricultural science teachers.
2. To identify the instructional methods and materials used by New Mexico agricultural science teachers to teach agricultural safety.
3. To investigate perceptions held by New Mexico agricultural science teachers concerning the importance of agricultural mechanics safety instruction and practices.
4. To determine the availability of selected safety equipment and emergency items in agricultural mechanics laboratories.

Methods/Procedures

The target population for this descriptive study was New Mexico secondary agricultural science teachers who offered an agricultural mechanics component within their programs. A list of teachers was obtained from the New Mexico public education department. Dillman's Tailored Design Method (2007) guided the collection of data and correspondence with sample participants. Identified teachers were asked to complete an online survey through Surveymonkey, an online survey software tool. Those subjects identified as teaching at least one agricultural science course in an agricultural mechanics laboratory ($N = 75$) were contacted. Subjects were contacted up to five times through e-mails from the researcher. There were thirty-eight respondents ($n = 38$) to the survey, giving the researchers a response rate of 51%. Comparison of early and late responders revealed no significant ($p < .05$) difference. Non-response error was not an overt concern due to the descriptive nature of this study. As such, the results are applicable to the respondents and are not overly generalizable to the non-respondents.

The instrument used for this study was one previously employed by Lawver (1992) to assess teachers in Texas. This instrument is a modified version of an original instrument developed by Hoerner and Kessler (1989). The instrument used in this study has been successfully exercised in similar studies of other states. To ensure face and content validity a panel of experts ($N = 9$) consisting of university faculty and agricultural science teachers were consulted. Recommendations to update language in the instrument were considered and integrated into the instrument. A pilot test was used with a similar population to estimate reliability. Cronbach's alpha coefficients were used to measure internal consistency in order to establish reliability. The pilot test data revealed a reliability Cronbach's alpha coefficient of .623. Nunnally (1967) suggested that Cronbach's alpha coefficients of .5-.6 are acceptable in the early stages of research. Reliability of the pre-test and final instruments is reported in Table one.

Table 1
Pilot Test and Final Instrument Reliability Scores

Instrument	Cronbach's Alpha
Pilot Test	.623
Final Instrument	.860

Part one of the instrument focused on demographic information and the safety materials most readily used and available in the agricultural science laboratory. This included information about years of teaching experience, college hours in agricultural mechanics, number of students enrolled in the program, what certifications the teacher had received concerning safety and average number of courses taught. The instrument also sought to identify the number of major and minor accidents that occurred in the agricultural mechanics laboratory. Injuries in the lab can vary greatly based on the type of work being performed and environment. Major injuries were characterized as injuries that resulted in a student not being able to effectively perform laboratory duties for more than one day after the injury. Examples provided to teachers included second degree burns, concussions, major falls and broken bones. The researcher felt this was important as employers with 10 or more employees are required by the Occupational Safety and Health Administration (OSHA) to report similar information.

The second section solicited responses concerning most commonly used safety practice and instructional methods utilized for teaching safety. This included questions concerning availability of personal protective equipment (PPE), equipment storage, instructional strategies used, instructional materials most often used, and other questions related to safety in the agricultural mechanics laboratory. This section of the survey concluded with questions pertaining to teacher's perceptions of safety in the agricultural mechanics laboratory.

Findings

Objective One: The first objective sought to determine demographic characteristics of the agricultural education programs and teachers who were teaching agricultural mechanics classes. The average respondent had 10.5 years of teaching experience. The most novice teacher had taught for one semester while the most senior teacher had taught for 31 years. The average teacher had received a minimum of 12 hours of college-level agricultural mechanics coursework and had been enrolled in a shop type class in high school. All teachers had at least three hours of post-secondary agricultural mechanics courses. Teachers maintained liability insurance ranging in amounts from no insurance up to $1 million. All programs surveyed were found to have an agricultural mechanics laboratory with an average size found to be between 1,000-2,000 square feet. Some other characteristics of the programs sampled are found in table two.

Table 2
Agricultural Mechanics Program Demographics

Characteristic	*M*	*Min*	*Max*
# students in agriculture program	79	9	300
# of agricultural mechanics courses taught	2	1	7
Average class size	13	4	30

The researcher found most teachers (84.2%) were certified in first aid and felt qualified to use it in an emergency (81.6%). The two most common safety certifications teacher's had obtained included the National Center for Construction Education and Research (NCCER) and Occupational Safety & Health Administration (OSHA) safety certifications. Some other safety certifications teachers stated as having included: EMT-B, first responder, defensive driving and a safety certification from the American Welding Society (AWS). Teachers felt "moderately" to "very well prepared" to provide safety instruction in their classes (76.6%). It was found that 71.1% of teachers kept a written report of all accidents in the agricultural mechanics shop. The researcher asked participants to list the average number of major and minor accidents occurrences in the agricultural science laboratory. These findings are found in table three.

Table 3
Average Number of Accidents Found Within the Agricultural Mechanics Laboratory

Type of Accident	*M*	*Min*	*Max*
Major	0.50	0	4
Minor	3.92	0	25

Objective Two: The second objective was to identify instructional methods and materials used for teaching safety in the laboratory environment. Teachers devoted a range of times to safety, with 44.7% of teachers spending less than 1/3 of their time devoted to safety, 42.1% dedicating 30% of their time to instruction of safety topics and 13.1% using ½ the instructional time on safety topics. To teach safety, teachers were found to be split between teaching it as a separate unit (36.8%), integrating safety lessons into each instructional unit (23.7%) or teaching safety equally as a separate unit and integrated within units (39.5%).

Teachers were found to use a variety of different instructional techniques and materials to teaching safety. The most common lessons were demonstrations lessons with power tools (92%) and hand tools (92%) as well as assessments on laboratory safety exams (92%). Less than 30% of the teachers taught students how to set up cleaning schedules or designate clean up foremen. When asked what materials they use to teach safety to their students, respondents were most likely to take advantage of hands-on safety materials (89.5%), worksheets (78.9%), videos (78.9%) and computer programs (50%). Other instructional materials included transparencies, IMS safety sheets and textbooks.

Objective Three: Participants were asked to rank the importance of various agricultural safety instructional topics or practices. Value of each topic was measured on a likert-type scale ranging from 1-5. Participants felt using eye protection was the most important topic. They felt teaching students hoe to develop safety posters was the least important topic. The values were rated from five “much importance” to one “little importance”. Table four presents a rank order listing of the most important and least important topics identified by the teachers.

Table 4
Teachers' Perceptions of Importance of Safety Topics

Safety Topic	*M*	*SD*
Using Industrial Quality Eye Protection	4.68	0.66
Electrical Safety	4.57	0.69
Power Tool Safety	4.32	1.02
Administration of Safety Exams	4.24	0.82
Welding Exhaust Systems	4.13	1.12
Hand Tool Safety	3.82	1.18
Using Accident Report Forms	3.82	1.16
Laboratory Safety Inspections	3.76	0.94
Developing Safety Posters	2.87	0.99

Responding teachers were asked to rate how well prepared they were to provide safety instruction related to various instructional topics. They responded on five point scale with 5 being “very well prepared” to 1 being “poorly prepared”. Respondents felt the best prepared to teach nt eh proper use of industrial quality eye protection. They felt the least prepared to teach students the state safety laws regarding agricultural mechanics. Teacher’s preparedness to teach various safety topics is listed in ranked in order within table five.

Table 5
Agricultural Education Teachers' Preparedness to Provide Safety Instruction.

Safety Topic	*M*	*SD*
Using Industrial Quality Eye Protection	4.05	0.98
Welding Exhaust Systems	3.74	1.33
Electrical Safety	3.71	1.06
Setting Clean up Schedules	3.47	1.06
Accident Report Forms	3.39	1.03
Color coding shop equipment	3.16	1.20
Administering Safety Laws	2.92	1.15
Developing Safety Posters	2.79	1.04
Understanding State Safety Laws	2.79	1.04

Objective Four: To aid teachers in demonstrating safety they must have the appropriate materials. The goal of the fourth objective was to determine the availability of selected safety equipment and emergency items in the agricultural mechanics laboratory. The most common safety materials and practices involved the use of fire extinguishers, industrial quality eye protection, welding gloves, properly marked exits, fire alarms and eye wash stations. Safety posters, respirators and hard hats were the least common safety materials found in the agricultural mechanics laboratories. Table six identifies the most prevalent safety equipment found in the agricultural mechanics laboratory.

Table 6
Safety Equipment Used in the Agricultural Education Laboratory.

Safety Practices	%	*f*
Fire extinguishers	97.4	37
Industrial quality eye protection	94.7	36
Welding gloves	94.7	36
Exits marked	92.1	35
Safety cabinets for flammable liquids	86.8	33
Fire alarm	81.6	31
Welding exhaust system	81.6	31
Eye wash station	73.7	28
Fire blanket	73.7	28
Hearing protection	73.7	28
Screens/curtains on welding booths	73.7	28
Shop coat or overalls	71.1	27
Welding apron or jacket	63.2	24
Safety guards on all equipment	60.5	23
Marked safety zones	50.0	19
Eye protection regulations posted	47.4	18
Safety posters near power tools	44.7	17
Respirators	31.6	12
Hard hats	26.3	10

Teachers were also asked to respond to the use of eye protection in their educational laboratories. Spectacles with side shields and full face shields were the most common types of eye protection found in the laboratory environment. Most teachers were found to provide eye protection to the students at no cost. The types of eye protection most often found in the agricultural mechanics lab and how teachers managed their use are listed in table seven.

Table 7
Eye Protection Uses in the Agricultural Education Laboratory.

Eye Protection Uses	%	*f*
Most Common Types Used		
Spectacle with side shields	89.5	34
Full face shields	84.2	32
Goggles	76.3	29
Spectacles without side shields	39.5	15
Ways Eye Protection Provided		
Furnished at no cost to student	78.9	30
Students furnish their own	13.2	5
Furnished for a rental fee	7.9	3

Conclusions

The average agricultural mechanics teacher in New Mexico has over ten years teaching experience with 12 hours of college coursework in college agricultural mechanics courses. The majority of these teachers taught at least two courses with a mechanics component with an average size of 13 students. Most teachers in the state are certified in first aid and feel confident to use it in an emergency. The most common safety certifications teachers had were through the NCCER or OSHA. Most teachers felt "moderately" to "well prepared" to teach safety and kept accident reports on file. This is information is important as it represents the dedication to safety agricultural education teachers in New Mexico have.

Respondents were found to spend at least a third of their instructional time teaching safety. Most commonly these safety lessons were being equally taught as a separate unit and integrated within other units (i.e.; teaching power tool safety while teaching tool identification). This is important as it shows teacher were continually reinforcing the safety practices learned throughout the school year. This instruction was primarily provided in the form of worksheets, safety exams and demonstrations. According to the Theory of Planned Behavior, behavioral intentions can be best viewed as consequences of an individual's attitude (Azjen, 1991). In this situation, this attitude can potentially be linked to the teachers' confidence levels in teaching safety.

An agricultural mechanics class deals with a variety of topics that all require some type of specific safety component. Participants felt the most confident to provide safety instruction on the use of eye protection, welding exhaust systems and electrical safety. On the other hand, they felt the least prepared to provide instruction on developing safety posters and state laws surrounding safety. According to Bandura's Self-Efficacy Theory, a person's beliefs about their capabilities are not the same as actual ability, but they are closely related. If low efficacy or confidence is present in a teacher when performing a task, then their ability to perform said task is expected to be low (Bandura, 1997). These findings imply that teachers may not be placing emphasis on certain safety topics do to their lack of knowledge and self-efficacy in those topic areas. It can be inferred that teachers simply didn't want need to put much time into the development of safety posters, as this is a common thing that can be purchased for the laboratory.

Teachers felt the most important safety topics were eye protection, safety exams and electrical safety. These findings are consistent with Swan (1993). They felt the use of accident report forms and safety inspections were the least important skills to teach. We felt it was important, as mentioned in the literature review, to develop a culture of safety and continuous occupational risk assessment when teaching students who may pursue a career in the construction industry. To better understand why teachers place emphasis on certain areas and not on others, the researchers recommend further research be done assessing the teachers' self-efficacy levels in reference to their safety knowledge.

Teachers were found to be lacking in their knowledge of state laws and the implementation of important safety procedures. This is reflective of similar findings by Dyer and Andreason (1999). Teachers should be encouraged to incorporate clean up schedules and safety inspections into their courses. State leaders and teacher trainers are encouraged to solicit "buy in" from teachers for these safety practices. One way to accomplish this is to include these subjects in undergraduate or graduate agriculture education and agricultural mechanics courses. This brings up the question as to whether teachers focused on those areas in which they had focused on during their training? Teachers should encourage new teachers to implement lessons involving the understanding and application of state laws into their courses. This can be accomplished by having agricultural mechanics specific meetings during state teacher in-service by state safety professionals.

The most common safety items found in the agricultural science laboratory were fire extinguishers, industrial quality eye protection, welding gloves, properly marked exits and chemical storage cabinets. Teachers indicated that full face shields or spectacles with side shields were the preferred eye protection. Personal protective equipment, specifically safety spectacles, were commonly provided to the student at no cost. The least common safety items were eye protection regulations, safety posters, respirators or hard hats. Teacher's perceived self-efficacy in developing safety posters was low which, according to Bandura, may have an effect on teacher's not developing safety posters for their educational laboratories.

Recommendations

The researcher felt there were several recommendations based on the findings of this study. There needs to be an increase of training for teachers in regards to state laws surrounding safety. To reinforce this instruction state leaders and university supervisors are advised to offer in-service on these specific topics. College agricultural mechanics courses should require student to research safety laws, develop warnings for the lab and practice using accident report forms. An evaluation should be done on agricultural mechanics programs within the state of New Mexico to make sure those specific subjects teachers felt little preparation in are being addressed. Funds should be sought to provide safety posters and regulations to be posted within the educational laboratory. Research should be continued to determine barriers to teachers using recommended safety practices in agricultural mechanics.

Safety instruction within an agricultural science laboratory is an important aspect of any successful program. New laws and increased accountability have placed additional importance on safety standards in the agricultural science learning laboratory. To ensure these measures are met, teachers are required to teach appropriate safety and demonstrate safe work habits. Effective agricultural mechanics teachers should strive to cultivate a safety culture within the classroom and laboratory. School administrators need to take a more active role in making sure students are working in a safe environment. There should be training for administrators within the areas of identifying appropriate safety practices within the agricultural mechanics laboratory. This study can be expanded and used to compare results between states and within teacher groups.

Agricultural mechanics courses continue to be an extremely popular subject. Our students deserve qualified teachers in well-equipped learning laboratories who empower a culture of safety within their courses. The environments need to be ones that encourage real world experiences. These habits must be expected from every student. Requiring everyone who enters the shop to practice safety will make it easier for students to be successful in a harmless learning environment. It is important to recognize that the findings of this study must be limited to those who participated and may not necessarily be reflective of all programs. Nonetheless, the results of this study provide baseline data to understand how and what type of safety practices are being taught in the area of agricultural mechanics laboratories in New Mexico.

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Implementing the edTPA: Perspectives, Challenges, Strengths, and Recommendations for the Future Adoption of edTPA in Agriculture

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Abstract

The edTPA has recently emerged within the past few years as an innovative Teacher Performance Assessment and is currently adopted to some extent in 34 states. Researchers conducted four focus groups with sixteen student teachers during and after completion of the edTPA at North Carolina State University. When asked to articulate about their experience with the edTPA, numerous participants believed edTPA to be nearly overwhelming and confusing. Participants also felt the edTPA did not adequately capture their totality of their student teaching experience especially in regard to FFA, SAE, and community engagement. These stresses and general confusion were not alleviated with assistance from the cooperating teacher. They believed that the edTPA enhanced deep, focused reflection on their teaching practice. Student teachers also believed that the edTPA, while not adequately capturing the totality of the student teaching experience, did serve as a quality assessment of their teaching practice. Student teachers felt confident of their future teaching success as a result of successfully completing the edTPA.

Introduction/Conceptual Framework

Historically, teachers have had little control over the tests that evaluate them (Darling-Hammond, 2012). State teaching standards commonly use evaluation means of traditional pencil-and-paper licensure tests typically focusing on basic skills such as subject matter knowledge and pedagogical knowledge (Guaglianone, Payne, Kinsey, & Chiero, 2009). The Praxis Series tests are currently used in determining which teacher education candidates are qualified to obtain licensure for teaching. These tests are composed of reading, writing, and mathematics sections in the form of essays and multiple-choice questions that evaluate core academic skills for educators (Educational Testing Service, 2015). The Praxis II tests individuals on subject-specific content, but is also in the form of essay and multiple-choice questions.

Darling-Hammond (2012) argues that for decades, teachers' scores on traditional paper-and-pencil tests of basic skills and subject matter, like the Praxis, "haven't been significantly related to classroom effectiveness" (p. 10). Instead, Darling-Hammond (2006) has stressed the implementation and use of authentic assessments, such as teacher performance assessments, "offer more valid measures of teaching knowledge and skill than traditional teacher tests, and they inspire useful changes in programs as they provide rich information about candidate abilities- goals that are critical to an evaluation agenda that both documents and improves teacher education" (p. 121).

Across the country, teacher preparation programs have tried to move away from strict reliance on the more traditional means of determining competent teachers to offer more ‘real world’ teaching assessments that efficiently evaluate teacher performance. Many teacher licensure programs are developing assessment tools for measuring their pre-service teacher candidates’ abilities as well as their own success as teacher educators in adding to those abilities (Darling-Hammond, 2006). A current trend in teacher preparation programs across the country is the implementation of a teacher performance assessment to serve as an authentic measure of teacher skill. Darling-Hammond (2012) states the teacher performance assessment experience is deemed high-stakes and is just like solo teaching when compared to “typical” student teaching which is more about rehearsal of teaching practices rather than assessment of teacher readiness.

The edTPA has recently emerged within the past few years as an innovative Teacher Performance Assessment (TPA). Darling-Hammond (2012) states, “edTPA is designed to examine whether prospective teachers are ready to teach by reviewing candidates’ plans, videotapes of instruction, evidence of student work and learning, and commentary on student work” (p. 12). Teachers’ ability to develop academic language is also examined during assessment, which is in line with new Common Core standards (Darling-Hammond, 2012). The edTPA gathers evidence of teacher candidates’ work in planning, instruction, and assessment to help predict teacher quality. More specifically, edTPA for agricultural education is comprised of three tasks and has fifteen rubrics evaluating these tasks. Task One involves planning, which includes the following: planning for agricultural-related understandings; planning to support varied student learning needs; using knowledge of students to inform teaching and learning; identifying and supporting language demands; and planning assessments to monitor and support student learning. Task Two involves instruction, and includes the use of video clip(s) for evaluating the following: learning environment, engaging students in learning; deepening student learning; subject-specific pedagogy; and analyzing teaching effectiveness. Task Three evaluates assessment and includes the following: analysis of student learning; providing feedback to guide learning; student use of feedback; using assessment to inform instruction; and analysis of student learning.

According to the AACTE website, edTPA is the first standards-based assessment to become available to teacher preparation programs across the country. Currently, 508 teacher preparation programs in 34 states are participating in edTPA (AACTE, American Association of Colleges for Teacher Education, 2014). More specifically, seven states currently have an edTPA policy in place, while the remaining are either taking steps towards implementation or participating in edTPA (AACTE, 2014). States with an edTPA policy in place have statewide policies requiring the completion of a state-approved performance assessment as part of program requirements or for state licensure and/or, state program accreditation (AACTE, 2014).

Research on the use of performance assessments in teacher education has yielded mixed findings as to the benefits on teaching practice. In a study by Okhremtchouk, Seiki, Gilliland, Ateh, Wallace, and Kato (2009), participants indicated the completion of the Performance Assessment for [State] Teachers resulted in much stress and anxiety. Also noted was the negative impact on other university coursework, teaching practices, and personal time. Yet, even with such challenges the participants did recognize the contribution of the performance assessment in increasing their awareness of their instructional considerations and improving practice

(Okhremtchouk et al., 2009). Chung (2008) found teacher candidates were better able to identify and address academic needs, develop lessons with a central focus, and thoroughly assess student learning.

Purpose of the Study

The edTPA was implemented at North Carolina State University in the fall of 2013 and piloted by the first group of agricultural education student teachers in the spring of 2014. Although edTPA is currently being piloted and therefore considered a low-stakes assessment, it is critical to examine the experiences of student teachers during the process of completing the edTPA. The increasing influence of the edTPA on the teacher certification process makes it an important area for research.

The objectives of the research were to examine student teachers'

1. Perspectives of the edTPA,
2. Perceptions of the challenges and barriers of the edTPA,
3. Perceptions of the perceived benefits of the edTPA.
4. Recommendations for future completion of edTPA.

Method/Procedures

In an effort to closely examine the perceptions of the student teaching cohort specific to the completion of the edTPA, the focus group method was deemed to be the most appropriate approach to gather data. According to Morgan (1988), focus groups combine elements of individual interviews and participant observation in groups, which are the two principal means of collecting qualitative data. Focus groups also "provide insight into attitudes, perceptions, and opinions of participants" (Krueger, 1994, p. 19).

This study was conducted using a census sample. Participants of this study included sixteen undergraduate students at North Carolina State University working towards an undergraduate degree in Agricultural Education. Participating students were completing their student teaching experience during the semester in which the edTPA was being piloted. Student teachers were all enrolled in a seminar course, AEE490, taken in their final semester. It was instructed to the student teachers by their AEE490 course instructors the edTPA would count as a percentage of their final grade and was a high-stakes assessment, meaning a passing score on the edTPA was required to pass the course.

At the beginning of the study, the accessible population was sixteen participants, $N = 16$. This population was used for the midterm questionnaire ($n = 16$) and first focus group ($n = 15$) in March. There were only 15 participants in the first focus group because one participant was absent due to illness. It is important to note that the population changed throughout the course of the study due to two participants not completing the edTPA. At the end of the study, the population decreased by two ($N = 14$). The participant absent from the first focus group was not one of the participants that did not complete the student teaching experience. This population was used for the final questionnaire ($n = 14$) and second focus group ($n = 14$) in April. The response rate for the second questionnaire was 93% ($n = 13$).

Prior to the first focus group, the primary researcher met with three other members of the research committee to discuss the facilitation of focus groups and the questions to be used. The guiding questions for the focus groups were agreed upon by the researcher and committee members as well as approved by the Institutional Review Board. Dooley (2007) states most qualitative researchers are guided by a set of basic questions and issues to explore, but deviations may occur in order to capture nuances and emerging trends not previously determined. Krueger (1994) also notes through open-ended questions in a focus group, participants are able to choose the manner in which they respond. The focus group guideline consisted of open-ended questions regarding students' experiences with edTPA in order to gain as much insight as possible.

Focus groups are typically composed of six to ten participants per group (Krueger, 1994; Merriam, 2009). With that recommendation for number of participant in a group, the sample was divided equally between two groups. Once students were in their designated focus groups, they were asked to sign a consent form to ensure confidentiality of information for both the researcher and participants. They were also asked to develop a pseudonym to conceal their identity for the purpose of confidentiality. The focus groups were conducted in the classrooms that the seminar course is held in on North Carolina State University campus to adhere to qualitative research's naturalistic approach. An audio recording device was used to record the duration of the focus groups and field notes were taken throughout the course of the focus groups.

Krueger (1994) states focus groups are conducted in series in order to detect trends and patterns across groups. As such, two focus groups were held. The first focus group (FG1) was held in March briefly after participating student teachers had submitted their completed edTPA. The second focus group (FG2) was held a month after student teachers completed edTPA, during their final student teaching seminar. The focus group recordings were transcribed and analyzed using coding and the constant comparative method (Merriam, 2009). Different pieces of data from the focus groups were color-coded based on similar content. Each different color represented a different word, concept, or idea. These individual pieces of color-coded data were selected and constantly compared with each of the other transcripts until patterns emerged. Once patterns were apparent, these were categorized and developed into themes, also described by Dooley (2007) as "a provisional code or name" (p. 37).

Findings

Objective 1: *Examine student teachers' perspectives of the edTPA.*
The first objective was to examine the perspectives of student teachers specific to the edTPA. Initially students were asked about their general thoughts and experience overall regarding edTPA. The first thoughts that came to mind from participants included, "confusion", "overwhelming", "cringe", and "hectic" (FG1, FG2). One student said edTPA was a "foggy cloud the entire time" (FG2). Another participant expressed she felt like she was getting her national board (FG1). Colin stated, "I felt like I was burnt out before I even started" (FG1).

When asked about their self-efficacy and confidence as a teacher on a scale of 1 to 10 during edTPA, multiple participants reported low levels of less than five. One participant specifically reported, "Nerves about video-taping brought my confidence down" (FG1). Colin noted, "I felt like there was anxiety surrounding [edTPA], like we didn't know what we were getting into" (FG1).

Theme 1: edTPA does not Adequately Capture the Student Teaching Experience

A subtheme identified aside from initial comments regarding edTPA was student teachers felt edTPA did not adequately encompass all aspects of agricultural education. Participants in FG1 described edTPA as very content specific. Colin quoted that when it comes to agricultural education, "I feel like it's not like your every day classroom" (FG1). One participant noted, "It feels like we were only tested on a few specific things that aren't really that important in the grand scheme of things" (FG1). Another participant went into further explanation of how edTPA did not adequately capture her student teaching experience,

> "I think for other education majors, edTPA is more cookie cutter and fits them better. But edTPA didn't know I was at school Monday's and Thursday's until 9 pm doing officer meetings and parliamentary procedure practice. And edTPA didn't know about the fruit sale we had. There are just so many things agriculture education does that edTPA didn't address. It was very content specific, but we do so much more." (FG1)

Objective 2*: Examine student teachers'* perceptions of the challenges and barriers of the edTPA.

The second objective was to determine any challenges and overall barriers edTPA as expressed by participants. Two major themes emerged as the most challenging during the course of student teachers' edTPA experience.

Theme 1: Early Timing of the Due Date for edTPA was Challenging for Student Teachers

The early timing of the edTPA was a major concern for participants during their student teaching experience. Given the difference in schedules for universities and public high schools, the beginning of the semester began at different times, with universities beginning a new semester three weeks prior to public high schools. One participant noted, "For the first three weeks we are [in the high school], we aren't teaching since they are finishing up their semester" (FG1). Other students in FG1 also expressed the issue with semester timing,

> "I found it hard that it was due so early. One, because it was due at the beginning of our teaching so we were getting used to everything anyways." (FG1)
>
> "Seems like edTPA is better suited for those teaching in the fall due to time trade-off." (FG1)
>
> "Timing was terrible. I was frustrated with the video, not comfortable with my teaching yet, and not enough time to implement everything." (FG1)

A subtheme that emerged from the timing of edTPA was the issue of timing in course sequence and course content. Aside from the general timing of edTPA at the beginning of the university semester and the early due date, participants expressed the timing affected the topic selected for their learning segment. Many student teachers felt it was challenging to choose higher order thinking topics that edTPA required so early in the semester. In reference to course content, simply stated by Alice, “Because of timing, it was out of sequence” (FG1). Many students felt it was difficult choosing a topic due to semester timing. One student expressed, “I had a hard time picking a topic because it was so early in the semester that we should be teaching basics like FFA, SAE, and stuff like that before getting into our topic” (FG1). Another student stated, “It’s difficult having to pick higher level thinking like what [edTPA] wanted without having to put any of the lower level stuff in there because all my kids had never had any animal science before” (FG1). Alejandro, Alan, and Tristan followed up by saying,

> “I couldn’t jump too far into my animal science curriculum, because I hadn’t got that base knowledge and terminology that I would be using throughout the curriculum.” (FG1)
>
> “I had a lot of freshman so it took a little longer to plan and get that base knowledge.” (FG1)
>
> “That’s going to be our biggest hurdle, um, trying to fit in something that has higher order thinking that you didn’t have to wait until the end of the semester to build that base knowledge up to.” (FG1)

To summarize, one student stated that in regards to edTPA requirements, it was “strange having to get kids to the level you want to see, but not having the time to do it” (FG1).

Theme 2: Incorporating Academic Language into both Agricultural Education Instruction and the edTPA Portfolio was Challenging.

Another major barrier to edTPA was the inclusion of academic language in both the handbook and the edTPA scoring rubrics. Additionally, student teachers were expected to help their students learn and use the academic language of agricultural education. Alejandro stated, “[edTPA] seemed to have been written by nuclear engineers, it could have been much simpler written” (FG1). Similar to Alejandro’s statement, Alice said, “I would have liked more clear explanations than just a number and some really detailed, fancy words” (FG1). Many students felt that edTPA was testing them on how well they could perform with reading and writing, as clearly expressed by one student,

> “I felt like I was being tested on how well I could read and write because some of those prompts I had to look up the words. I didn’t feel that I could do my best when I didn’t understand what it was asking me.” (FG1)

Other students felt that their work was repetitive due to the repetitive nature of the prompts, adding to the complexity of edTPA (FG1, FG2). Tristan stated, “[edTPA] was too much information- instruction overload. Between the handbook, rubrics, commentary prompts, it was almost like, ‘OK, which one do I need to pay more attention to?’” (FG1).

Many participants when asked how they would have liked additional help on edTPA responded with help regarding edTPA language. Participants wanted to have more examples, a more simplified version of the rubrics, and a more thorough explanation of the commentary prompts.

Theme 3: Lack of Cooperating Teacher Support in Completing the edTPA.

A third theme that emerged during the course of this study was the lack of support provided by cooperating teachers (CT) during the edTPA experience. Since 2014 represented the initial pilot year of edTPA implementation at North Carolina State University, cooperating teachers were learning about edTPA along side of student teachers. Some cooperating teachers had been through the National Board for Professional Teaching Standards certification process, so understood the task before student teachers. Still as a primary mentoring figure in student teachers' lives, cooperating teachers were expected to assist with the edTPA, at least from the perspective of the student teachers. When asked during FG1 what advice could be given to students in future semesters, Alice responded,

> "CT assistance. How can the university support our CTs and give them a little snapshot of this process. Providing support for CTs and progress monitoring. I wish mine knew more about what I had to do." (FG1)

Another student recommended, "[teacher education faculty] should give CTs a heads-up in the fall so they are prepared and aware. Prepare the CTs for it. Mine was like, I don't know if I ever want to have a student teacher again after this" (FG2). One participant noted the added assistance provided by a CT who had navigated the process for national board certification,

> "My CT was national board certified, so that helped me out a lot. If I needed help on something, she would know exactly what they wanted. She made the biggest difference in my edTPA experience." (FG2)

Objective 3*: Examine Student Teachers'* Perceptions of the perceived benefits of the edTPA.

Although there were many challenges of edTPA expressed, such as timing and academic language, student teachers also highlighted many benefits perceived of the edTPA experience.

Theme 1: Reflection on Teaching was Enhanced via the edTPA.

Many student teachers felt the assessment was a good reflection tool that helped with the identification of teaching strengths and weaknesses. The researcher asked students to evaluate their self-efficacy on a scale of 1 to 10 before and after their edTPA experience. Colin expressed, " I thought I was teaching at a 6 or 7, but after looking at the prompts for the self-reflection, edTPA did show me a lot of what I wasn't doing, so more like a 3 or 4" (FG1). Another student expanded on Colin's comment by noting, "Yeah, it did do a good job of showing me, 'Oh, I need to ask more questions,' so it was a good reflection tool" (FG1). When asked about one thing from edTPA to take back into teaching practice, one student noted, "I think it helped a lot on reflection, looking at what I did and what I could do better next time" (FG1).

Apart from edTPA as an overall reflection tool, a subtheme that emerged was many participants viewed the video component to be the most beneficial contributor to reflection on teaching. One student stated, "I think I'll videotape myself every semester over the years and see how I improve" (FG2). In regards to the video portion, Cathy, Tristan, and Evelyn all stated how the video served as a beneficial aspect of edTPA,

> "Looking back at it, I think that the videos were good because I learned a lot from watching my video and seeing myself teach because, I mean, you don't realize you're doing stuff in the classroom." (FG2)
>
> "I felt like that was one of the key parts of the video--to see how we gave feedback and actually witness that instead of us writing about it, like it gives you a better evidence of that skill." (FG1)
>
> "I think that, no matter what the format is, student teachers and teachers should always have to film themselves and look at themselves--like that was actually my favorite part." (FG1)

In fact, when asked if students could change one thing about edTPA, a couple participants replied they would have liked more visual evidence. One student expressed, "I would have liked a little more video evidence so it wouldn't rely on how well you can type" (FG2). Both Tristan and Alejandro stated,

> "If I were to change one thing about the edTPA, I would maybe have more visual evidence and not so much of the commentary with prompts, because I feel like people that can be great teachers, maybe can't write it out as well, and that seemed to be the bulk of the assessment, was how well I can write and explain what I did, and not necessarily how well I did what I did." (FG1)
>
> "I feel like more visual evidence, more evidence of the hands on activities, more evidence of the hands on assessment I gave rather than limiting those to three caveat pages. I feel like that's a better assessment of how I'm performing in the classroom rather than can I research some theories, can I put it all on paper. I think visual evidence is where we should be graded at, rather than what we could say we did." (FG1)

Theme 2: edTPA served as a Quality Assessment of Teaching Practice

Another theme that emerged as a benefit was the edTPA served as a good assessment of participants' own teaching practices. Mark noted, "[a]side from the confusing language, [edTPA] does accomplish what we learned and it is a good assessment, it's just poorly put together" (FG1). Tristan and Lyza Jane both expressed,

> "I really felt like edTPA was a great assessment tool because it does incorporate so many, um, areas. It's got a section that can evaluate how well you plan, how well you work, how well you assess your students with physical or academic challenges. I felt like it did a good job of assessing our rapport." (FG1)
>
> "I felt it is a good assessment of our teaching, not only with what we can do in the classroom, but how we prepare for teaching and the way that we evaluate students. I know that I can give a much better assessment now since I've completed edTPA." (FG2)

Theme 3: Student Teachers felt Confident of Future Teaching Success as a Result of Successful edTPA Completion

One major benefit of edTPA was increased overall preparation and confidence for future teaching practice. Mark noted, “The overall picture of [edTPA] encompassed everything we have learned, from planning to implementing instruction, evaluating and assessment, so it was a good summary” (FG2). Another student followed by saying, “I feel more confident. It all brought what I learned in the past two years together” (FG2).

Other than the benefits of reflection and assessment, many participants felt that overall edTPA would assist future teaching practices, specifically in getting a teaching job and potential national board certification. Many participants expressed that edTPA will be helpful with future jobs as a teacher,

> “I used my lesson plans and materials, assessments, in my portfolio.” (FG2)
>
> “Lessons to take for the future, for example, in interviews and future teaching.” (FG2)
>
> “Employers might think we are better qualified for a job. If they see something with such extent and reflection, it might look better. Helps in the long run, seeing everything you’re expected to do and look at.” (FG2)

Students also expressed that the edTPA experience was a good precursor to the National Board Certification. One student stated, “I think [edTPA] will help me complete the national board” (FG2). Another student further emphasized this,

> “It definitely got you talking about or practicing how to write about education and being in a professional literacy manner about what you did and everything like that because it definitely mirrors the national boards.” (FG2)

Objective 4*: Examine student teachers’* recommendations for future completion of edTPA.

At the end of each focus group, participants were asked if they had any advice or recommendations for future student teachers completing edTPA. A common theme that emerged was that in regards to edTPA timing, participants would have like earlier exposure. One participant suggested, “Do we start it is a freshman or do we just learn about it. Learning more step by step about it. Lead into it, but don’t actually do it” (FG2). Another student followed this comment by saying, “That’s what I envision, so by the time you actually have to complete it, it’s like second nature” (FG2). Others suggested edTPA be a multi-year project. Alejandro mentioned in FG1, “have it be a two-year project,” while another student stated,

> “A lot of the components of edTPA incorporate things we have been doing as a freshman… the biggest thing I would say that would help me would be to kind of adapt it like a senior project you had to do in high school, kind of start it as a freshman.” (FG1)

Conclusions/Implications/Recommendations

When asked to articulate about their experience with the edTPA, numerous participants believed edTPA to be nearly overwhelming and confusing. Participants also felt the edTPA did not adequately capture their totality of their student teaching experience especially in regard to FFA, SAE, and community engagement. These student teachers expressed stress of completing the edTPA by the midpoint of their student teaching semester. Part of the confusion stemmed from the difficult language of the edTPA documents and the challenge of incorporating academic language into classroom instruction. These stresses and general confusion were not alleviated with assistance from the cooperating teacher.

Embedded within these areas of challenge and confusion are several implications for teacher educators. First, teacher educators using the edTPA must understand the components and purpose of the edTPA. They may want to incorporate components of edTPA into early teacher preparation courses. While not teaching to the test, certainly exposure to the kinds of tasks and reflections in the edTPA would alleviate student anxiety and confusion. Finally, the edTPA should be used to assess only those components of teacher preparation for which the instrument was designed: classroom instruction. Teacher educators in agriculture must continue to seek effective methods of assessing student teachers' knowledge and skill in the realms of FFA, SAE, and community engagement.

Even though student teachers cited several negative aspects of the edTPA portfolio assessment, they did express several positives. They believed that the edTPA enhanced deep, focused reflection on their teaching practice. Reflection on teaching practices, especially reflection on specific components of teaching practices like assessment, individualized education plans, and academic language, may be challenging to incorporate into the daily routine of a practicing teacher. Because teacher education faculty required that the edTPA be completed near the midpoint of the student teaching semester, student teachers were forced to reflect on their early teaching practice deeply and frequently.

From a developmental standpoint, there was likely benefit to this deep, frequent reflection early in student teaching. Teacher educators may want to consider structuring the student teaching semester so that the edTPA is due relatively early in the semester. This may allow students the opportunity for deep, focused reflection on teaching at a time when they may only be teaching a partial load. And, this type of focused reflection may help uncover effective teaching practices that can be promulgated or it may expose incorrect or ineffective teaching before it becomes routine.

The focus of the reflection on teaching practice that is embedded in the edTPA could comprise an entire line of research. How are effective teaching practices uncovered through completion of the task commentaries in edTPA? What is the impact of this reflection on forming a reflective practitioner? Do student teachers continue to reflect on specific teaching aspects, like individualized instruction, academic language, and learning assessment, after the edTPA is submitted?

Student teachers also believed that the edTPA, while not adequately capturing the totality of the student teaching experience, did serve as a quality assessment of their teaching practice. Certainly, these student teachers realized that the edTPA did not take into account important aspects of agricultural education, like FFA, SAE, and community involvement. Still, most student teachers realized that the edTPA did encompass sufficient teaching knowledge and skill to serve as a fair representation of their teaching ability.

The implication of this finding is that edTPA appears to have face and content validity from the perspective of student teachers in agriculture. So, while arduous and time-consuming, edTPA appears to have validation from student teachers in agriculture. Teacher educators in agriculture can feel comfortable helping their students successfully navigate edTPA and stand behind it as a valid assessment of initial teaching knowledge and skill.

From a research perspective, one could imagine a line of research that delves into how to structure the edTPA so that it could encompass FFA, SAE, and community engagement for student teachers of agriculture. What would the FFA, SAE, and community components look like? What artifacts would student teachers submit to prove their knowledge and skills in these areas? What prompts would be included in the FFA, SAE, and community engagement commentaries? What would comprise the scoring rubrics for each component?

Finally, student teachers felt confident of their future teaching success as a result of successfully completing the edTPA. Perhaps the fact that student teachers completed a difficult, time-consuming task like composing the edTPA portfolio gave them confidence in their teaching ability.

Teacher educators must understand that they will necessarily assist student teachers in understanding the components of the edTPA, just as they must engage and encourage student teachers in completing the assignment. Teacher educators may have the confidence that successful completion of this task measures student teachers knowledge and skill such that it also boosts their self-efficacy in teaching. Research should be conducted to determine the source and strength of the confidence, or self-efficacy, in teaching ability that these student teachers expressed. How did the edTPA boost teacher self-efficacy? What about the task influenced these teachers?

While not perfect, the edTPA does appear to challenge student teachers mightily. And, in similar measure, it appears to demonstrate satisfactory face and content validity in regards to initial teaching knowledge and skills. And, perhaps because of the deep, focused reflection and the challenge of climbing the edTPA "mountain," student teachers may even be more effective and more confident teachers because of their efforts.

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Examining Student Teachers' Perceptions of the Ease of Completion, Resources to Support, Influence on Student Teaching, and Preparation for Completion of the edTPA in Agriculture at North Carolina State University

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Many states are in the early phases of adopting the edTPA as the student teacher performance assessment gateway to licensure. Student teachers in agriculture at one land-grant university in the initial adoption year of the edTPA were surveyed about their perceptions of the ease of completion of edTPA, sources of assistance and information to assist with that completion, influence of the edTPA on their student teaching practice, and perceptions of preparation in completing the edTPA. Peers, the student teaching coordinator, and the edTPA Agriculture Handbook were the most important resources. As a source of information in completing the edTPA, the evaluation rubrics ranked at the middle of the list of resources. The three task commentaries were the most challenging for student teachers to complete. While the edTPA required much time and effort and did not capture the totality of the student teaching practice, student teachers did find value in completing the portfolio. Student teachers felt that they were least prepared for the Task 3: Assessment of Student Learning sections of the portfolio.

Introduction/Theoretical Framework

Education reform has been a hotly debated topic for decades, especially in regards to the preparation of effective and well-qualified teachers. Darling-Hammond (2012) contends the most effective tool to improve teacher quality lies in teacher evaluation. To accurately assess the preparation of pre-service candidates, reliable and valid assessments must be used that pay close attention to context, process, and reflection, factors that traditional evaluations of teaching either ignore or undervalue (Bunch, Aguirre, & Tellez, 2009).

The primary purpose of teacher education preparation programs is to produce well-prepared teachers to ensure all of their graduates entering the classroom are effective (National Research Council, 2010). With the ever-increasing demands on teacher preparation programs to overall teacher quality, there have been some concerns raised. For the past 25 years, every report on teacher preparation has addressed the need for deeper and more-sustained opportunities for teacher candidates to learn and practice teaching in schools or real-world settings (AFT, American Federation of Teachers, 2012). Whittaker and Nelson (2013) state the end goal of any quality teacher preparation program is to ensure that teacher candidates can plan, teach, and assess students' needs.

Although there have been repeated calls for stringent accountability measures to guarantee teacher education graduates entering the workforce were deemed "quality", the most common forms of assessment have been certification exams. Darling-Hammond (2012) argued for decades, teachers' scores on traditional paper-and-pencil tests of basic skills and subject matter, like the Praxis, "haven't been significantly related to classroom effectiveness" (p. 10). Haertel

(1991) further supported this view by stating multiple-choice tests and generic classroom observations do not yield valid and comprehensive measures of the knowledge base of teaching. In a survey conducted by the AFT (2012), new teachers reported on-the-job learning was more helpful than their formal training. They also reported their training was a "failure to prepare them for the challenges of teaching in the 'real world'" (p. 7) and there was a significant gap between preparation and the reality of teaching in the classroom. Darling-Hammond (2006) argues that authentic assessments, such as teacher performance assessments, "offer more valid measures of teaching knowledge and skill than traditional teacher tests, and they inspire useful changes in programs as they provide rich information about candidate abilities- goals that are critical to an evaluation agenda that both documents and improves teacher education" (p. 121).

Consequently, teacher preparation programs are moving away from reliance on traditional forced-answer means of determining competent teachers. To answer the calls of critics of teacher preparation and to provide more authentic means of assessment, teacher education programs are offering more 'real world' teaching assessments that efficiently evaluate teacher performance. Teacher preparation programs across the country are implementing teacher performance assessments that are authentic evaluations of teacher knowledge and skill.

Teacher performance assessments were first introduced in the 1980's at Stanford University by Professor Lee Shulman (Haertel, 1991). Chung (2008) stated teacher performance assessments (TPAs) have become more appealing and beneficial to teacher education programs for their "innovative ways of assessing knowledge and skills" (p. 7). According to Oluwatayo and Adebule (2012), TPAs are an exercise designed to expose student teachers to the practical aspect of the teaching profession and enable them to put into practice knowledge and skill acquired during classroom interactions with their classroom instructors.

The AFT (2012) recommended teaching must have a universal assessment process for entry that includes a comprehensive teacher performance assessment. More specifically, teacher performance assessments structure beginning teachers' activities by having them engage in particular modes of teaching practice that are consistent with more advanced teaching, such as analyzing student work and assessing one's own teaching practice (Chung, 2005). The Performance Assessment for California Teachers (PACT) was developed to "examine the planning, instruction, assessment, and reflection skills of student teachers against professional standards of practice" (Darling-Hammond, 2006, p. 121). Teacher performance assessments, and specifically PACT, build on efforts by the National Board for Professional Teacher Standards along with other organizations to develop performance assessments for use with beginning teachers (Pecheone & Chung, 2006).

Background of edTPA

The edTPA emerged within the past few years as an innovative teacher performance assessment. It was created and developed through a partnership between the Stanford Center for Assessment, Learning, and Equity (SCALE) and the American Association of Colleges for Teacher Education (AACTE, American Association of Colleges for Teacher Education, 2014). Developers of edTPA drew from 25 years of experience of developing performance-based assessments of teaching including National Board for Professional Teaching Standards and PACT (AACTE, 2014). The edTPA is a subject-specific assessment that includes versions in 27 different teaching fields, including agricultural education. The goals of edTPA are to improve student outcomes and strengthen the information base guiding improvement, accreditation, and evaluation of teacher preparation programs (AACTE, 2014). Additionally, the edTPA is designed to be used in combination with other measures as a requirement for licensure and guide professional development for teachers across the career continuum (AACTE, 2014).

Darling-Hammond (2012) states, “edTPA is designed to examine whether prospective teachers are ready to teach by reviewing candidates’ plans, videotapes of instruction, evidence of student work and learning, and commentary on student work” (p. 12). The edTPA gathers evidence of teacher candidates’ work in planning, instruction, and assessment to help predict teacher quality. The edTPA for agricultural education is comprised of three tasks and 15 rubrics evaluating these tasks. Task 1, representing three to five consecutive hours of instruction, involves planning, which includes planning for agricultural-related understandings, planning to support varied student learning needs, using knowledge of students to inform teaching and learning, identifying and supporting language demands, and planning assessments to monitor and support student learning. Task 2 involves instruction, and includes the use of video clips for evaluating the learning environment, engaging students in learning, deepening student learning, agriculture-specific pedagogy, and analyzing teaching effectiveness. Task 3 evaluates assessment and includes analysis of student learning, providing feedback to guide learning, student use of feedback, using assessment to inform instruction, and analysis of student learning.

The edTPA is the first standards-based assessment to become available to teacher preparation programs across the country. Currently, 508 teacher preparation programs in 34 states are participating in edTPA (AACTE, 2014). States with an edTPA policy in place have statewide policies requiring the completion of a state-approved performance assessment as part of program requirements or for state licensure and/or, state program accreditation (AACTE, 2014).

Several institutions that are implementing edTPA have reported positive impacts of this teacher performance assessment. The Director of Assessment and Accreditation at [Eastern State] University reported, “edTPA brings us the opportunity to talk about what kinds of skills we want our candidates to have around planning, around instruction, around assessment...it’s been very positive for us” (AACTE, 2014). Research by Chung (2008) also found positive impacts on the teaching practice of teacher candidates. Chung (2008) further elaborated those participants from an earlier pilot group in North Carolina were encouraged to “think about teaching in new ways and to enact some of those new ideas in their practice” (p. 23) as a result of their completion of the teaching event. This finding is further supported by a more recent study by Okhremtchouk et al. (2009) that found the performance assessment encouraged teacher candidates to be increasingly aware of their actions and students’ behaviors.

The edTPA was implemented at North Carolina State University in the fall of 2013 and piloted by the first group of agricultural education student teachers in the spring of 2014. In order to earn their teaching credential, teacher candidates are expected to pass the edTPA along with successful completion of student teaching. There is a dearth of research on the implementation of performance assessments in agricultural education. Focus groups conducted with completers of the Performance Assessment for California Teachers (PACT) found concern with the ability of the assessment to provide a true reflection of a student teacher's ability and effectiveness in the classroom. Other challenges included the substantial time investment needed to complete the assessment and technological issues that were presented during the recording, editing, and uploading of the video portion of the assessment. However, several of the participants did identify positive contributions emerging from the completion of the PACT such as an increased awareness of considerations and decisions made in the classroom and an overall improvement in teaching effectiveness (De Lay & Warner, 2013).

Priority Four of the National Research Agenda describes the need for "Meaningful, Engaged Learning in All Environments" (Doerfert, 2011, p. 21). The findings of this study can inform and potentially improve teacher preparation coursework and have an impact on the student teacher experience at North Carolina State University and other institutions implementing the edTPA as a measure of teacher readiness and effectiveness. Darling-Hammond (2012) states that in respect to edTPA, this may be the first time that the teacher education community has come together to hold itself accountable for the quality of teachers who are being prepared and to develop tools its members believe are truly valid measures of teaching knowledge and skills.

Purposes/Objectives

The purpose of this research was to examine specific factors influencing the completion of the edTPA by agricultural education student teachers at North Carolina State University. While other agriculture teacher education programs have implemented a performance assessment as part of the teacher credentialing process, this was the first cohort of student teachers to complete the edTPA at North Carolina State University. The research objectives guiding this study were to:

1. Identify sources of support and information for completion of edTPA,
2. Identify the level of difficulty in completion of edTPA,
3. Identify the influence of the edTPA on the student teaching experience, and
4. Examine student teachers' perceived preparedness for completion of edTPA.

Methods/Procedures

This study was conducted using a census of all student teachers in agriculture during the spring 2014 semester at North Carolina State University. Participants of this study included 16 undergraduate students. Two participants completed phase 1 of the questionnaire and then dropped out of student teaching for personal reasons. One participant was absent during phase 2 of the questionnaire. Participating students were enrolled in a student teacher seminar course and were student teaching at the time of the study. There were no restrictions based on participant's background, gender, race, or years of prior teaching experience. Though this is a census study, this cohort of student teachers represents the very first group of student teachers to use edTPA in the nation.

The questionnaire was developed using previous research and questionnaires developed by Chung (2005, 2008). Phase 1 questions related to research objectives 1 and 2, while phase 2 questions related to research objectives 3 and 4. Phase 1 of the questionnaire, which focused on perceptions of easy of completion and resources used to complete the edTPA, was conducted at the mid-March student teaching seminar, within 10 days of student teachers submitting their edTPA portfolios for evaluation. Phase 2 of the questionnaire, which focused on value of the edTPA to the overall student teaching experience and perceptions of preparation to complete the edTPA, was conducted at the end-of-semester student teaching seminar in late-April.

Both phases of the questionnaire were analyzed for face and content validity by a panel of experts consisting of agricultural teacher education faculty and student teaching supervisors. Reliablity analyses were conducted *post hoc.* Reliability for the construct of difficulty of sections of edTPA was $\alpha = .79$. Reliability for the construct of teachers' perceived preparedness to teach was $\alpha = .52$. Reliability for the construct of teachers' perceived influence of edTPA on teaching was $\alpha = .85$. Since this was a census study with a limited number of participants, data were reported as counts.

Findings

Overall, teacher candidates estimated that completion of the edTPA required an average of 34.25 hours. The first objective was to examine the sources of support for the completion of edTPA (see Table 1). The researchers identified the sources of support as the following: agriculture rubrics, materials from the student teaching seminar course, *edTPA Agriculture Handbook*, *edTPA Making Good Choices*, the student teaching coordinator's e-mails, the university supervisor, peers, and the College of Education workshops. Participants were asked to identify how helpful each of the resources were in completing the edTPA. Half of participants ($n = 8$) identified e-mails from the student teaching coordinator as being a very helpful or helpful resource, followed by the edTPA Agriculture Handbook as the next most helpful. When asked to identify the least helpful source of support, 69% of participants ($n = 11$) recognized the College of Education workshops.

Table 1
edTPA Sources of Support and Information for Completion of edTPA (N = 16).

Source of Support	Very Helpful (*n*)	Helpful (*n*)	Somewhat Helpful (*n*)	Little Help (*n*)	Not Helpful (*n*)
Student teaching coordinator's e-mails	7	3	4	2	-
edTPA Agriculture Handbook	3	5	5	1	2
Peers	2	9	3	2	-
edTPA agriculture rubrics	2	6	5	2	1
Materials from student teaching seminar	2	5	7	2	-
University supervisor	1	8	5	1	1
edTPA *Making Good Choices*	-	2	6	5	3
College of Education workshops	-	1	2	3	8

Participants were asked to rank the edTPA components according to their level of difficulty ranging from very difficult to very easy (see Figure 1). Student teachers identified *Task 1 Context for Learning* as the least difficult task of edTPA. They identified *Task 3 Assessment Commentary* as the most difficult task of edTPA.

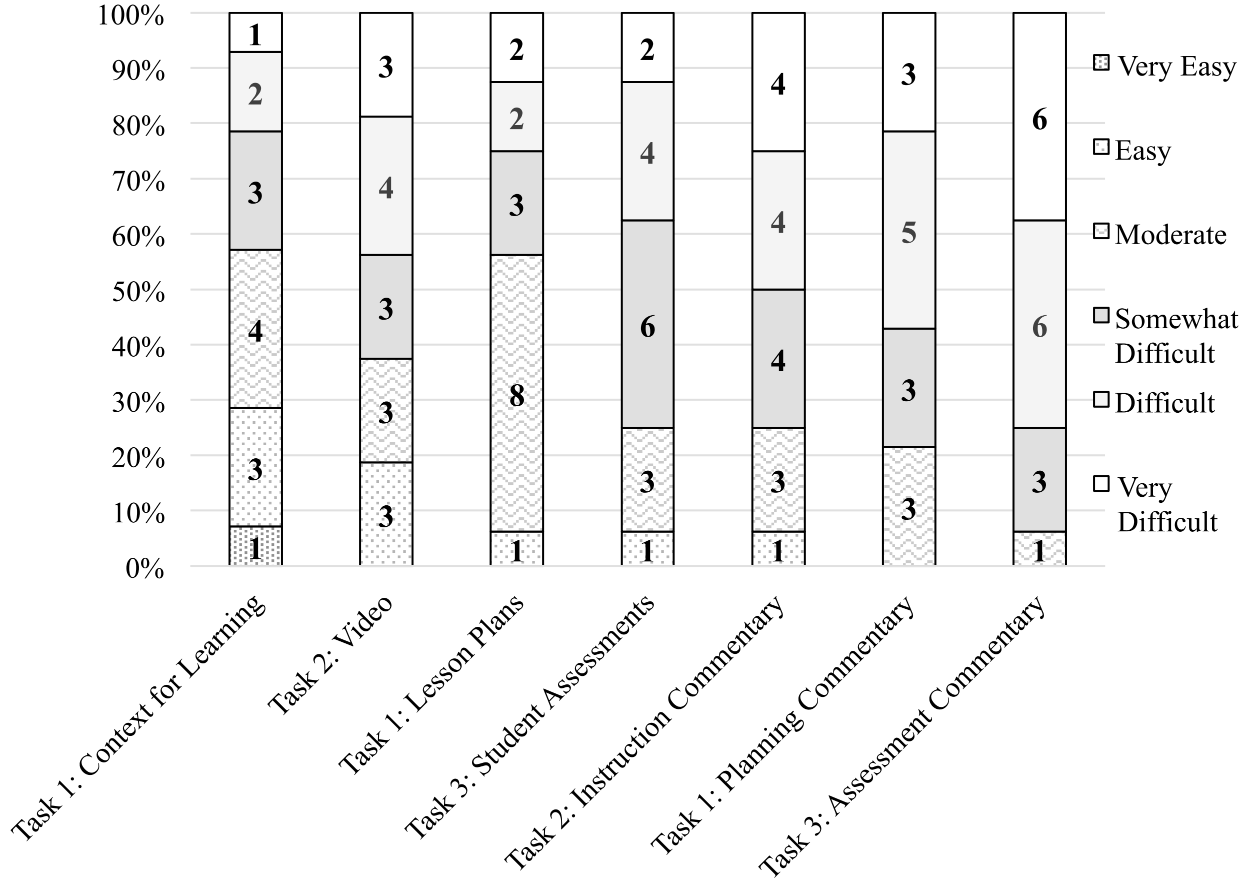

Figure 1. *Rank of edTPA sub-task components according to the perceived level of difficulty for completion as determined by student teachers (N = 16).*

Participants were given the Phase 2 questionnaire following completion of edTPA and asked to describe their experience with edTPA (see Table 2). Seventy-seven percent (n = *10*) expressed they learned important skills through the process of constructing edTPA and 69% (n = *9*) indicated completion of the performance assessment encouraged reflection on instructional decisions. Fifty-four percent (n = *7*) responded the process of constructing edTPA helped to improve their knowledge of learners. However, 84% (*n = 11)* of participants either agreed or strongly agreed the edTPA took too much time and work to complete. Similarly, 69% (n = 9) of participants either agreed or strongly agreed that the edTPA tasks did not adequately capture essential aspects of their teaching practices. Student teachers were divided as to the influence of the edTPA lesson planning, knowledge of learners, use of assessment, implementation of instruction, and contribution to future teaching practice.

Table 2
Influences of edTPA on the Student Teaching Experience (N = 13).

Statement	Strongly Agree (*n*)	Agree (*n*)	Disagree (*n*)	Strongly Disagree (*n*)
edTPA tasks did **not** capture essential aspects of my teaching practices adequately.	3	6	3	---
edTPA took too much time and work to complete.	2	9	2	---
The process of constructing edTPA helped me to reflect more carefully on my instructional decisions.	2	7	4	---
I learned important skills through the process of constructing edTPA.	1	9	3	---
The process of constructing edTPA helped to improve my lesson planning.	1	5	7	---
edTPA tasks were **not** relevant to teaching.	1	1	10	1
The process of constructing edTPA helped to improve my knowledge of learners.	---	7	6	---
The process of constructing edTPA helped to improve my assessment of student learning progress.	---	7	6	---
My teacher credentialing program prepared me in ways that allowed me to be successful on edTPA.	---	7	6	---
edTPA will be useful for my teaching practice.	---	7	5	1
The process of constructing edTPA helped me to improve my implementation of instruction.	---	6	7	---

The fourth objective of this study was to determine the perceived preparedness and perceived level of difficulty for completion of edTPA (see Table 3). Most student teachers felt *moderately prepared* to *very well prepared* in all areas of teaching. Only one participant responded they did not feel well prepared in regards to planning that builds students' conceptual understanding, relevant skills, and problem-solving strategies. Another participant responded they did not feel well prepared with identifying and supporting language demands associated with key agricultural learning tasks.

Table 3
Student Teachers' Perceived Preparedness (N = 13).

edTPA Rubric (*rubric #, description*)	Very Well Prepared (*n*)	Moderately Well Prepared (*n*)	Somewhat Well Prepared (*n*)	Not Well Prepared (*n*)
06. Demonstrate a positive learning environment that supports students' engagement in learning.	9	4	---	---
07. Actively engage students in developing agricultural-related conceptual understanding, skills, and problem-solving strategies.	8	4	1	---
05. Use a variety of assessments (i.e. observations, portfolios, tests, performance tasks).	7	5	1	---
09. Use representations or realia to support students' ability to understand agricultural concepts and procedures.	6	7	---	---
14. Assign work that helps students use their higher-order thinking skills to think critically and solve problems.	5	7	1	---
03. Use knowledge of your students to justify instructional plans.	5	6	2	---
08. Use instructional strategies that promote active student learning.	4	8	1	---
01. Planning that build students' conceptual understanding, relevant skills, and problem-solving strategies.	4	7	1	1
10. Evaluate and change teaching practice to meet students' varied learning needs.	3	10	---	---
11. Analyze evidence of student learning.	2	9	2	---
04. Identify and support language demands associated with a key agricultural learning task.	2	7	3	1
02. Identify and address special learning needs and/or difficulties.	1	8	4	---
12. Give productive feedback to students to guide their learning.	1	10	2	---
13. Provide feedback and opportunities for focus students and guide their future learning.	1	10	2	---

Conclusions/Implications/ Recommendations

The limitations of this research is that data were gathered with one cohort of 16 student teachers in agriculture at one land-grant university in the initial adoption year of the edTPA. Readers of this manuscript are cautioned to interpret the findings in light of these limitations, but also understand that the research findings do provide valuable insights into the early adoption of this teacher performance assessment. Since the introduction of edTPA is currently occurring in many states, those faculty who are adopting edTPA may find these conclusions, implications, and recommendations useful.

Student teachers referenced the student teaching coordinator's emails with tips for completing the edTPA as being most helpful. The edTPA agriculture handbook and peers were also cited as being helpful when completing the edTPA. Student teachers appeared to find the edTPA *Making Good Choices* documents and the College of Education as providing little to no help in completing the edTPA. Interestingly, the edTPA agriculture rubrics would have ranked near or at the middle of the list of resources for completing the edTPA.

The implication of this finding is that teacher educators in edTPA states and institutions should focus their efforts to assist student teachers on local and content-specific assistance, such as instructor emails, peer evaluation, and the agriculture-specific edTPA materials. Since the edTPA agriculture rubrics are the basis of scoring the portfolio, teacher educators should find ways to increase the exposure to and usefulness of these materials for completion of the edTPA. These rubrics explicitly identify the criteria necessary for proficient and exemplary performance on the edTPA. Cooperating teachers were identified as the most helpful source of support in Chung's (2008) study. Additional research should also examine the level of support provided by cooperating teachers at [University].

Not surprisingly student teachers at North Carolina State University ranked *Task 1: Context for Learning* as the easiest portion of the edTPA to complete. This straight-forward, three-page component simply outlines the characteristics of the school, classroom, and students involved with the portfolio. In sum, student teachers perceived that the actual artifacts of the three edTPA tasks were the easiest to complete. However, only one to four individual student teachers deemed these tasks either *very easy* or *easy* to complete. On the other end of the spectrum, three to seven students thought these tasks were either *difficult* or *very difficult* to complete. The result is a fairly uniform bell distribution of students across the range of difficulty for these tasks, as one might expect from a cohort of student teachers.

More interesting is the finding that all three of the commentaries were deemed to be the most difficult portions of the edTPA. These are the reflection pieces of the portfolio. Only one student teacher determined that any one of the commentaries was *easy*. On the contrary, between 12 to 15 of the student teachers felt that completing these commentaries was *somewhat difficult*, *difficult*, or *very difficult.* Meaningful assessments should challenge students to deliver their best performances, and it appears that the commentary portion of the edTPA did challenge our student teachers.

The implications of the finding that the commentaries are most difficult for students is that teacher educators should continue to incorporate reflection in their teacher preparation courses. And, that reflection should be directed in nature, similar to that which will be encountered in the edTPA. However, caution should be exercised so that reflection exists not just for the purpose of completing the edTPA, but because directed reflection is effective teaching practice.

As the teacher educators make modifications to their courses to add opportunities for reflection or otherwise prepare student teachers for edTPA, collection of data related to Objective 2 may be meaningful as a longitudinal data collection. How do modifications to the curriculum and learning activities alter the perceptions of difficulty of completing each portion of the edTPA? Does the edTPA retain its robustness as an assessment tool? Even with this current data set, how do the perceptions of difficulty, and, for that matter, sources of support in completing the edTPA, relate to students' actual performance scores?

Related to Objective 3, we established that this cohort of student teachers determined that the edTPA did not capture the essence of student teaching practice and required too much time and effort to complete. Research by De Lay and Warner (2013) and Okhremtchouk et al., 2009 also recognized the substantial time investment needed for completion of a performance assessment. However, the majority of the student teachers did perceive that completing the edTPA did help them reflect on instructional decisions and did help them learn important teaching skills. Most student teachers also felt that the edTPA tasks were related to their teaching. This cohort of student teachers was otherwise split about perceptions of the edTPA helping improve lesson planning, knowledge of learners, assessment of student learning, and teaching practice.

The implication is that teacher educators should be honest with student teachers about the amount of time and effort necessary to succeed with the edTPA. They should also recognize and structure graded coursework in student teaching that goes beyond the edTPA in determining assessment of the student teacher's teaching ability. In sum, the edTPA is what it is…an assessment of teaching performance over a relatively short period of time. It can be used as a tool, if applied early in student teaching, to help student teachers reflect upon their practice.

As with any new assessment, those implementing the assessment should continue to monitor the assessment from a variety of angles to ensure its ongoing efficacy. The edTPA is no different. We recommend that teacher educators in agriculture continue to evaluate how completion of the edTPA impacts student teachers. Thus, the questionnaire in Objective 3 should be administered annually to student teachers who are completing the edTPA.

The spring 2014 student teaching cohort perceived that they were either prepared to complete the edTPA in agriculture. Fewer than four student teachers indicated they were not well prepared for what any one of the 15 edTPA rubrics measured. Student teachers felt most prepared for what four of the rubrics in *Task 2: Delivery of Instruction* measured. Overall, the level of preparation seems to relate to the perceptions of ease of difficulty of completing Task 2. Student teachers were generally less prepared for what the *Task 3: Assessment of Learning* rubrics measured.

This is perhaps the most interesting finding of this research: student teachers in agriculture at this land-grant university may not be well prepared to assess student learning and use those assessments to both make modifications for learner and alter their future instruction to meet student learning needs. Clearly, additional research with other cohorts of student teachers at our university is necessary to determine if this finding is a true pattern or a random occurrence. If additional research were to establish a pattern that student teachers struggle with assessing students and using those assessment data effectively, then additional coursework and/or professional development with assessment would be warranted.

Longitudinal research should be conducted to determine if this is a pattern of lack of preparation in assessment at North Carolina State University. Data should also be gathered from other agricultural education teacher preparation programs to determine if data are similar with regard to the lack of preparation in student assessment.

These findings, implications, and recommendations about the early adoption of the edTPA in agriculture both hearten and challenge some teacher preparation programs in agriculture. These initial student teachers did seem to be appropriately challenged by the edTPA. They did see value in the exercise of completing the edTPA beyond its serving as the gateway for teacher certification. And, opportunities exist whereby teacher educators in agriculture can better prepare their student teachers for successful completion of the edTPA.

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Analyzing Student Teacher Critical Thinking Through Blogs in an Online Community of Practice

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Abstract

Technology is becoming increasingly popular in higher education in the way students are asked to communicate and collaborate. The student teaching experience is an integral part of developing preservice teachers. During this experience, it is important that student teachers practice the theory that they have been taught in their preparatory programs. This study determined the frequency in which student teachers posted blogs at each level of critical thinking, the relationship between the number of blogs posted by each student teacher, and the student teachers' average level of critical thinking displayed in those blog posts. Six levels of critical thinking, according to Bloom's Taxonomy of Educational Behaviors were present. The Florida Taxonomy of Cognitive Behaviors was used to code student teacher blog posts. Of the student teachers' blog posts (n=942), 89.5% were at the lower-order levels of critical thinking, consistent with prior research. The results did not indicate a significant relationship between the number of posts per student teacher (N=21) and student teachers' average level of critical thinking. Further research should be implemented in higher education to add to the baseline data of critical thinking through blogging in online environments that are provided in this study.

Introduction

In many realms of professional development, focus remains primarily on theory and practice as two separate concepts, but rarely finds the opportunity to establish the links between the two (Berggren & Soderlund, 2011). To effectively bridge the gap between theory and practice, teacher education must encourage awareness, reflection, and experimentation with new concepts (Berggren & Soderlund, 2011; Gallos, 2008). Teacher preparation programs must reach beyond traditional methods to immerse preservice teacher candidates into field experiences (e.g., student teaching) that guide them in the process of constructing practical knowledge and reflecting with a purpose (Pena & Almaguer, 2012; Perry & Power, 2004).

It is important for pre-professionals to think critically so that they work to develop an intellectual sense of confidence in reason (Paul & Elder, 2006). Further, it is important for student teachers to utilize higher-order skills which enable them to analyze, assess, and improve thinking skills (Paul & Elder, 2006). Higher-order cognitive skills, such as critical thinking, prepare student teachers to overcome challenges they may encounter during their personal lives and careers (Tsui, 2002). Critical thinking can best be defined as "a reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information for which an incontrovertible solution is unlikely" (Rudd, Baker, & Hoover, 2000, p. 5). O'Hare and McGuinness (2009) defined critical thinking as "challenging a claim or opinion (either one's own or another person's) with the purpose of finding out what to believe or do" (p. 123). Scriven and Paul (1987) stated that critical thinking involves analyzing information gathered through reflection. "Critical thinking skills are essential and need to be fostered as part of any teacher education program" (Szabo & Schwartz, 2011, p. 80). There are pressures to develop more critically thinking pre-professionals in education (Berggen & Soderlund, 2011; Gallos, 2008; Paul & Elder, 2006; Pena & Almaguer, 2012; Perry & Power, 2004).

The need for deeper connections and critical thinking can be fostered through the use of effective higher-order thinking, probing, and reflective questioning skills (MacKnight, 2000; Pena & Almaguer, 2012). There is still debate as to which practices most efficiently cultivate and assess critical thinking (Perry, 2014). In an attempt to increase reflection, articulation, and social negotiation—components of higher order thinking—higher education faculty are using asynchronous communication technologies to enhance course discussions and the quality of student learning (Gilbert & Dabbagh, 2005; Vonderwell, 2002).

As student teachers participate in an authentic learning experience at a distance from their university faculty and peers, technology offers the opportunity to enhance the learning process in an environment outside of the classroom through online discussions or blogs (Szabo & Schwartz, 2011). It is essential to integrate critical thinking skills into online discussions so that students are challenged intellectually and experience relevant learning experiences (Pena & Almaguer, 2012). A challenge for personal learning, however, falls on the responsibility of the student teacher to use online learning environments in a manner that offers high-quality educational experiences that promote critical thinking (Szabo & Schwartz, 2011). Though popular in today's advancing technological world, student teachers may not understand the purpose of Web 2.0 technologies in education. Web 2.0 technologies—which include social networking sites, web applications, and weblogs—have recently received a lot of interest in higher education (Halic, Dee, Paulus, & Spense, 2010). The term weblog is a contraction of web log, often referred to as a 'blog'; it is an Internet-based platform in which users can post text, images, or video-based materials for others to view. Users may facilitate an information exchange and a collaboration network to support teaching and learning processes (Cakir, 2013). Blogs are convenient for producing and sharing student reflections and "offer an audience for students' writing within the safety of a learning community thus offering opportunities for collaborative learning" (Robertson, 2011, p. 1628). "Blog[s] are considered a great tool for … student teachers to record their growth and changes as well as build a learning community" (Yang, 2009, p. 18). It is becoming more common to witness the use of blogs as a tool that supports student teacher reflection (Walker, 2005; Williams & Jacobs, 2004), which in turn may increase the depth of a student teachers' critical thinking (Sessa, Matos, & Hopkins, 2009).

Blogs can be housed in an electronic community of practice [CoP]. CoPs offer teacher educators and preservice teachers the opportunity to reflect through blog posts on public or private discussion boards (Walker, 2005; Williams & Jacobs, 2004; Yang, 2009). A CoP is a group of people "bound together by shared expertise and passion for a joint enterprise…[that] share their experiences and knowledge in free-flowing, creative ways that foster new approaches to problems" (Wenger & Snyder, 2000, p. 139-140). Communities of practice are diverse, problem-solving, and assist in developing professional skills (Killeavy & Moloney, 2010; Wenger & Snyder, 2000; Yang, 2009). Some refer to the community of practice as a community of inquiry, a very valuable tool for enhancing higher-order learning (Garrison, Anderson, & Archer, 2001; Halic et al., 2010).

Many studies have been conducted to investigate the use of blogs in educational settings (Chuang, 2008; Top, Yukselturk, & Inan, 2010; Wang & Hsua, 2008; Yang, 2009). Though blogging serves as an environment that may foster higher-order learning, recent research shows that online environments are not being utilized to their full potential. Most notably, Garrison et al. (2001) and Gilbert & Dabbagh (2005) evaluated critical thinking in online discussions and found that 75% to over 80% of students' online postings were at the lower-order thinking levels (i.e., knowledge, comprehension, application) (Duron, Limbach, & Waugh, 2006) of Bloom's Taxonomy of Educational Objectives (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Conversely, in a study conducted by Szabo and Schwartz (2011), online discussion forums increased critical thinking skills and initiated higher-order thinking by preservice teachers. The structure of online discussions and question prompts may be key reasons that student teachers' postings reflect relatively low levels of critical thinking (Bradley, Thom, Hayes, & Hay, 2008). "By using collaborative online discussions, teacher candidates have the opportunity to gain a deeper understanding of learning" (Pena & Almaguer, 2012, p. 26). The development of student teachers' abilities to think critically through collaborative, interactive, and critical reflection is fundamental to their professional careers (Pena & Almaguer, 2012).

Wenger (1998) argued that if educational professionals can train themselves to think of the development of knowledge primarily as active participation in social communities, then the traditional teaching methods no longer appear productive. Educators are not only fostering their own learning, but are fostering the learning "in [their] relationships, [their] communities, and [their] organizations" (p. xix-xx). Though a community cannot be forced, Hoadley (2012) offers techniques in which technology can be used to foster a learning-oriented community of practice. Users must have connectivity; if users do not identify the central members of an already existing group, it is important that they locate others who share similar practices (Hoadley, 2012; Kimble, Hildreth, & Bourdon, 2008). Further, Hoadley (2012) believes that educators must help student learners fix themselves into "supportive authentic contexts, or create quasi-authentic contexts in which they can "do" the knowledge that is desired; mere regurgitation is not enough" (p. 290). Finally, Gokhale (1995), Marzano (1993) and Paul and Elder (2006) suggested that student teachers understand the purpose and understanding of collaborative learning. As blogs serve as a vehicle for users to exchange ideas and share experiences, they become an optimal setting for social constructivist learning (Ferdig & Trammell, 2004) by those who utilize collaborative learning methods. Social constructivism has been "the most accepted epistemological position associated with online learning" (Kanuka & Anderson, 1998, p. 5).

Theoretical Framework

Since the mid-twentieth century when Lev Vygotsky (1978) developed the social constructivism theory, educators, and psychologists have been seeking evidence that learning and knowledge develops through social interaction (Santrock, 2011). More recently, learning has been perceived from a "cognitive and constructivist perspective [that] emphasizes what learners know (knowledge) and how they think (cognitive processes)…as they actively engage in meaningful learning" (Anderson & Krathwohl, 2001, p. 38). Approaches to instructional strategies can be classified as constructivist or direct instructional (Santrock, 2011). "A focus on meaningful learning is consistent with the view of learning as knowledge construction, in which students seek to make sense of their experiences" (Anderson & Krathwohl, 2001, p. 65). Constructivist learning, or meaningful learning, requires that instructors require more of students by eliminating instructional methods that simply present factual knowledge and move towards assessments that demand that students practice more than simple recall and recognition of factual knowledge (Bransford, Brown, & Cocking, 1999; Lambert & McCombs, 1998).

The constructivist approach, unlike direct instruction, is learner-centered and emphasizes teachers as facilitators, rather than direct instructors. Someone who utilizes the constructivist approach believes that individuals should actively construct their own knowledge and understanding; be encouraged by the teacher to explore the world around them; and discover, reflect, and think critically (Bonney & Sternberg, 2011). In today's educational society, the constructivist approach emphasizes collaboration and working with peers to construct knowledge and understanding (Slavin, 2011; Wentzel & Watkins, 2011). Vygotsky's (1962) social constructivism theory emphasized the importance of social interaction on learners' cognitive development. Vygotsky believed that dialogue was critical to student learning. Vygotsky (1978) developed the concept of the zone of proximal development (ZPD) as it pertained to student learning. The ZPD is a term used for the range of learning tasks that are too difficult for the learner to complete without assistance or too simple that the skill can be completed by the learner working independently (Santrock, 2011). Scaffolding is the support offered to the learner based upon their ZPD or current learning capabilities (Santrock, 2011). As the learner begins a new task, he/she may need direct instruction; as the student's competence progresses less assistance is given (Santrock, 2011). By asking probing questions a teacher may scaffold learners to help them think more critically (MacKnight, 2000; Wang & Hsua, 2008).

Finally, Vygotsky (1962, 1978) believed in transforming the classroom with tools that give attention to the learners' culture, ZPD, scaffolding, and shared activity (collaboration). As computers and electronic communication have made their way into the 21st Century culture, it would be appropriate to assume that Vygotsky would support the use of online means of interaction (Jost, 1999) and Web 2.0 technologies in developing student learning through collaboration and communication in social environments. This research aims to study student teachers' blog posts in an electronic community of practice and build upon social constructivism in the context of teacher education, with an interpretive and collaborative approach.

Purpose and Objectives

Though critical thinking has become an anticipated outcome in higher education, students in colleges of agriculture have been found to have insufficient critical thinking skills (Flores, Matkin, Burbach, Quinn, & Harding, 2010; Rudd et al., 2000). In an attempt to improve agricultural education programs, teacher educators in agricultural education have increased focus on research and education regarding comprehending and applying cognitive function (Boone, 1990; Cano, 1993; Dyer & Osborne, 1996; Jones & Williams, 1986; Lamm, Rhoades, Irani, Roberts, Snyder, & Brendemuhl, 2011; Parr & Edwards, 2004; Rollins, 1990). It is important for agricultural education student teachers to think critically; "therefore, a need exists to assess those skills in college students and examine whether they have acquired these skills through their college experiences" (Odom, Shehane, Moore, & McKim, 2014, p. 218).

The present study aligns with the American Association for Agricultural Education National Research Agenda Priority 4: Meaningful, Engaged Learning in All Environments. This area suggests that research in Agricultural Education should "assess various learning interventions and delivery technologies to increase problem-solving, transfer of learning, and higher order thinking" (Doerfert, 2011, p. 21) and to "examine various meaningful learning environments…for their impact on specific cognitive, affective, and psychomotor outcomes" (p. 9). The purpose of this study was to explore student teacher levels of critical thinking in blog posts housed in an electronic community of practice. The following objectives guided this study:

1. Determine the frequency and the average level of critical thinking exhibited by Iowa State University agricultural education student teacher's reflection through blog posts in an electronic community of practice.
2. Determine the relationship, if any, between the number of blogs posted by each student teacher and the average level of student teacher critical thinking displayed within the blog posts.

Methodology

Researchers have recently moved away from measuring interaction quantitatively (e.g., number of posts) to more qualitative measures (e.g., quality of posts) (De Wever, Schellens, Valeck, & Van Keer, 2006), since an increase in number of posts does not necessarily mean an increase in quality of learning (Vonderwell, 2002). These more qualitative measures are often studied in relation to critical thinking (Ertmer & Stepich, 2004; Lee, 2005; Walker, 2004).

This study utilized a convenience sample of student teachers (N=21) during the fall 2013 and spring 2014 semesters, due to the accessibility and cooperation of the agricultural education Department at Iowa State University. Agricultural education student teachers at Iowa State University were required to post a weekly discussion and bi-monthly blog to the National Association of Agricultural Educators CoP private discussion board. Chuang (2008) suggested the importance of having a private discussion board in order for student teachers to openly express their thoughts and opinions. Student teachers were required to post blogs and discussions during each of the fourteen weeks of their student teaching experience as a part of the final assessment for the student teaching experience; however, specific grades for student teacher blog posts were not assigned. There were no specific topics or recommendations given to the student teachers as to what should be discussed in the CoP. IRB approval was obtained through the Office of Responsible Research at Iowa State University to ensure appropriate collection and use of data.

This study interpreted qualitative data from a quantitative perspective. Creswell and Plano Clark (2011) and Tashakkori and Teddlie (2003) determined that mixed methods studies explore the manner in which qualitative data can be transformed into quantitative data to determine descriptive measures (i.e., frequencies and percentages) and for survey instrument development. Bloom et al.'s (1956) Taxonomy of Educational Objectives is widely accepted in educational research as a means of categorizing learning behaviors into levels of cognition. Bloom et al.'s (1956) hierarchical Taxonomy recognizes six levels of cognitive abilities and skills: *knowledge* (requires the least cognitive processes), *comprehension*, *application*, *analysis*, *synthesis*, and *evaluation* (requires the most cognitive processes). Based upon Bloom et al.'s (1956) Taxonomy, Duron et al. (2006) determined higher-order thinking to be those skills or behaviors demonstrated at the analysis, synthesis, and evaluation levels. Thus, lower-order thinking skills would be those at the knowledge, comprehension, and application levels (Duron et al., 2006).

Though recent revisions have been made to the original Taxonomy (Anderson & Krathwohl, 2001), a useful tool for observing critical thinking in the classroom is the Florida Taxonomy of Cognitive Behavior (FTCB) (Brown, Ober, Soar, & Webb, 1970). The FTCB was directly derived from Bloom's Taxonomy (Ulmer, 2005). Based on these assertions, Miller (1989) stated, "the FTCB can be considered valid in light of the support generally given to Bloom et al.'s (1956) Taxonomy as a means of identifying specific behaviors in the various levels of cognition" (p. 43). The validity for the FTCB instrument was based upon its direct development from Bloom et al.'s (1956) Taxonomy (Ball & Garton, 2005; López & Whittington, 2001; Miller, 1989; Whittington, 1991; Whittington & Newcomb, 1993). The FTCB (Brown et al., 1970) at its 55 behavior descriptors was used to analyze and code student teachers' blog posts for critical thinking.

Due to the qualitative nature of the data in this study, instrument reliability was established using peer review (Johnson & Christensen, 2014). As suggested by Johnson and Christensen (2014), the researcher discussed the process of coding, and interpretations of the data with a peer reviewer throughout the course of the study. Johnson and Christensen (2014) call this special type of peer review a *critical friend*. Creswell (2007) recognizes this sort of external check of the research process as peer debriefing. The peer asks challenging questions about the methods, meanings, and interpretations of the researching who is coding the data (Johnson & Christensen, 2014). The peer reviewer coded randomly selected blog posts, utilizing the FTCB, and compared the results with those of the researchers. This assisted the peer reviewer in understanding the coding process and in providing feedback for the researcher prior to coding all student teacher blog posts. The peer reviewers' results were compared with the researchers' results. Discrepancies were discussed between the researcher and reviewer. Sankey and Foster (2012) used a similar procedure when they employed a content analysis of teaching philosophy statements. In the present study, discrepancies were most notably identified between either two higher-order levels or two lower-order levels posts, appearing less often between lower- and higher-order levels. However, it should be noted that careful consideration and detailed notes were taken to ensure consistency within the coding system.

Once the blog posts were secured in an Excel file after each semester, all posts were numbered (*N*= 1,016). Some methodologists recommend that the researcher determine the choice of coding method prior to the study, "to harmonize with [the] study's conceptual framework paradigm, and to enable an analysis that directly answers your research questions and goals" (Saldaña, 2013, p. 62). Provisional coding was used because each level of critical thinking was a predetermined category anticipated from the literature review (Saldaña, 2013), and previous research findings (Bradley et al., 2008; Garrison et al., 2001; Gilbert & Dabbagh, 2005; Walker, 2004). Blog posts were manually coded at one of six levels of critical thinking, based on Bloom et al.'s (1956) Taxonomy and the FTCB (Brown et al., 1970): knowledge, comprehension, application, analysis, synthesis, and evaluation. On the FTCB, comprehension is broken into sub-categories: translation and interpretation. To ensure the blog postings were coded in a manner that was consistent with the Taxonomy and the FTCB, each were regularly studied and consulted during the coding process. Each post was coded twice at four-week intervals and compared. Critical thinking levels assigned to blog posts from the first coding interval were compared with corresponding codes from the second coding interval and entered into an Excel file. Corresponding blog posts not coded at the same level of critical thinking were recoded for a third time after a four-week interval. Posts that were not consistently coded at the same level of critical thinking after the third coding interval were not used in the study. Intrarater reliability was established as excellent for the present study (α=.93) by coding the blog postings three times at four-week intervals (Weir, 2005). An intrarater reliability code of zero indicated no reliability while a code of 1.0 indicated perfect reliability (Weir, 2005). The usable codes (*n* = 942) were then copied to a new Excel file.

Three Excel sheets were utilized to keep blog posts separated: total blog posts at each level of critical thinking, total blog posts per student teacher, and total blog posts at each level of critical thinking per student teacher. Because the data was ordinal (Urdan, 2010) with critical thinking being coded among six hierarchical levels, each level was given a multiplier in order to determine average level of student teacher critical thinking (1: knowledge, 2: comprehension, 3: application, 4: analysis, 5: synthesis, 6: evaluation). The multiplier is similar to that of using a weighted system as suggested by Miller (1989) and Newcomb and Trefz (1987). The total number of blog posts at each level of critical thinking was multiplied by the appropriate multiplier, then divided by the total number of posts, resulting in the average level of critical thinking per student teacher.

The total number of posts and the average level of critical thinking were entered into IBM SPSS Version 22.0 and Spearman's rho was calculated to determine if any correlational relationships existed between the number of blog posts and average level of critical thinking per student teacher. Spearman's rho was the statistical procedure of choice because of the small sample size in this study and because the parametric alternative of Pearson's r assumes a randomized sample which was not appropriate for the present study (Pallant, 2013). Preliminary analyses were performed to ensure linearity (Pallant, 2013). Although data did not demonstrated true linearity and displayed a more curvilinear relationship, with the small sample that was used it was decided to leave all data points for analysis (Pallant, 2013). Based on the design of this study, limitations should to be considered. Although results of this study should not be generalized beyond the convenience sample as participants are not representative of all student teachers, valuable information can be attained (Creswell, 2012).

Results

Objective one sought to determine the level of critical thinking exhibited by Iowa State University student teachers through blogs housed in an electronic community of practice. Table 1 provides selected examples of posts that were coded at each level of Bloom's taxonomy of critical thinking utilizing specific observations listed on the FTCB.

Table 2 identifies the number of posts (*n*=942) coded for each level of critical thinking. Student teachers' blog posts demonstrated each of the six of Bloom et al.'s levels of critical thinking. The student teachers' blog posts demonstrated critical thinking at the knowledge (*n*=441, 46.82%), comprehension (*n*=344, 36.52%), application (*n*=58, 6.16%), analysis (*n*=51, 5.41%), synthesis (*n*=31, 3.29%), and evaluation (*n*=17, 1.80%) levels.

Table 1
Example Student Teacher Blog Posts Coded Utilizing the FTCB (Brown et al., 1970)

Level of CT	Example Post	Observation
Knowledge	*Well, I started off my student teaching experience with three full days of in-services. During the course of those three days we covered ALICE training…the new Infinite Campus grading system, how to 'teach like a pirate', and a few other important topics.*	Tells about an event
Comprehension	*Thanks for the inspiring words, because I am another detail-oriented person who struggle to remind myself of the larger picture, let alone my students. I should be taking notes on these thoughts so that I can read them over to remind myself every morning, haha.*	Gives reason (tells why)
Application	*At this point I'm more strict than I am the teacher full of jokes and personal conversations about outside of school, which doesn't match my personality. From my little experience so far it's more of a class by class and age issue. I've noticed that I can…micromanage less with the juniors and seniors, but that's not the case with the freshman and sophomore classes…*	Applies previous learning to a new situation
Analysis	*Does giving them a leadership role like that reward them though? For instance, they may realize I am giving them something unique and not offering it to other students…I have seen it work before, but what is your opinion on that?*	Infers purpose, point of view, thoughts, feelings
Synthesis	*I … am currently working on a word search… to give to my Animal Science class just in case I get done early. This will have all the terms we've gone over so far and will be a good review. I'll just ask that the students keep this in their binders and pull it out if I run a few minutes fast…*	Produces a plan, proposed set of operations
Evaluation	*I thought our mid-term meeting was really great. I … enjoyed the peer reviews of our lesson plans. To be honest, I think I got more out of that than any other evaluation thus far this semester. My group had some wonderful ideas and it got me to thinking…why didn't I think of that to begin with[?] Do you ever notice that when in the thick of things, those awesome ideas are harder to come by. I wonder why that is? Is it because I am too focused on one thing and not looking at the bigger picture? When I am processing things in preparation for my lesson plans, am I really taking things I have learned before into consideration? Sometimes it feels like I am in a constant brain fart.*	Evaluates something from evidence

Table 2
Frequencies and Percentages of Student Teacher Blog Posts (n=942) at each Level of Critical Thinking

Levels of Critical Thinking	*f*	%
Knowledge	441	46.82
Comprehension	344	36.52
Application	58	6.16
Analysis	51	5.41
Synthesis	31	3.29
Evaluation	17	1.80

Table 3 displays the results for objective two, the total number of blog posts each student teacher posted over the duration of the semester and the student teachers' average level of critical thinking as reflected in blog posts. The highest number of posts by one individual was 97 and the lowest was eight. On a scale of one to six, with knowledge being one and evaluation being six, the highest mean level of critical thinking reflected in student teachers' blog posts was 2.73, between the comprehension and application levels. The lowest average level of critical thinking was 1.38.

Table 3
Total Blog Posts (n = 942) per Student Teacher and Student Teachers' Average Level of Critical Thinking

Student Teacher	*n*	*M*	Student Teacher	*n*	*M*
1	11	2.73	12	40	1.75
2	30	2.27	13	8	1.75
3	58	2.16	14	11	1.73
4	74	2.07	15	97	1.69
5	27	2.07	16	25	1.68
6	87	2.05	17	67	1.67
7	56	2.05	18	32	1.63
8	33	2.00	19	39	1.44
9	65	1.89	20	12	1.42
10	96	1.88	21	16	1.38
11	58	1.85			

Note. Data is organized from highest to lowest average level of critical thinking. *M* = the average level of critical thinking where 1 = knowledge, 2 = comprehension, 3 = application, 4 = analysis, 5 = synthesis, and 6 = evaluation.

The relationship between the number of posts and the average level of critical thinking was investigated using Spearman's rho correlation coefficient. Preliminary analyses were performed to ensure no violations of the assumptions of linearity by generating a scatterplot (Pallant, 2013). Pallant (2013) suggested that a scatterplot is useful before calculating correlations because it provides an indicator of whether or not the variables in the study are related, and if they are related, the direction and magnitude of the relationship. A scatterplot also identifies any extreme outliers in the data (Pallant, 2013). It was found that the data set displayed slight curvilinearity rather than a normal straight-line scatterplot. No significant correlation (Cohen, 1988) was found between the two variables (r_s = .154, N = 21, p < .505).

Conclusions and Discussion

When considering the findings of this study, we conclude that student teachers demonstrate critical thinking at the lower levels of Bloom et al.'s (1956) Taxonomy when blogging in an electronic CoP. Student teachers were anticipated to utilize higher-order thinking skills since blogs promote thoughtful reflection and a CoP serves as an environments in which these skills can be enhanced (Garrison et al., 2001; Gilbert & Dabbagh, 2005; Halic et al., 2010; Killeavy & Moloney, 2010; Vonderwell, 2002; Wenger & Snyder, 2000; Yang, 2009). However, knowledge, comprehension, and application represented 89.5% of the total blog posts, accounting for approximately ten percent more blog postings at lower-order thinking levels than findings by Garrison et al., (2001) and Gilbert and Dabbagh (2005).

Kanuka and Anderson (1998) determined that online discussion mediums are often used for "sharing [and/or] comparing of information" (p. 7). There were no specific topics for conversation predetermined by the University supervisors, and no specific guidelines as to what the student teachers were asked to discuss during the student teaching experience, only the weekly and bi-monthly requirements. Therefore it is reasonable to conclude that sharing and comparing (Brown et al., 1970) were the highest levels of critical thinking skills that the student teachers attained.

The lack of cognitive behaviors at the analysis and synthesis levels could be attributed to the ideas of effort and risk (Garrison et al., 2001). Student teacher behaviors at the analysis and synthesis levels—detecting an error in their own thinking or that of their peers', inferring their purpose, point of view, thoughts or feelings, or formulating hypotheses and intelligent guesses—require time of the student teacher that may not be abundant in their busy schedules. Furthermore, "it may be more risky to offer tentative solutions or hypotheses in that their ideas may be rejected" (Garrison et al., 2001) by peers in the CoP. As seen in this study, the student teachers did not utilize collaboration through the CoP to analyze or propose an alternative lesson plan idea for their peers, processes of higher-order thinking levels.

As application, analysis, and synthesis levels of cognitive behaviors were minimally utilized; this leaves little reason for student teachers to utilize evaluation levels of critical thinking. Evaluation requires that the student teacher make "judgments about the value, for some purpose of ideas, works, solutions, methods, [and/or] materials" (Bloom et al., 1956, p. 185). If student teachers propose lesson plan ideas, ask for suggestions on particular teaching methods, or offer classroom management ideas—behaviors of previous higher-order levels— at limited levels, there becomes little need to "evaluate based on criteria" (Ewing & Whittington, 2007) in order to determine effective or accurate application of those methods or ideas (Bloom et al., 1956). Another factor may explain why student teachers exhibited less cognitive behavior at higher-order levels. Garrison et al. (2001) stated "collaborative learning in an educational sense is more than a mindless free-for-all…interaction must be coordinated and synergistic" (p. 21), thus requiring instructional or facilitator presence in order to attain higher-order outcomes. The University supervisors did not have an active role in the CoP in this study, which may have contributed to a lack of higher-order thinking demonstrated by student teachers.

Wenger (1998) described a community as “a way of talking about the social configurations in which participation in the community is acknowledgeable as competence” (p. 5). Those student teachers who blog considerably less than their peers or demonstrate a low level of critical thinking may not be participating with a complete understanding of their contribution to collaborative learning (Gokhale, 1995; Marzano, 1993; Paul & Elder, 2006). Those students who post a high number of posts or display a lower average level of critical thinking may be bored with the daily routines of student teaching or may not be challenged enough by the discussions or peer collaboration in the CoP. Conversely, those students who post a lower number of blogs or display a low level of critical thinking as compared to their peers may be towards one end of their ZPD (Vygotsky, 1978) which may require facilitation or assistance in the CoP to enhance their critical thinking skills (Santrock, 2011). Additional assistance may be needed to help students maintain a level of identity (Wenger, 1998) by contributing meaningful discussion (Garrison et al., 2001; Haavind, 2006; Krathwohl & Anderson, 2010; Liu &Yang, 2012) to the CoP by blog posting more often and at higher levels of critical thinking.

Implications and Recommendations

Student teachers may need more experience prior to student teaching in providing meaningful feedback to their peers. Paulsen, Smith, and Anderson (2014) determined that preservice teachers “found peer feedback beneficial when reflecting on previously implemented lesson plans” (p. 5). These conclusions have implications for teacher education faculty; especially University supervisors who organize and structure the CoP. It is common that student teachers feel overwhelmed with having to respond to all members of a group and all conversations posted to a discussion board. In this situation, student teachers may be experiencing feedback fatigue limiting their thoughtfulness in their response to peers. If the number of blog posts per student teacher does not correlate with their average level of critical thinking, should there be a set requirement as to *how much* student teachers are expected to blog over the duration of a semester? Or perhaps the focus should remain on the *quality* of blog posts?

The following are recommendations based upon the conclusions and implications of this study. If the goal of teacher preparation programs is to guide students in the process of constructing practical knowledge and reflecting with a purpose (Pena & Almaguer, 2012; Perry & Power, 2004), it would be appropriate that University supervisors play a more involved role in guiding learners through the student teaching experience. However, Szabo and Schwartz (2011) and Gilbert and Dabbagh (2005) recognized the importance for students to take responsibility of their own learning through the constructivist approach inherent in learning environments such as a CoP.

It is recommended that a facilitator or University supervisor implement question prompts (MacKnight, 2000; Pena & Almaguer, 2012) and specific topics of discussions to encourage students to utilize higher-order thinking skills within asynchronous discussions. These questions may prompt responses based upon the manner in which the questions are asked and what the questions challenge the student teachers to assess, evaluate, create, or debate. If designed to prompt higher-order thinking, question prompts may serve as a guide for student teacher learning (Pena & Almaguer, 2012; Perry & Power, 2004) yet leave the responsibility on the student teacher (Szabo & Schwartz, 2004) to respond and collaborate with their peers to determine the appropriate analysis or evaluation of a situation. In addition, if University supervisors utilize prompts, they must find credible and reliable resources that suggest ways to format and ask probing questions that will encourage student teachers to utilize higher-order thinking skills.

It is recommended that teacher education faculty that utilize Web 2.0 technologies during the student teaching experience to analyze levels of critical thinking and establish a baseline level of critical thinking expected of their student teachers to achieve through discourse. It is important to determine what should be deemed a satisfactory level of critical thinking in the student teaching experience if student teachers are expected to collaborate by means of asynchronous discussion. Whittington and Newcomb (1993) and Whittington, Stup, Bish, and Allen (1997) recommend that higher education students perform at higher levels of cognition—considering other related factors—but do not provide a specific critical thinking level at which students should achieve. We recommend that a goal for student teacher critical thinking as reflected in blog posts is necessary before analysis or assessment of critical thinking in order to determine if online technologies can be used to enhance student teachers critical thinking skills and abilities.

Though there are many critical thinking assessments available, it is difficult to find a suitable instrument to analyze critical thinking through discourse in an online CoP. It is impossible to determine nonverbal cues of the student teacher based upon one or two paragraphs posted weekly. The FTCB is a valuable tool, but it would be valuable to design an instrument specific to analyzing critical thinking in reflective writings and asynchronous discussions via online environments. Garrison et al. (2001) utilized content analysis when evaluating online discourse, but also recognized the difficulty in obtaining an accurate account of interaction, as what would be collected in a face-to-face setting. However, if the FTCB remains one of the best tools in measuring critical thinking in online environments, measures need to be taken in order to ensure reliability of the instrument. Whittington (1991) received training in the use of the FTCB before implementation. If critical thinking is to be assessed by supervisors that do not have a background in critical thinking literature and wish not to receive such training, an instrument should be devised that would be user friendly and easy to adopt. Such a tool may also be utilized in departments other than Agricultural Education, perhaps English where assessment and analysis of discourse is much more common.

Finally, it is suggested that student teachers be encouraged to attend a weekly focus group with the researcher(s) so that truthful and rich data can be ensured. The student teacher can then clarify any misunderstandings and confirm what was actually done in the classroom setting in relation to the context described in their online postings. A focus group with the student teachers will not only add triangulation to the methodology to gain a better understanding of coding text-based messages in Web 2.0 applications, but will also provide insight to how much privacy the student teachers want, and what benefits they see of the probing questions and prompts. Replication of similar studies with other populations or conditions may help to define frameworks of phenomenon presented in this study.

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Cooperative Teacher Perspective of Student Teaching Skills and Activities

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Abstract

The purpose of this study was to determine cooperating teachers' perceptions of the skills and activities required during the student teaching experience. The population for this descriptive study consisted of individuals who have served as cooperating teachers in Iowa and South Dakota over the last five years (N = 70). After analyzing the statements from eight constructs (evaluation of student performance, teaching activities, FFA, planning instruction, SAE, teaching profession, school-community relations, and adult education), it was determined that cooperating teachers surveyed in this study believe that the seven of the eight constructs were very relevant to the student teaching experience. The eighth construct – adult education- was determined to be irrelevant. This study serves as a feedback loop to university agricultural education student teaching coordinators regarding the skills and activities cooperating teachers believe are relevant to the student teaching experience. Since cooperating teachers exert a powerful influence upon practices adopted by the student teachers, it is critical that teacher education faculty implement cooperating teacher training that emphasize the importance of the required skills and activities required during the capstone student teaching experience. Agricultural education programs nationwide can use these results as guidelines when reviewing expectations of student teaching and cooperating teachers.

Introduction

The importance of the capstone student teaching experience is well documented and has been identified as "a central component of nearly every U.S. teacher education program" (Rozelle & Wilson, 2012, p. 1196). This capstone experience is generally the culminating activity of a teacher preparation program which integrates theory and practice to support the attainment of knowledge, skills, and dispositions (Goodnough, Osmond, Dibbon, Glassman, & Stevens, 2009) necessary for preservice candidates to become "minimally competent in [the] specialized knowledge, human relations, and professional skills" (Henry & Weber, 2010, p. 4) needed by a beginning teacher.

Numerous studies have queried the experience of the student teacher (Dahlgren & Chiriac, 2009; Edgar, Roberts, & Murphy, 2011; Kasperbauer & Roberts, 2007; Mueller & Skamp, 2003; Smalley, Retallick, & Paulsen, 2015; Torrez & Krebs, 2012; Torres & Ulmer, 2007; Valencia, Martin, Place, & Grossman, 2009). Recent research has highlighted the relationship between the preservice teacher candidate and the cooperating teacher. One of the most important roles of a cooperating teacher has been identified as that of mentor (Crasborn, Hennisse, Brouwer, Korthagen, & Bergen, 2011; Enz, Cook, & Wallin, 1991; Sudzina & Coolican, 1994). Scherff and Singer (2012) stated that "preservice teachers seek emotional support and task assistance from their mentors, and that the specific ways that mentors dialog with preservice teachers is important" (p. 264). Additionally, Clark, Triggs, and Nielsen (2013) further expounded that cooperating teachers serve several important roles in the capstone student teaching experience which include: provider of feedback, gatekeeper of the profession, modeler of practice, supporter of reflection, purveyor of context, convener of relation, agent of socialization, advocate of the practical, gleaner of knowledge, abider of change, and teacher of children.

Cooperating teachers have been found to exert a strong influence on the teaching practices of student teachers (Rozelle & Wilson, 2012) and the manner in which they "come to know and participate in the profession" (Clark et al., 2013, p.182). Cooperating teachers often guide student teachers in practical teaching matters such as "safety, due process, when is it necessary to obtain approval from the administration, when a counselor should be consulted, etc." (Awaya, McEwan, Heyler, Linsky, Lum, & Wakukawa, 2003, p. 53). Additionally, Torrez and Krebs (2012) reported that master cooperating teachers also provide positive contributions to the student teacher with resources and materials such as access to teaching files, copies of textbooks, and assessments. When considering the vast gamut of roles the cooperating teacher plays, it is not surprising that student teachers believe the cooperating teacher "to be one of the most important contributors to [the] teacher preparation program" (Clark et al., 2013, p. 163).

Henry and Weber (2010) professed "a teacher who agrees to supervise a student teacher has consented to assume one of the most responsible, influential, and exciting roles in teacher education" (p. 2). When considering the importance of the cooperating teacher's impact on the success of a teacher education program, it is surprising that "the voices of the cooperating teacher…largely remain absent in the extant literature" (Torrez & Krebs, 2012, p. 486).

Rozelle and Wilson (2012) exclaimed that values and behaviors exhibited by cooperating teachers exerted "a dominant influence" (p. 1204) on the practices adopted by the student teachers. Since the "most legitimate knowers" (Sleeter, 2001, p. 209) are the ones who participate in an experience, it is therefore important that cooperating teachers are given the opportunity to share their perspective regarding the important aspects of the clinical activities and experiences of the student teaching experience.

Theoretical Framework

The theoretical framework for this study is founded in Ajzen's (1991) theory of planned behavior displayed in Figure 1. Ajzen (1991) defined the theory of planned behavior as "a theory designed to predict and explain human behavior in specific contexts" (p. 181).

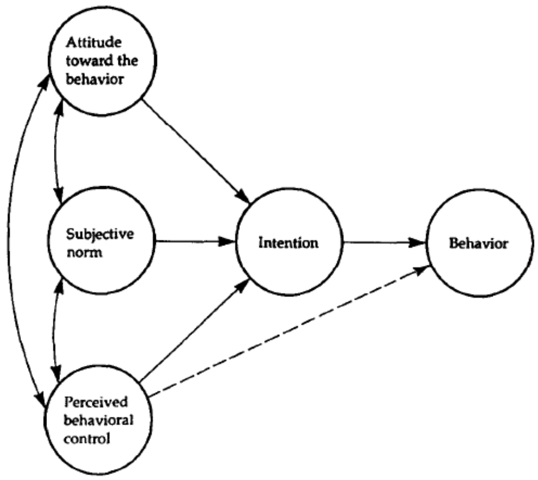

Figure 1. Theory of Planned Behavior. Ajzen, I., (1991). Theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 182. doi: 10.1016/0749-5978(91)90020-T.

Three primary beliefs—behavioral beliefs, normative beliefs, and control beliefs—converge to determine one's intention to perform a given behavior. One's attitudes regarding implementing a particular behavior comes specifically from a personal consideration of the potential outcome of a given behavior. Normative beliefs held by an individual influence one's perception of peer acceptance of implementing a specific behavior. A third antecedent of intention is perceived behavioral control. This precursor to intention is based upon an individual's perception of the level of difficulty in performing the behavior.

Cooperating teachers are considered an important extension of the teacher education program (Clark et al., 2013); therefore perceptions regarding the relevance of student teacher activities required by the teacher education program impacts intention to implement the activities in the cooperating teacher's agricultural education program. As a role model who can influence the teaching practices of student teachers (Rozelle & Wilson, 2012), it is important to understand cooperating teachers' attitudes and beliefs. Building upon the Theory of Planned Behavior, the purpose of this study was to determine cooperating teachers' perceptions of the activities required during the student teaching experience.

Two specific objectives guided the study:

1. Determine Iowa and South Dakota cooperating teachers' perceived level of relevance regarding required student teaching activities and skills.
2. Identify the relevance of student teaching skills and activities associated with the student teaching experience as perceived by Iowa and South Dakota cooperating teachers.

Methods/Procedures

The population for this descriptive study consisted of individuals who have served as cooperating teachers in Iowa and South Dakota over the last five years *(N = 70)*. We purposively selected this convenience sample to better understand cooperative teachers' perceptions within the states of Iowa and South Dakota. We identified participants by contacting the teacher education coordinator at each institution and obtained a contact list for cooperating teacher host sites. All data were collected during the fall semester of 2014.

The instrument used in this study was developed by Smalley, Retallick and Paulsen, (2015) who studied agricultural student teachers' perspectives of the relevance of student teaching skills and activities. The instrument was developed by reviewing student teaching handbooks (*N* = 22) from each NC-AAAE teacher preparation institution to determine the requirements expected during the student teaching experience. A document analysis of the handbooks resulted in a list of student teaching activities that were categorized into eight primary constructs: planning instruction, teaching, and evaluation of student performance, Supervised Agricultural Experience (SAE), FFA, school–community relations, adult education, and teaching profession.

Smalley, Retallick and Paulsen, (2015) piloted the instrument and reported internal consistency for each summated scale by construct (Table 1) as recommended by Nunnally and Bernstein (1994). Reliability coefficients ranged from α = 0.72 to α = 0.88 and were considered acceptable to good (George & Mallery, 2003).

Table 1
Constructs, Number of Items, and Internal Consistency of Researcher-Designed Instrument from Pilot Study

Construct	Number of items	Alpha[a]
School–community relations	14	0.88
Planning instruction	14	0.87
SAE	10	0.84
Teaching profession	8	0.82
FFA	15	0.81
Evaluation of student performance	5	0.79
Teaching	18	0.76
Adult education	5	0.72

[a] = Cronbach's alpha. Scale: >.9 = Excellent, >.8 = Good, >.7 = Acceptable, >.6 = Questionable, >.5 = Poor and <.5 = Unacceptable (George & Mallery, 2003).

Dillman, Smyth, and Christian's (2009) tailored design method was used to develop the electronic survey instrument and the data collection process. All activities were not identical among programs, but were developed into constructs. Cooperating teachers were asked to evaluate the perceived relevance of each student teaching skill or activity within each construct on a three-point Likert-type scale (1 = *irrelevant*, 2 = *relevant*, 3 = *very relevant*). The midpoint of the scale—*relevant*—was determined because the statements were derived from handbooks and activities currently required in agricultural teacher education capstone experiences. Jacoby and Matell (1971) found justification in scoring Likert-type scale items dichotomously and trichotomously and concluded that "reliability and validity are independent of the number of scale points" (p. 498).

The usable response rate was 74.28% (n = 52), which represented respondents from cooperating teachers in Iowa and South Dakota. To control for nonresponse error, we compared early and late respondents as recommended by Lindner, Murphy, and Briers (2001) and found no statistically significant differences. Data were analyzed using descriptive statistics. To categorize each statement and construct, we established the following mean ranges: very relevant = 3.0–2.34, relevant = 2.33–1.67, and irrelevant = 1.66–1.00.

Results/Findings

The purpose of this study was to determine the extent to which cooperating teachers deem traditionally required student teaching skills and activities relevant as part of the capstone student teaching experience. Summated means (grand means) were calculated for each of the eight constructs (Table 2). Respondents considered seven of the eight constructs very relevant as part of the student teaching experiences. Cooperating teachers considered one construct—adult education—as irrelevant for student teaching.

Table 2
Relevance of Constructs Perceived by Cooperating Teachers

Construct	Grand mean	*SD*
Evaluation of student performance	2.90	0.31
Teaching Activities	2.71	0.43
FFA	2.63	0.49
Planning instruction	2.61	0.51
SAE	2.60	0.53
Teaching profession	2.50	0.55
School–community relations	2.36	0.61
Adult education	1.52	0.56

Note. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

Planning instruction activities associated with the student teaching experience focused on collecting/reviewing documents and reviewing agricultural education classroom procedures. Respondents considered all but two planning instruction activities as very relevant (Table 3). Respondents identified, *participate in administrative duties of the agriculture education program* and *review articulations/other agreements between the Agricultural Education program and post-secondary program(s)* as relevant.

Table 3
Relevance of Planning Activities Associated with Cooperating Teachers

		Irrelevant		Relevant		Very relevant			
Planning instruction activities	*n*	*f*	%	*f*	%	*f*	%	*M*	*SD*
Meet with the advisory council/committee about the local agriculture program	52	0	0.00	1	1.92	51	98.08	**2.98**	0.56
Inventory and evaluate references and instructional aids in the school and community	52	0	0.00	11	21.15	41	78.85	**2.79**	0.41
Determine school policies and procedures for handling FFA and other organization accounts	52	0	0.00	11	21.15	41	78.85	**2.79**	0.41
Develop a unit plan for each unit you teach	52	0	0.00	11	21.15	41	78.85	**2.79**	0.41
Utilize a plan book or appointment book to schedule classes and activities	52	0	0.00	14	26.92	38	73.08	**2.73**	0.42
Develop learning experiences for students with special needs along with the special education teacher	52	0	0.00	14	26.92	38	73.08	**2.73**	0.42
Determine procedures for purchasing tools, equipment, teaching materials, and supplies	52	2	3.85	15	28.85	35	67.31	**2.63**	0.56
Develop learning experiences for talented and gifted students	52	1	1.92	17	32.69	34	65.38	**2.63**	0.58
Review and demonstrate proper safety procedures in the school agriscience or ag. mechanics lab	52	2	3.85	15	28.85	35	67.31	**2.63**	0.56
Obtain a copy of your cooperating teacher's course outlines, description, or syllabus	52	0	0.00	19	36.54	33	63.46	**2.63**	0.49
Survey the agriculture facilities	52	2	3.85	2	51.9	2	44.2	**2.40**	0.57

to determine the quantity and quality of tools and equipment by instructional areas				7	2	3	3		
Prepare and use teaching/lesson plans for all lessons	52	3	5.77	25	48.08	24	46.15	**2.40**	0.6
Participate in administrative duties of the agricultural education program including Perkins reports, FFA program of activities, and Annual FFA and SAE reports.	52	4	7.69	31	59.62	17	32.69	**2.25**	0.59
Review articulations/other agreements between the Agricultural Education program and post-secondary program(s)	52	4	7.69	33	63.46	15	28.85	**2.21**	0.57
Planning activities construct								**2.61**	**0.51**

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

Teaching activities associated with the student teaching experience focused on successful classroom teaching in a variety of settings. Respondents considered all teaching activities very relevant with the exception of *utilize a resource person*, which they considered relevant (Table 4).

Table 4

Relevance of Teaching Activities Associated with Cooperating Teacher

		Irrelevant		Relevant		Very relevant			
Teaching activities	*n*	*f*	%	*f*	%	*f*	%	*M*	*SD*
Direct student laboratory Experiences	52	0	0.00	3	5.77	49	94.23	**2.94**	0.24
Conduct a class discussion	52	0	0.00	6	11.54	46	88.46	**2.88**	0.32
Prepare and use a variety of teaching aids	52	0	0.00	6	11.54	46	88.46	**2.88**	0.32
Prepare a bulletin board (traditional or electronic) for teaching/learning or motivation	52	0	0.00	6	11.54	46	88.46	**2.88**	0.32
Plan, organize, conduct, and evaluate a field trip	52	0	0.00	8	15.38	44	84.62	**2.85**	0.36
Use interest approaches to motivate students to learn	52	0	0.00	9	17.31	43	82.69	**2.83**	0.38
Direct a student presentation	52	1	1.92	8	15.38	43	82.69	**2.81**	0.44
Evaluate your cooperating teacher's teaching performance	52	0	0.00	11	21.15	41	78.85	**2.79**	0.42
Have a full teaching load of all classes	52	0	0.00	12	23.08	40	76.92	**2.77**	0.42
Teach a lesson using a computer	52	0	0.00	12	23.08	40	76.92	**2.77**	0.42
Develop and present a program/presentation on agricultural awareness	52	1	1.92	11	21.15	40	76.92	**2.75**	0.48
Utilize students' experiences in the teaching/learning process	52	0	0.00	14	26.92	38	73.08	**2.73**	0.45
Review discipline policies and procedures with the cooperating teacher and prepare written classroom and laboratory rules that you will enforce	52	1	1.92	12	23.08	39	75.00	**2.73**	0.49
Conduct a class using small group Instruction	52	0	0.00	16	30.77	36	69.23	**2.69**	0.46
Use reference and resource materials (e.g., AEA, Internet, extension, community colleges)	52	0	0.00	21	40.38	31	59.62	**2.60**	0.50
Direct students in problem solving	52	1	1.92	19	36.54	32	61.54	**2.60**	0.53
Supervise students engaged in independent learning activities	52	2	3.85	28	53.85	22	42.31	**2.38**	0.57
Utilize a resource person	52	13	25.00	27	51.9	12	23.08	**1.98**	0.67

	2	
Teaching activities construct	**2.71**	0.43

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

E*valuation of student performance* activities focused on methods of student evaluation used during student teaching and are shown in Table 5. Respondents considered all evaluation activities very relevant.

Table 5
Evaluation of Student Performance Activities by Cooperating Teachers

Performance Activities		Irrelevant		Relevant		Very Relevant			
	n	f	%	f	%	f	%	Mean	SD
Construct tests to assess student understanding, growth, and development	52	0	0.00	3	5.77	49	94.23	**2.94**	0.24
Develop and communicate methods for evaluating student performance	52	0	0.00	4	7.69	48	92.31	**2.92**	0.27
Develop and use a grading rubric for class evaluation	52	0	0.00	6	11.54	46	88.46	**2.88**	0.32
Review tests and other evaluation instruments with the cooperating teacher	52	0	0.00	6	11.54	46	88.46	**2.88**	0.32
Utilize a grading system consistent with school policy and expectations of the cooperating teacher	52	0	0.00	9	17.31	43	82.69	**2.83**	0.38
Evaluation of student performance construct								**2.90**	**0.31**

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

Supervised Agricultural Experience activities focused on helping students with their SAE projects and gaining a better understanding of the SAE program. Respondents considered all supervised agricultural experience activities as very relevant with the exception of *work with employers and/or parents to develop students' SAE programs*, which they considered relevant (Table 6).

Table 6
Evaluation of Supervised Agricultural Experience Activities by Cooperating Teachers

Activities Dealing with SAE		Irrelevant		Relevant		Very Relevant			
	n	f	%	f	%	f	%	Mean	SD
Relate classroom instruction to students' SAEs	52	0	0.00	9	17.31	43	82.69	**2.83**	0.38
Direct students in keeping records of their SAE	52	1	1.92	9	17.31	42	80.77	**2.79**	0.46
Help students with SAE plans and Agreements	52	1	1.92	10	19.23	41	78.85	**2.77**	0.47
Discuss SAE with the cooperating teacher and/or administrator	52	2	3.85	11	21.15	39	75.00	**2.71**	0.54
Guide students in the selection and/or expansion of their SAE	52	2	3.85	17	32.69	33	63.46	**2.60**	0.57
Help students understand how SAE relates to tasks performed by people in agricultural occupations	52	1	1.92	17	32.69	34	65.38	**2.63**	0.53
Assist students in solving problems associated with their SAE programs	52	1	1.92	22	42.31	29	55.77	**2.54**	0.54
Teach two lessons integrating personal finance into SAE.	52	0	0.00	28	53.85	24	46.15	**2.46**	0.50
Conduct SAE follow-up sessions	52	4	7.69	24	46.15	24	46.15	**2.38**	0.63
Work with employers and/or parents to develop students' SAE programs	52	6	11.54	25	48.08	21	40.38	**2.29**	0.67
SAE activities construct								**2.60**	**0.53**

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

FFA activities focused on providing students with leadership development and gaining a better understanding of the FFA program. Respondents considered all, but one FFA activities very relevant (Table 7). They considered *assist in organizing the local FFA test plot* as being relevant.

Table 7
Cooperating Teachers Perception of FFA Activities Associated with Student Teaching Experience

Activities involved with FFA		Irrelevant		Relevant		Very Relevant			
	n	f	%	f	%	f	%	Mean	SD
Supervise one FFA activity other than a regular meeting	52	0	0.00	4	7.69	48	92.31	**2.92**	0.27
Discuss with the cooperating teacher how to appropriately integrate FFA into classroom instruction	52	0	0.00	9	17.31	43	82.69	**2.83**	0.38
Help officers plan an agenda and serve as FFA adviser for one or more FFA meetings	52	0	0.00	9	17.31	43	82.69	**2.83**	0.38
Prepare a team (or individual) for a CDE event.	52	0	0.00	9	17.31	43	82.69	**2.83**	0.38
Discuss fund-raising activities with the cooperating teacher	52	0	0.00	10	19.23	42	80.77	**2.81**	0.40
Assist FFA officers with their duties as Needed	52	1	1.92	12	23.08	39	75.00	**2.73**	0.49
Assist in planning/attend/participate in a state or national FFA leadership conference	52	1	1.92	14	26.92	37	71.15	**2.69**	0.51
Relate FFA activities to class Instruction	52	0	0.00	18	34.62	34	65.38	**2.65**	0.48
Obtain and review a copy of the FFA chapter's program of activities	52	0	0.00	20	38.46	32	61.54	**2.62**	0.49
Teach one or more lessons on leadership or FFA	52	2	3.85	17	32.69	33	63.46	**2.60**	0.57
Plan and supervise an overnight trip involving students	52	2	3.85	20	38.46	30	57.69	**2.54**	0.58
Assist a member in applying for an award or scholarship	52	2	3.85	20	38.46	30	57.69	**2.54**	0.58
Assist a committee in planning and conducting an event	52	1	1.92	23	44.23	28	53.85	**2.52**	0.54
Review procedures for state and county fair entries	52	5	9.62	18	34.62	29	55.77	**2.46**	0.67

Assist in organizing the local FFA test Plot	52	17	32.69	27	51.92	8	15.38	**1.83**	0.68
FFA activities construct								**2.63**	**0.49**

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

School–community relations activities focused on providing visibility for an agricultural education program. Respondents considered 8 of 14 school–community relations activities very relevant (Table 8). They considered six activities relevant: *visit with agribusiness leaders about the local agriculture program*, *attend or assist with a school function or athletic event*, *visit with other community leaders about the local agriculture program*, *attend at least one community related meeting*, *visit the county Extension office to gather information about agriculture in the community*, and *trade student teaching responsibilities with a student teacher in another school*.

Table 8
Cooperating Teachers Perceptions of School-Community Relation Activities

School-Community Relations		Irrelevant		Relevant		Very Relevant			
	n	f	%	f	%	f	%	Mean	SD
Confer with administrators about the qualities they want to see in a good teacher and go over important points in interviewing for a teaching position	52	2	3.85	8	15.38	42	80.77	2.77	0.51
Develop correspondence for teachers, administrators, and parents to inform and secure permission for field trips and/or overnight trips	52	4	7.69	9	17.31	39	75.00	2.67	0.62
Participate in parent-teacher and/or IEP Conferences	52	3	5.77	11	21.15	38	73.08	2.67	0.58
Attend school related meetings such as faculty meetings, parent's association, school board, etc.	52	3	5.77	14	26.92	35	67.31	2.62	0.60
Have a school district administrator who is responsible for teacher evaluation observe your teaching and provide suggestions for improvement	52	3	5.77	14	26.92	35	67.31	2.62	0.60
Visit a high school agriculture program in a neighboring community. Consider visiting a school that is on a different schedule (block or traditional) from your student teaching center	52	4	7.69	13	25.00	35	67.31	2.60	0.63
Visit one or more other classes	52	3	5.77	15	28.85	34	65.38	2.60	0.60
Visit other rural and/or agricultural businesses in the community	52	3	5.77	23	44.23	26	50.00	2.44	0.61
Visit with agribusiness leaders about the local agriculture program	52	5	9.62	35	67.31	12	23.08	2.13	0.56
Attend or assist with a school function or athletic event	52	9	17.31	29	55.77	14	26.92	2.10	0.66
Visit with other community leaders about the local agriculture program	52	7	13.46	37	71.15	8	15.38	2.02	0.54
Attend at least one community related meeting such as civic organizations,	52	11	21.15	30	57.69	11	21.15	2.00	0.66

garden clubs, Farm Bureau, fair board, etc.									
Visit the county extension office to gather information about agriculture in the community	52	12	23.08	32	61.54	8	15.38	1.92	0.62
Trade student teaching responsibilities with a student teacher in another school for one day	52	17	32.69	27	51.92	8	15.38	1.83	0.68
School-community relation construct								2.36	0.61

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

A*dult education* activities focused on promoting agricultural education beyond the classroom. Respondents considered all adult learning activities as irrelevant (Table 9).

Table 9
Adult Education Activities Perception by Cooperating Teachers

Adult Education Activities		Irrelevant		Relevant		Very Relevant			
	n	f	%	f	%	f	%	Mean	SD
Meet with an advisory committee to plan adult education activities	52	24	46.15	23	44.23	5	9.62	1.63	0.66
List procedures used by the cooperating teacher in planning, conducting, and evaluating adult education activities	52	26	50.00	24	46.15	2	3.85	1.54	0.58
Review past adult education activities conducted by the cooperating teacher	52	25	48.08	26	50.00	1	1.92	1.54	0.54
Participate in adult education activities	52	28	53.85	23	44.23	1	1.92	1.48	0.54
Plan, conduct, and/or coordinate an adult education activity	52	30	57.69	22	42.31	0	0.00	1.42	0.50
Adult education activities construct								1.52	0.56

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

T*eaching profession* activities focused on being part of organizations and excelling at classroom teaching. Respondents considered all, but three teaching profession activities very relevant (Table 10). They considered three activities relevant: *attend a local education association or school professional development event*, *meet with the local educators' association representative* and *serve on a faculty/staff committee*.

Table 10
Teaching Profession Activities Perceived by Cooperating Teachers

Profession Activities		Irrelevant		Relevant		Very Relevant			
	n	f	%	f	%	f	%	Mean	SD
Discuss with the cooperating teacher the appropriate balance between personal and professional responsibilities	52	0	0.00	4	7.69	48	92.31	2.92	0.27
Review and discuss with cooperating teacher their teaching and extended/summer contract including salary schedule	52	0	0.00	9	17.31	43	82.69	2.83	0.38
Attend a sub-district/district/area/ regional teacher ag association or FFA meeting	52	0	0.00	14	26.92	38	73.08	2.73	0.45
Become familiar with the teaching standards. Complete a mock evaluation with the cooperating teacher and begin identifying artifacts that would demonstrate proficiency	52	3	5.77	10	19.23	39	75.00	2.69	0.58
Discuss professional organizations (local and state education associations, NAAE, ACTE, etc.) as well as local community organizations with the cooperating teacher	52	3	5.77	11	21.15	38	73.08	2.67	0.58
Attend a local education association or school professional development event	52	8	15.38	23	44.23	21	40.38	2.25	0.71
Meet with the local educators association Representative	52	13	25.00	23	44.23	16	30.77	2.06	0.75
Serve on a faculty/staff committee (ex. School Improvement)	52	18	34.62	25	48.08	9	17.31	1.83	0.71
Teaching activities profession construct								2.50	0.55

Note. Item mean is shown in boldface. Scale: 1 = Irrelevant, 2 = Relevant, 3 = Very relevant.

Conclusions/Implications/Recommendations

The findings of this study shed light on cooperative teachers' perspectives regarding the relevance of activities that are commonly part of the agricultural education student teaching experience and serves as a feedback loop to university agricultural education student teaching coordinators regarding the skills and activities cooperating teachers believe are relevant to the student teaching experience. Since cooperating teachers exert a powerful influence upon normative belief development (Ajzen, 1991) and ultimately upon the practices adopted by the student teachers (Rozelle and Wilson, 2012), it is critical that teacher education faculty implement cooperating teacher training that emphasize the importance of the required skills and activities required during the capstone student teaching experience.

Cooperating teachers surveyed in this study considered seven of the eight overall constructs very relevant. These findings confirm the relevance of the skills and activities currently used by teacher education programs in Iowa and South Dakota. They considered one construct—adult education—as irrelevant. Given the decreased focus on adult farmer programs in Iowa and South Dakota, it's logical that cooperating teachers in this study find adult education less relevant than the other constructs. Because of the lack of an immediate need for adult education principles, cooperating teachers feel less focus should be spent on adult education at the time of student teaching. While Knowles, Horton, and Swanson (2012) would argue that some adult teaching methods would be appropriate for secondary-aged students, agriculture teachers might be better served if adult education programming was offered through graduate or continuing education after they gain some experience in the classroom.

The findings of this study are consistent with Torrez and Krebs (2012) who suggested that part of being a master cooperating teacher is assisting student teachers with teacher development activities associated with evaluating student performance. In this study such activities included developing tests to assess students, developing a method for evaluating student performance, and utilizing a grading system. The cooperating teachers surveyed in this study found the activities and skills related to the evaluation of student performance were very important to the capstone student teaching experience.

This study has implications for institutions that are planning to evaluate current teacher education programs or preparing to revamp student teaching experiences and expectations of cooperating teachers. Agricultural education programs nationwide can use these results as guidelines when reviewing expectations of student teaching and cooperating teachers. This study serves as a foundation for further investigation. The voices of university supervisors should also be heard. Future research should seek to determine if all teacher preparation programs require similar experiences. Little is known about how student teaching experiences are reviewed and how recommendations are handled at each teacher preparation institution. Replicating this study with all teacher preparation programs would add to the body of knowledge for the agricultural teacher education profession and potentially improve the impact of the student teaching experience nationally.

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Peer Review in Agricultural Education: Interrater Reliability of Manuscript Reviews for the 2014 National Agricultural Education Research Conference

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Abstract

This study analyzed 336 peer reviews of 112 manuscripts submitted for possible presentation at the 2014 National Agricultural Education Research Conference (NAERC). There were scoring errors on 6.8% of the reviews; the most frequent errors were failure to record a score or assigning a score above the range of points possible for one or more of the review criteria. The coefficient of variation (C_V) for same-paper ratings of manuscript quality ranged from 3.94% to 96.43% with a mean of 19.65% (SD = 15.22%). The interrater reliability for same-paper evaluations of manuscript quality was .15. The C_Vs for reviewer same-paper reject-accept recommendations ranged from 0.00% to 98.97% with a mean of 38.80% (*SD = 22.72%*). *The interrater reliability for same-paper reject-accept recommendations was .09. On 82 (73.21%) manuscripts all three reviewers agreed on the manuscript's relevance to agricultural education. Mean manuscript quality scores explained 68.3% of the variance in mean reject-accept recommendations leaving 31.7% of the variance unexplained. There were no significant ($p >$ .05) differences by academic rank in ratings of manuscript quality, reject-accept recommendations, or assessments of relevance to agricultural education. The authors offered recommendations for improvement of the NAERC manuscript review process.*

Introduction

In 1987, Camp, Hillison and Jeffries identified research productivity as the second most important factor (after faculty) in determining reputational quality rankings of university agricultural education programs. More than 20 years later, Birkenholz and Simonsen (2011) developed and tested a theoretical model of characteristics of distinguished agricultural education programs. As posited in their model, Birkenholz and Simonsen also found that research was one of the most often cited characteristics of distinguished programs.

Although agricultural educators publish in numerous journals and present at diverse conferences, the American Association for Agricultural Education (AAAE) sponsors three primary outlets for dissemination of scholarly work; the *Journal of Agricultural Education*, three regional research conferences, and the National Agricultural Education Research Conference (NAERC). Birkenholz and Simonsen (2011) identified professional meetings and presentations as one of the primary means through which faculty and departmental academic reputations are established and maintained. Agricultural education department heads rated presentation of papers at refereed research conferences as the second most important indicator of faculty research productivity; only publication of refereed journal articles was rated higher (Radakrishna & Jackson, 1993).

Papers to be considered for presentation at NAERC are limited to a maximum of 12 pages in length (single-spaced, 12-point Times New Roman font, with 1-inch margins) not counting the references (AAAE, 2014b). Each paper undergoes double-blind peer review by three reviewers using an evaluation rubric containing two scored components. The first component (manuscript quality) contains seven items for reviewers to evaluate overall writing quality and specific manuscript components (introduction, literature review and theoretical/conceptual framework, purpose and objectives, methods, results, and conclusions and recommendations). The manuscript quality evaluation component is internally weighted due to the different maximum point values assigned to different manuscript components (i.e. the introduction section has a maximum value of 5 points while the methods section has a maximum value of 15 points). The second component (reject-accept recommendation) contains a single item on a 1 to 6 Likert-type scale (1 = strongly disagree and 6 = strongly agree) asking reviewers if the paper should be presented at NAERC. A third un-scored component asks reviewers to assess (on a yes or no basis) if the manuscript is relevant to the agricultural education research agenda (Doerfert, 2011) or to agricultural education, broadly defined.

Raw scores for the two scored components (manuscript quality and reject-accept recommendations) are averaged across the three reviewers for each manuscript, converted to z-scores, weighted at .33 and .67, respectively, and added to determine each paper's final evaluation score. Based on AAAE's Protocol Guidelines for Conference Paper Selection, Presentations, and Awards (AAAE, 2011), the research conference chair may accept or reject a reviewed manuscript based on the three reject-accept recommendations alone or use the weighted score; there is no opportunity to revise and resubmit a rejected manuscript. The typical acceptance rate for NAERC is approximately 40% (Ricketts, 2013).

Given the importance of refereed conference presentations, especially NAERC presentations, in establishing faculty and departmental reputations (Birkenholz & Simonsen, 2011; Radakrishna and Jackson, 1993), a need existed to examine the peer review process by which papers are selected. Results from this study were expected to generate discussion and recommendations for improving the peer review process.

Conceptual Framework

Peer review is considered to be the cornerstone of scientific research (Baethge, Franklin, & Mertens, 2013). The British Academy (2007) stated, "Judgements about the worth or value of a piece of research should be made by those with demonstrated competence to make such a judgement" (p. 2). According to Daniel (1993), "Reviewers assume the role as 'Gatekeepers of Science'. . . recommending, in the ideal case, only those. . . manuscripts that meet the highest of scientific standards" (p. 1).

The journal *Philosophical Transactions* became the first peer-reviewed journal in 1752 (Spier, 2002) when the editor submitted manuscripts for "inspection by a select group of members who were knowledgeable in such matters, and whose recommendations were influential in the future progress of that manuscript" (p. 357). From this rather modest start, peer review has developed to the point where it is part of the fabric of scholarly inquiry (Hogden, 1997).

Yet, not all scholars have been entirely complimentary about the peer review process. In his forward to Daniel's (1993) classic, *Guardians of Science: Fairness and Reliability of Peer Review*, Nӧth wrote, "The Peer Review System. Some like it! Some dislike it! Some believe it is unfair! Some suspect it is ambiguous! Regardless of one's position, from the time of its inception in the 17th century it has remained controversial."

One of the oft-cited concerns about the peer review process is a perceived lack of agreement between reviewers as to manuscript quality (Bornmann, Weymuth, & Daniel, 2010; Daniel, 1993; Hodgson, 1997). According to Whitehurst (1984), "There are many reasons to be concerned with interrater agreement in peer review, not the least of which is a prevalent impression that the fate of a manuscript. . . is determined more by luck and editorial bias than to manuscript quality" (p. 26).

Pedhazur and Schmelkin (1991) defined reliability as "the ratio of true-score variance to observed-score variance" (p. 85). Under this definition, each manuscript review (an observed score) can be thought of as containing two components; a measure of actual manuscript quality (true score) and a combination of random and systematic errors (Shrout & Fliess, 1978). Thus, in the context of peer review of manuscripts, interrater reliability can be conceptualized as the extent to which two or more reviewers, using the same evaluation rubric, agree in their assessments of the quality and acceptability of the same manuscript (Huck, 2008; Kottner et al., 2011).

Several studies have been conducted evaluating the reliability of peer reviews. Marsh and Ball (1989) reported a mean interrater reliability of .27 between same-manuscript peer reviews for 10 social science journals. Kravitz et al. (2010) found an interrater reliability of .17 between same-manuscript reviews of 2264 manuscripts submitted to the *Journal of General Internal Medicine*. Hogden (1997) submitted the same grant proposal in the same funding year to two agencies that used the same proposal scoring system. The correlation between the two resulting peer review committee scores was .592, indicating that the scores from one panel explained only 35% of the variance in the scores from the other panel.

Studies have also focused on the qualifications of referees. Hamermesh (1994) concluded from a study which found that almost 12% of referees were from the same university department as the editors that referees may be appointed based on their relationship with the editor rather than on other qualifications. Stossel (1985) found that while the most highly-regarded individuals in a profession may be best suited to serve as referees, these same individuals have the greatest number of obligations, and therefore refuse to review papers more frequently than younger, more inexperienced colleagues. Other studies, however, have found the quality of reviews to be negatively correlated with referee seniority and status, causing the editors to actively seek out less experienced referees of lower academic status (Finke, 1990; Judson, 1994).

Purpose and Objectives

The purpose of this study was to evaluate the peer review of manuscripts submitted for presentation at the 2014 National Agricultural Education Research Conference. Specific objectives were to:

1. Determine the variability of same-manuscript ratings and the inter-rater reliability of peer reviews for manuscript quality scores;

2. Determine the variability of same-manuscript ratings and the inter-rater reliability of peer reviews on reject-accept recommendations;
3. Determine the level of same-manuscript agreement between peer reviewers on their assessment of each manuscript's relevance to agricultural education;
4. Determine the relationships between manuscript quality scores, reject-accept recommendations, and assessment of relevance to agricultural education;
5. Determine whether manuscript quality scores, reject-accept recommendations, and assessments of relevance to agricultural education differed by the academic rank (instructor, assistant professor, associate professor or professor) of the reviewer.

Methods

After institutional IRB approval and approval by the AAAE Research Committee, the lead researcher was provided with access to the Fast Track® manuscript review files for each of the 112 manuscripts submitted for the 2014 NAERC. Each manuscript had been reviewed by three peer reviewers for a total of 336 reviews. Review data were manually entered into an Excel spreadsheet and each reviewer's academic rank was determined using either the AAAE Directory (AAAE, 2014a) or the reviewer's institutional web site. To ensure reviewer anonymity, no reviewer identification information other than academic rank was included in the data set. All data were verified and imported into SAS (Version 9.3) for data analysis.

All reviewers completed their NAERC manuscript evaluations using an online rubric. The rubric contained seven quantitative items for evaluating manuscript quality; introduction (1 - 5 points), literature review and conceptual/theoretical framework (1 - 11 points), purpose and objectives (1 -7 points), methods/procedures (1 - 15 points), results (1 - 11 points), conclusions and recommendations (1 - 15 points), and writing quality (1 - 5 points); total manuscript quality scores could range from 7 to 69 points. The reject-accept recommendation item asked reviewers to rate their level of agreement, on a 1 to 6 scale (1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, and 6 = strongly agree), that the manuscript should be accepted for presentation at the conference. A single yes or no item asked whether the study was clearly linked to the agricultural education research agenda or to agricultural education broadly defined.

Objectives one and two sought to determine the variability and interrater reliability of manuscript quality scores and reject-accept recommendations. For both objectives, the mean total score, standard deviation and coefficient of variation (C_V) were calculated on the reviews for each manuscript and their distributions were examined. The C_V, which expresses the standard deviation as a percentage of the mean ($C_V = M / SD$ x 100), was used as a descriptive measure of the relative variation of reviewer scores for the same manuscript (Freund & Wilson, 1993). According to Abdi (2010), the C_V allows direct comparison of the variation in two or more variables (manuscript reviews) with different means or measured on different scales (such as manuscript quality scores and reject-accept recommendations). Higher C_Vs indicate greater variation among reviewers' ratings.

Intraclass correlation coefficients (ICC) were calculated as the measure of interrater reliability (Shrout and Fliess, 1979). ICC coefficients range from -1/*c* (where *c* is the number of reviewers per manuscript) to 1.00 (Whitehurst, 1984); since the 2014 NAERC used three reviewers per manuscript, the lower limit on negative scores for this study was -.33. As a practical matter, negative coefficients are interpreted as zeros while values of 1.0 are interpreted as perfect agreement among reviewers (Whitehurst, 1984). The ICC "provides an index of the reliability of the ratings for a *single, typical* judge" (MacLennan, 1993, p. 294) and is the most appropriate measure of interrater reliability (Cicchetti, 1980).

According to Whitehurst (1984), the use of ICC for manuscript reviews "corresponds to a one-way random effects analysis of variance (ANOVA) in which separate and independent ratings of each manuscript are treated as subjects" (p. 81). In this analysis, "the intraclass correlation takes the form of the ratio of the variance attributable to manuscripts to the variance attributable to manuscripts plus the error components" (p. 23). This is consistent with the definition of reliability as the "the ratio of true-score variance to observed-score variance" (Pedhazur & Schmelkin, 1991, p. 85).

Shrout and Fliess (1979) identified six forms of ICC depending on the statistical model of the reliability study. In this study, each manuscript was evaluated by a different set of peer reviewers and each scored component (quality score and reject-accept recommendation) was considered a separate item. Thus, the researchers identified the ICCs for objectives one and two as meeting the requirements of ICC(1,1) as described by Shrout and Fliess (1979).

Objective three sought to determine the level of agreement between reviewers on the relevance of the manuscript to agricultural education. Since each reviewer rated this on a yes or no basis, agreement percentages were calculated (Kottner et al., 2011). Although agreement percentages have been criticized for failing to correct for agreement due to chance (Lombard, Snyder-Duch, & Bracken, 2000), the researchers selected this method because, on a practical level, the actual level of agreement, regardless of its source, was the variable of interest. From a research perspective, correcting for chance agreement results in a statistical model of agreement instead of a description of agreement (Uebersax, 1992).

Objective four sought to determine the relationships between manuscript quality scores, reject-accept recommendations, and assessment of the manuscripts' relevance to agricultural education. The magnitude of each correlation was described using the descriptors proposed by Davis (1971).

The final objective sought to determine if differences existed in manuscript quality scores, reject-accept recommendations, or assessments of relevance to agricultural education by reviewer academic rank (instructor or similar, assistant professor, associate professor or professor). One-way analysis of variance (ANOVA) and the chi square test of association were used to analyze data for this objective.

For objectives one through four, manuscripts (N = 112) were the unit of analysis and all statistical results are based on the three reviews for each manuscript. For objective five, individual manuscript reviews (N = 336) were the unit of analysis; no attempt was made to correct for non-independence between observations caused by reviewers evaluating multiple manuscripts.

Reviews from the 2014 NAERC were considered to be a time-place sample representative of past and future NAERC manuscript reviews. As such, the use of inferential statistics was warranted (Oliver & Hinkle, 1982). The .05 alpha level was selected *a priori* for all tests of statistical significance.

Results

One hundred and twelve manuscript submissions were each reviewed by three reviewers for the 2014 NAERC, for a total of 336 manuscript reviews conducted by 151 individual peer reviewers. Of the 336 manuscript reviews conducted, 23 (6.8%) contained one or more scoring errors. The most frequent errors were failing to record a score for an evaluation criterion (18 occurrences) and assigning a score above the rubric's maximum value for an evaluation criterion (16 occurrences). Conference managers typically contact reviewers to resolve errors in scoring, but these corrections cannot be edited in the reviewer's submitted manuscript evaluation rubric (D. Doerfert, personal communication, August 15, 2014). Because the purpose of this study was to determine the reliability of the peer review process as conducted by the peer reviewers, all 336 reviews were included in the analysis.

Objective 1

Objective 1 sought to determine the variability of same-manuscript ratings and the inter-rater reliability of peer reviews for manuscript quality scores. The distribution of the mean quality scores for each manuscript (based on three reviews per manuscript) was negatively skewed (skewness = -0.66) and ranged from 28.00 to 64.33 with a grand mean of 50.24 (SD = 7.47). The distribution of within-manuscript standard deviations was positively skewed (skewness = 1.22) and ranged from 1.73 to 30.99 with an overall mean of 9.18 (SD = 5.48).

The distribution of C_Vs for manuscript quality scores (Figure 1) was positively skewed (skewness = 2.34) and ranged from 3.94% to 96.43% with a mean of 19.65% (SD = 15.22%). None of the 112 manuscripts had perfect agreement between the three reviewers as to manuscript quality score. The interrater reliability of manuscript quality scores for the 2014 NAERC was .15.

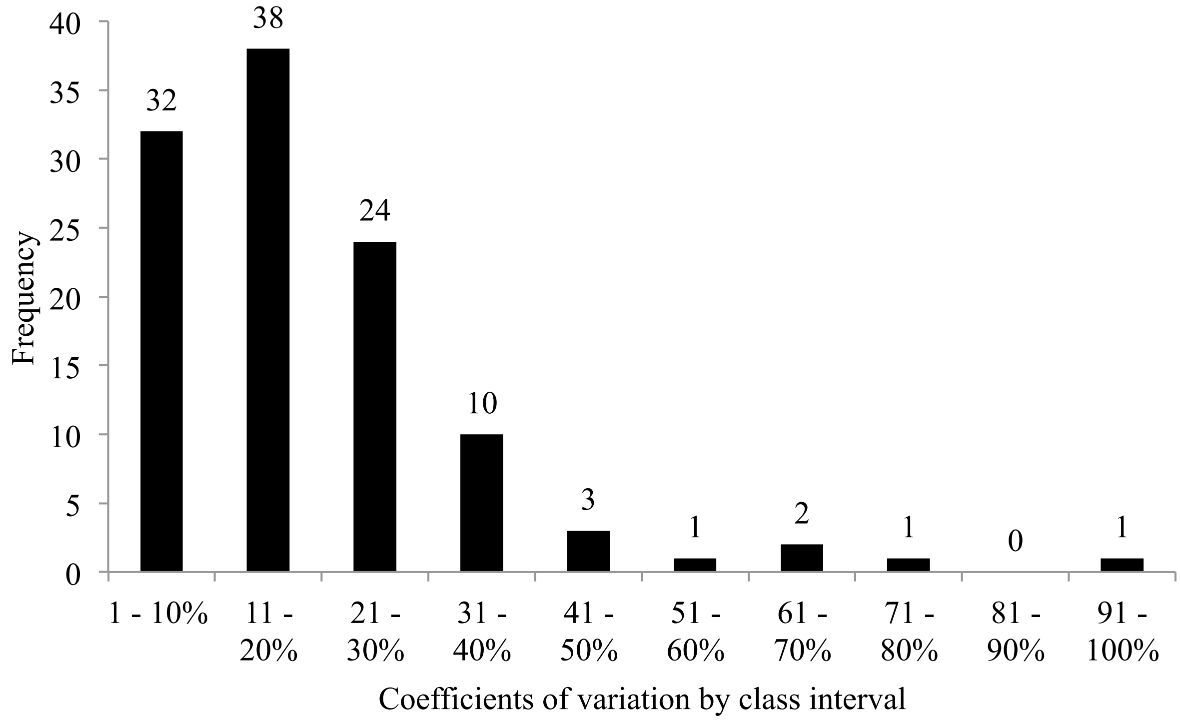

Figure 1. Distribution of coefficients of variation for within-manuscript quality scores.

Objective 2

Objective 2 sought to determine the variability of same-manuscript ratings and the inter-rater reliability of peer reviews on reject-accept recommendations. The distribution of mean reject-accept recommendations for each manuscript (based on three reviews per manuscript) had a slight negative skew (skewness = -0.14) and ranged from 1.33 to 5.67 with a grand mean of 3.98 (*SD* = 1.01). The distribution of within-manuscript standard deviations exhibited little skewness (0.02) and ranged from 0.00 to 2.89 with a mean of 1.39 (*SD* = 0.71).

The distribution of C_Vs for manuscript reject-accept recommendations had a slight positive skew (skewness = 0.21) and ranged from 0.00% to 98.97% with a mean of 38.80% (*SD* = 22.72%). As shown in Figure 2, raters were in perfect agreement in their reject-accept recommendations for 5 of the 112 (4.46%) manuscripts; for 35 (31.25%) manuscripts the C_V was more than 50%. The interrater reliability for accept-reject recommendations for 2014 NAERC manuscripts was .09.

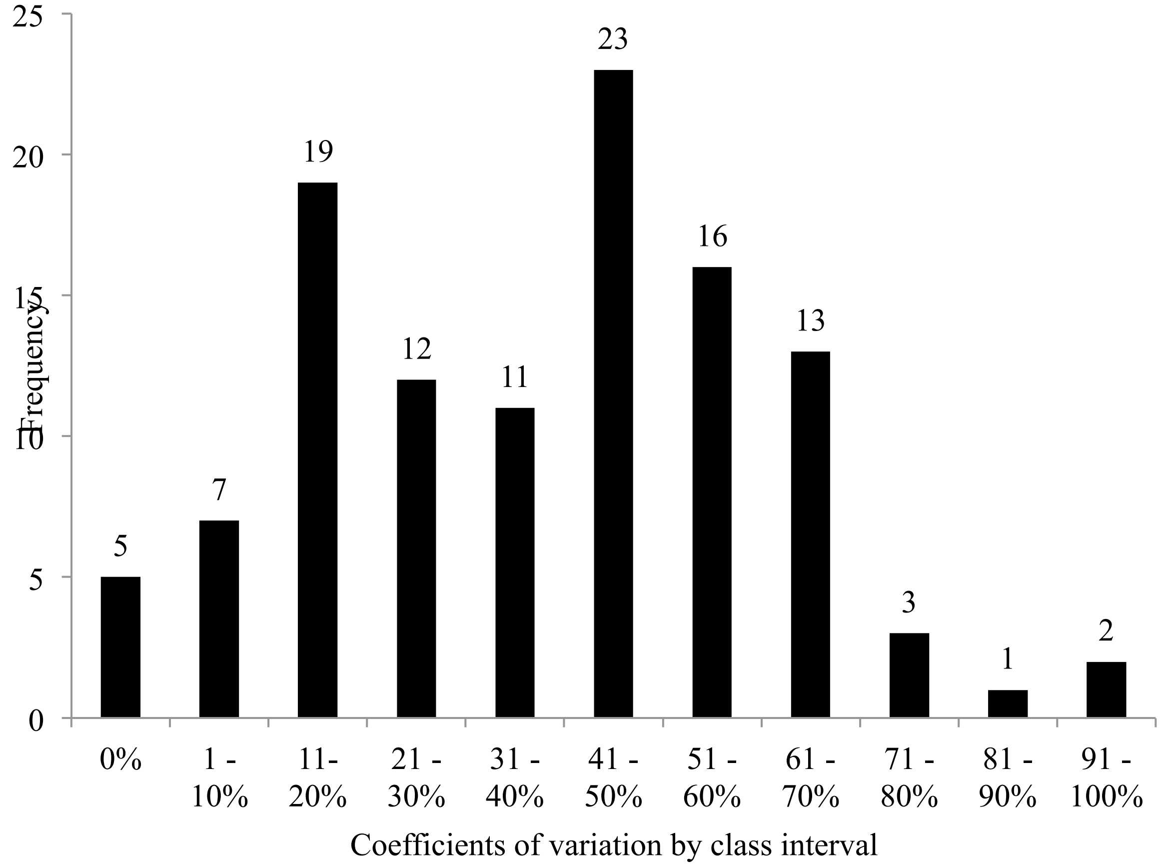

Figure 2. Distribution of coefficients of variation for within-manuscript reject-accept recommendations.

Objective 3

Objective 3 sought to determine the level of same-manuscript agreement between peer reviewers on their assessment of each manuscript's relevance to agricultural education. A single dichotomous item on the evaluation rubric asked reviewers to indicate whether or not the author(s) had clearly linked the study to an agricultural education priority research area (Doerfert, 2011) or to an area of agricultural education not specifically identified in the research agenda. On 82 (73.21%) manuscripts all three reviewers agreed this linkage had been made; on 20 (17.86%) manuscripts two reviewers agreed and one reviewer disagreed; on seven (6.25%) manuscripts two reviewers disagreed and one reviewer agreed. The remaining three (2.68%) manuscripts each had one missing reviewer response to this item.

Objective 4

Objective 4 sought to determine the relationships between manuscript quality scores, reject-accept recommendations, and assessment of relevance to agricultural education. There was a significant ($p < .0001$) and very strong (Davis, 1971) positive correlation ($r = .83$) between the mean quality scores and the mean reject-accept recommendations for the 112 manuscripts submitted for the 2014 NAERC. Mean quality scores explained 68.3% of the variance in mean reject-accept recommendations; however, 31.7% of this variance was not explained by mean quality scores.

There was a significant ($p = .02$) and low (Davis, 1971) positive correlation ($r_s = .24$) between mean relevance ratings and mean reject-accept decisions for the 112 manuscripts. The correlation ($r_s = .16$) between mean relevance ratings and mean manuscript quality scores was not statistically significant ($p = .08$).

Objective 5

Objective 5 sought to determine whether differences existed in manuscript quality scores, reject-accept recommendations, and assessment of relevance to agricultural education by reviewer academic rank. One-hundred-forty-seven unique reviewers performed 336 reviews. Thirteen reviewers (8.84%) were instructors or similar, 76 (51.70%) were assistant professors, 24 (16.33%) were associate professors, and 34 (23.13%) were professors. Of the 336 individual reviews conducted on the 112 manuscripts submitted for the 2104 *NAERC*, 47.6% were completed by assistant professors, 22.2% by professors, 21.6% by associate professors and 8.7% by instructors or similar reviewers. One-way ANOVAs revealed no significant differences ($p > .05$) by reviewer rank in manuscript quality scores, $F(3, 329) = 0.18$, $p = .91$, or in reject-accept recommendations, $F(3, 329) = 0.68$, $p = .57$. Finally, chi square analysis found no significant ($p > .05$) difference by rank in the percentage of reviewers agreeing or disagreeing about the manuscripts' relevance to agricultural education, $\chi^2(3) = 5.51$, $p = .14$. Table 1 provides descriptive statistics for these variables by reviewer rank.

Table 1
Descriptive Statistics for Manuscript Quality Scores, Presentation Recommendation Scores, and Relevance to Agricultural Education, by Reviewer Academic Rank

		Quality Score		Reject-Accept Recommendation		Relevant to Agricultural Education?	
Reviewer Rank	*N*	*M*[a]	*SD*	*M*[b]	*SD*	Yes (%)	No (%)
Instructor or Similar	27	51.46	10.55	4.21	1.40	89.29	10.71
Assistant Professor	159	50.33	11.01	3.96	1.58	85.53	14.47
Associate Professor	72	49.64	11.54	3.79	1.71	92.86	7.14
Professor	75	50.03	12.94	4.11	1.71	94.52	5.48

[a]Valid range of possible total scores was 7 to 69; due to scoring errors, actual scores ranged from 1 to 71. [b]Based on a 6-point scale (1 = "strongly disagree" and 6 = "strongly agree.")

Conclusions, Discussion and Recommendations

A small but critical percentage (6.8%) of all manuscript reviews contained one or more scoring errors. The most common errors were failure to record a score or recording a score above the maximum value for one or more manuscript quality criteria. Conference managers have the responsibility of identifying these errors and contacting reviewers to make corrections, adding to the workload required of conference managers. Because the currently employed Fast Track® manuscript submission and review system does allow automatic data validation or required-response features (D. Doerfert, personal communication, August 15, 2014), the researchers recommend that the AAAE Research Committee explore alternative manuscript submission and review systems that use technology to reduce potentially unnecessary editorial responsibilities. The distribution of C_Vs for same-manuscript quality scores ranged from 3.94% to 96.43% with a mean of 19.65%. Thus, for the average manuscript, the standard deviation between the three reviewers' quality ratings was nearly 20% as large as the mean manuscript quality score. A majority of C_Vs were clustered fairly closely around the mean. However, a significant subset of higher C_Vs was observed, resulting in a positively skewed distribution. This subset indicates that while the majority of the reviewers produced similar scores for manuscripts, a small number of reviewers differed greatly in the scores they assigned to a manuscript. This subset of manuscripts was also impactful on the interrater reliability of manuscript quality scores, which was .15. This is similar to the .17 value reported for the *Journal of General Internal Medicine* (Kravitz et al., 2010) but lower than the .27 reported as the mean of 10 social science journals (Marsh & Ball, 1989). To fully display the impact a small number of manuscript scores had on interrater reliability, 2014 NAERC manuscript quality scores were reanalyzed after removing the 28 manuscripts with C_Vs above the 75th percentile ($C_V > 24.53\%$). The interrater reliability increased (from .15) to .54 for reviews of the 84 remaining manuscripts.

The profession should engage in thought and dialogue about what constitutes quality in each of the seven components evaluated, as well as how to educate reviewers in determining that quality. Reviewer workshops, including sample reviews with subsequent discussion, should be conducted at the regional and national AAAE conferences. While total agreement on quality scores is neither likely nor desirable, the reliability of the review process can be greatly improved through concerted efforts.

The distribution of C_Vs for reject-accept recommendations ranged from 0.00% to 98.97% with a mean of 38.80%. Thus, for the average manuscript, the standard deviation between the three reviewers' reject-accept recommendation was nearly 40% as large as the mean manuscript reject-accept score. The mean C_V for reject-accept recommendations was 1.97 times as large as the mean C_V for quality scores. The interrater reliability of reject-accept recommendations was .09, suggesting that reviewers are less consistent in their reject-accept recommendations than they are with manuscript quality scores. Mean manuscript quality scores explained 68.3% of the variance in mean reject-accept recommendations. Further research is warranted to determine what subjective factors account for the 31.7% of variance not explained by manuscript quality.
As with manuscript quality scores, the interrater reliability of reject-accept recommendations was recalculated after removing the 28 manuscripts with C_Vs above the 75th percentile ($C_V >$ 57.51%). The interrater reliability increased (from .09) to .23 for reviews of the remaining 84 manuscripts. Thus, reviewer training may not prove as successful in increasing the interrater

reliability of reject-accept recommendations given that reviewers may have their own idiosyncratic notions, independent of quality, concerning what constitutes an "acceptable" NAERC manuscript.

Theory holds that the reliability of a measurement scale increases as the number of items increases (Pedhazur & Schmelkin, 1991). Thus, the weighting of the single-item reject-accept recommendation as 67% of the manuscript decision process is questionable. The AAAE Research Committee should consider discontinuing use of this item, reducing its weighting, or redesigning it as a multi-item scale. Additionally, discussion within the profession should focus on the purpose of these two related but separately-weighted review criteria. If the profession expects all variation in reject-accept decisions to be attributed to manuscript quality score, the need for the additional reject-accept criterion is questioned. However, if the profession expects that variation within reject-accept decisions is associated with evaluation components other than quality score, consensus must be reached as to what factors referees should be using to assign reliable reject-accept scores.

Reviewers disagreed on whether or not the author(s) had linked their manuscripts to the agricultural education research agenda on 26.79% of same-manuscript reviews. Since this item is not scored for manuscript selection and had a no significant relationship to manuscript quality scores, the researchers encourage the AAAE Research Committee to consider either deleting this item from the evaluation rubric or incorporating it into one of the evaluation sections in the manuscript score. Although the researchers are supportive of the intent of the item, its inclusion as a stand-alone item does not appear to serve a valid evaluative purpose.

Finally, there was no significant impact of reviewer academic rank on manuscript quality scores, reject-accept recommendations or assessments of a manuscript's relevance to agricultural education. Thus, the probability a manuscript will be accepted or rejected is not affected by the academic rank of the reviewers, suggesting that the quality of the profession's referee process is neither hindered nor strengthened by the use of higher- or lower-ranked referees. Conference planners should continue seeking reviews from all members of the profession, regardless of academic status.

For the 2014 NAERC, manuscripts were reviewed by instructors or similar, 8.0%; assistant professors, 47.3%; associate professors, 21.4%; and professors, 22.3%. When compared to the number of unique reviewers within each academic rank, the percentage of unique reviewers at the associate professor level was lower (16.33%) than the percentage of reviews conducted by associate professors (21.60%). The manager of the conference takes on the responsibility of performing reviews either declined or not completed by other reviewers; in 2014, the conference manager was an associate professor. His unprecedented high number of reviews is likely to have inflated the number of reviews taken on by the associate professor ranks within the profession, suggesting that the overall group has performed a higher number of reviews, when in fact, one associate professor has performed a higher number of reviews. There were the greatest number of unique assistant professors serving as reviewers; the percentage of unique reviewers at the assistant professor level (51.70%) greatly exceeds their percentage within the professional membership (29.9%). According to the most recent data available (Swortzel, 2011), the AAAE faculty membership consists of 10.8% instructors, 29.9% assistant professors, 24.6% associate professors, and 34.7% professors. Clearly assistant professors, who made approximately half of the unique reviewers and conducted almost half of the reviews, but only make up 29.9% of the membership population, are carrying a disproportionate share of the professional load in reviewing NAERC manuscripts, as has been previously posited by Stossel (1988). Associate professors and, especially, professors need to increase their level of involvement in reviewing NAERC manuscripts when time and availability allow.

As demonstrated by the literature, an ideal peer-review process has yet to be found in any research profession. However, periodic evaluation of a discipline's peer-review process enables the discipline to identify and address components of the process needing improvement. This study sought to describe the current status of the NAERC peer review process and bring to light both strengths and weaknesses of the process with the intention of generating discussion among members of the profession. As the agricultural education profession continues to improve its peer-review process, this study can serve as a benchmark on which to evaluate the results of these efforts.

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Utilizing the Tuning Protocol to Generate Peer Feedback During Student Teaching Lesson Plan Development

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Abstract

Self-adequacy during the student teaching experience is high on the list of concerns expressed by student teachers (Fritz & Miller, 2003; Ng, Nicholas, & Williams, 2010). That factor, in combination with others, determines the goals set by student teachers and sparks motivation to engage in effective instructional planning (Baylor & Kitsantas, 2005). The focus on structured instructional planning is important as pre-service teachers develop lessons to attain high levels of pupil achievement. The purpose of this study was to determine student teacher perceptions of the utilization of a tuning protocol (Allen & McDonald, 1993; Easton, 2009) when using peer review to revise lesson plans. When open coding was used in analyzing student teacher perceptions, four themes emerged: benefits, drawbacks, structure of the tuning protocol, and recommendations for future use. The majority of student teachers were satisfied with the outcomes of the tuning protocol review process and planned to use it in their professional careers. It is recommended that further research be conducted with agricultural education teacher preparation programs throughout the nation in order to clarify and add breadth to this line of study.

Introduction

Limited research has been conducted on the instructional planning process during student teaching in agricultural education (Greiman & Bedtke, 2008). An essential role of teacher preparation programs is to persuade pre-service teachers of the importance of instructional planning and to develop them into effective instructional planners (Baylor & Kitsantas, 2005). Being an effective instructional planner relies heavily on the degree to which pre-service teachers feel capable of designing an instructional plan and the cognitive and metacognitive abilities they exhibit (Baylor & Kitsantas, 2005; Driscoll, 2000; Reiser & Dick, 1996; Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger, 1987).

"Teacher [preparation programs] attempt to sort out which factors contribute to developing pre-service teachers and which factors may undermine their development" (Knobloch, 2006, p. 36), particularly the self-efficacy and confidence of pre-service teachers' teaching ability. Self-adequacy during the student teaching experience is high on the list of concerns expressed by student teachers (Fritz & Miller, 2003; Ng, Nicholas, & Williams, 2010) and it is that factor, in combination with other factors, that determines the goals set by student teachers and sparks motivation to engage in effective instructional planning (Baylor & Kitsantas, 2005).

Self-adequacy concerns are often experienced by pre-service teachers and have an influence on the teachers' ability to teach in the classroom (Fritz & Miller, 2003). Lesson plan design and development has often been a concern of beginning teachers (Fritz & Miller, 2003; Greiman & Bedtke, 2008; Veenman, 1984). In a study conducted by Ng et al. (2010), it was concluded that pre-service teachers believed their self-efficacy rested in their ability to manage student learning, such as through their implementation of appropriate pedagogical and assessment strategies. Research further indicates building pre-service teacher self-efficacy should be an integral component in teacher preparation programs (Ng et al., 2010). Although Krysher, Robinson, Montgomery, and Edwards (2012) found student teachers may be confident in constructing lesson plans, most found it difficult to identify materials helpful in the development of curriculum. Even fewer student teachers in their study perceived they understood how to effectively assess student learning. Bandura (1986) suggested an individual's perceived self-efficacy is a determining factor of future behavior. With these concerns in mind, what are ways teacher educators can build pre-service teacher self-adequacy with respect to instructional implementation and assessment strategies?

Vygotsky envisioned the success of individual development through cooperative environments (DiPardo & Freedman, 1988). Though it may seem as such, educators do not work alone. Rather, the efforts of educators themselves matter just as much as the efforts of their colleagues when determining the learning of students and the way a program is implemented (McDonald, Mohr, Dichter, & McDonald, 2007). Therefore, mutual are values, standards, methods, and problems of practice among pre-service teachers and their peers. McDonald et al. (2007) suggested that pre-service teachers stop trying to manage instructional planning problems alone. McDonald et al. (2007) also noted that educators may fail to see problems of their practice unless they "dare to inquire about them together" (p. 2). This manner of peer feedback promotes student-centered learning and encourages pre-service teachers' to share their work in front of larger audiences (DiPardo & Freedman, 1988).

The focus on structured instructional planning is important as pre-service teachers develop lessons to attain high levels of pupil achievement. Sung (1982) found pupils taught with less structured lesson plans were lower achieving. Instructional planning integrated with proactive strategies gives the student teacher the upper hand on successful class sessions and control over what may happen with their pupils (Bond & Peterson, 2004; Duke & Madsen, 1991). But the question remains, what combination of instructional planning practice and the utilization of peer feedback will benefit pre-service teachers before entering the professional education field?

Conceptual Framework

This study is based on the conceptual framework of Easton (2009), and Allen and McDonald (1993). David Allen and Joseph McDonald created tuning protocols at the Coalition of Essential Schools (Easton, 1999). When the term protocol is identified, it is not regularly associated with the educational processes. The term protocol may be associated with diplomacy to govern who greets whom first when governmental officials meet; it may be used to describe what enables computers to communicate successfully with one another; or it may refer to what ensures faithful replication of a medical treatment (McDonald et al., 2007). Protocols used in education however, serve as a structural guide for groups of educators to formally reflect and provide peer feedback regarding the planning and implementation of instructional strategies that best meet the needs of their students (Breidenstein, Fahey, Glickman, and Hensley, 2012; McDonald et al., 2007). The researcher-modified tuning protocol used in this study is depicted in Figure 1.

20 Minute Lesson Plan Tuning Protocol		
Presentation	Presenter shares the problem or draft of the plan currently under development and provides relevant information about efforts to date	5 minutes
Clarifying Questions	Group asks clarifying questions of the presenter. Solutions are not yet offered.	2 minutes
Silent Idea Generation	Members write down ideas or suggestions	3 minutes
Group Discussion	The group discusses ideas and solutions. The presenter listens and records suggestions.	8 minutes
Reaction	Presenter reacts to any responses he or she chooses. This is their opportunity to reflect upon new ideas they received.	2 minutes

Figure 1. Tuning Protocol procedure adapted from Easton, 2009.

Tuning protocols can be described as a method in which teachers can present actual work before their peers in a structured, reflective discourse in order to receive thoughtful, critical feedback to 'tune' the work to a higher standard (Allen, 1995; Easton, 1999; McDonald et al., 2007). Breidenstein et al. (2012), further defined tuning protocols as a "structured process that allows a teacher to gather the multiple perspectives of colleagues on a piece of work for the purpose of improving it, refining it, or bringing it more "in tune" with her stated goals or purposes" (p. 35). Educational tuning protocols were first developed as a method to critique the design and context for student exhibitions, but this same process is valuable for critiquing many components of education (Easton, 1999). For example, a tuning protocol is beneficial when examining a unit or lesson plan, an evaluation system or rubric design, a classroom management plan, or when implementing problem solving strategies (Easton, 1999).

McDonald et al. (2007) stated soon-to-be professional educators are responsible for their own learning and may fail to see their own mistakes in practice unless they utilize professional peers. Research further indicates pre-service teachers have difficulty when constructing and matching objectives and forms of evaluations (John, 2006; John, 1991; Joyce & Harootunian, 1964). The goal of the tuning protocol is to narrow the gaps that occur between the lesson plan and its perceived outcome (Breidenstein, Fahey, Glickman, Hensley, 2012). By using honest feedback from professional peers to assist in identifying errors in planning, pre-service teachers can make adjustments prior to implementing a lesson or teaching strategy. This open and honest conversation can build professional habits that encourage further inquiry and reflection (McDonald et al., 2007; Topping, Smith, Sawnson, & Elliot, 2000).

Purpose and Objectives

In order to guide student teachers in lesson plan development, instruments must be identified to assist in this process that will increase educational outcomes. The purpose of this research study was to determine student teacher perceptions of the utilization of a tuning protocol when using peer review to revise lesson plans, interpreting qualitative data from a quantitative perspective (Creswell & Plano Clark, 2011). This study aligns with the American Association for Agricultural Education Research Priority Area 4: “Meaningful, Engaged Learning in All Environments: examine the role of motivation, self-regulation, metacognition, and/or reflection in developing meaningful, engaged learning experiences across all agricultural education contexts” (Doerfert, 2011, p. 9). The following objectives were sought:

1) Determine student perceptions of tuning protocol utilization during the student teaching experience.

2) Determine suggestions student teachers recommend to improve the tuning protocol process.

3) Determine student teacher understanding of the purpose of the tuning protocol.

Methodology

The population of this study consisted of agricultural education students (N=26) from Iowa State University who participated in the student teaching experience during the Fall of 2013, Spring of 2014, and Fall of 2014. The tuning protocol was implemented during the mid-term and final student teaching meetings as an opportunity for student teachers to receive peer feedback through a professional development model. Pre-service teachers were asked to identify and provide copies of an implemented lesson plan which needed improvement (mid-term meeting) or was very strong (final meeting) along with accompanying student work for peer review during the mid-term and final student teaching meetings.

Given the printed protocol and verbal instructions, pre-service candidates were randomly assigned to a group of three. One person was designated as the presenter while the other two served as peer reviewers/participants. Graduate students or university faculty members facilitated each group and acted as the official timer. For this study, the timing was modified from the original framework of one hour (Easton, 2009) to 20 minutes per student to better fit into the mid-term professional development meeting timeframe.

Much like the preconference observation in the clinical supervision cycle (Goldhammer, 1969) the student teacher began the tuning protocol process by identifying and sharing an area of concern from a previously implemented lesson for which guidance and advice was needed. A brief overview of the lesson was presented which included the background, setting, objectives, teaching strategies, and examples of student work. During the initial presentation, peers took notes and silently reflected upon the presenter's scenario. Easton (2002) identified the importance of allowing a presenter time to share without interruption.

Next, two minutes were allowed for peers to ask clarifying questions. Feedback was not given during this stage. Immediately following the clarification stage, three minutes were provided for group members to silently reflect and provide written feedback for the presenter. Group discussion followed the silent idea generation stage. For eight minutes, the presenter listened and took notes as group members provided feedback and engaged in discussion regarding lesson improvement. In the final stage, two minutes were provided for the presenting student teacher to reflect upon and react to the peer feedback. Final thoughts about how the lesson could be improved in the future were written and shared. The 20-minute tuning protocol session was then repeated with the remaining group members.

Student teachers were asked to answer two open-ended questions upon completion of the tuning protocol and peer reflection experience: 1) what are your perceptions of utilizing the tuning protocol? 2) what suggestions do you have for further implementation of the tuning protocol? Student teachers responded in a private group housed in the NAAE Communities of Practice. Additionally, the student teachers were asked to complete a paper survey which included 10 questions regarding their perceptions of the tuning protocol format and process.

To accomplish objective one of the study, each response on the NAAE Communities of Practice was copied to a word document to be kept anonymous. Open coding was used to begin to "[identify] themes or categories that seem[ed] of interest" (Esterberg, 2002, p. 158). After the responses had been reviewed twice at a two-week interval, recurring themes emerged regarding the use of the tuning protocol: 1) benefits, 2) drawbacks, 3) structure and format, and 4) recommendations for future implementation. Statements were designated as *Benefits* when the student teachers proclaimed to have gained a positive experience; *Drawbacks* when students had a negative experience; *Structure* was coded when one of the components of the protocol was listed; and *Future Implementation* responses were coded when students offered suggestions for further implementation. Intrarater reliability was determined to be high ($\alpha = .94$) (Ary, Jacobs, & Sorensen, 2010). Responses that were not reliably coded were coded a third time. Qualitative data collected in this study was interpreted from a quantitative perspective (Creswell & Plano Clark, 2011) and allowed for both depth and breadth to guide the researchers in understanding the student teacher perspectives (Johnson, 2014). The mixed method approach was needed to analyze and interpret qualitative data that emerged through thematic coding while quantitative methods were used to determine response frequencies.

In order to achieve objective two and three, student teachers completed a written survey to gain perspective on their thoughts for future implementation of the tuning protocol. Much of the recommended future use appeared during the coding of the responses posted on NAAE CoP. Two questions were asked to determine student teachers' perceptions of the purpose and importance of the tuning protocol. The survey data was compiled and ordered by question type. Analysis and interpretation of qualitative data emerged through thematic coding. Through quantitative methods of determining frequencies, the amount of times each theme was discussed by the student teacher was also analyzed.

Results

Objective one sought to determine the perceptions of student teachers when utilizing the tuning protocol to revise lesson plans through peer feedback. When open responses for the reflective questions were investigated, the coded responses, as shown in Table 1, fit into four main categories: *Benefits*, *Drawbacks*, *Structure*, and *Future Implementation*. Table 1 depicts selected responses for each theme that emerged. The student teachers responded most frequently regarding the *Benefits* of the tuning protocol process.

Table 1
Selected Responses Regarding the Tuning Protocol Process

Themes	Example Responses
Benefits	*[The tuning protocol] forces me to actually come up with questions and ideas to present to my peers in the small group discussion.*
	…it's always nice to have a second opinion on what to do, especially in teaching.
	Through this protocol, I have learned the importance of peer review.
	It allows us to look at our lesson designs and how we can improve on them to help better serve our students.
Drawbacks	*I prefer the more informal discussion that occurs when teachers compare notes and give each other ideas for improvement.*
	Not sure if this activity was beneficial to me at the current moment—I am unaware if I will be teaching these lessons in the future.
	I feel that I struggled with the first tuning protocol because I was absent from the [initial] meeting so I had no idea what was going on.
	I think we could get it done in a lot less time, except when we veer off and talk about experiences of stories.
Structure	*The only thing I would change would be to shorten the time for discussion and more time using clarifying questions.*
	I think it has value but the structure could be changed.
	I like how it is set up with timed parts of discussion, idea generation, and questions.
	I think it's beneficial to have the time structure and to actually stick to it in order for it to be truly effective.

Future Implementation	*This would also be great for undergrads….so that their peers can critique it before they ever even teach the lesson (or use it in [Methods Course]).* *…I feel the spring student teachers should do this before they go into student teaching with a lesson.* *Maybe it could be done with my advisory committee two times a year or something.* *It would be nice if we had the ability to put this on the CoP [Communities of Practice] throughout the semester to get some feedback…*

Objective two sought to determine feedback student teachers suggested for future implementation of the tuning protocol. Table 2 displays the frequencies and percentages of student teacher responses regarding their perceptions of the using the tuning protocol.

Table 2
Open Coded Responses for Student Teacher Perceptions of Utilizing the Tuning Protocol

	Fall 2013 *n* = 9 Responses = 44[a]		Spring 2014 *n* = 12 Responses = 65[a]		Fall 2014 *n* = 4[b] Responses = 14[a]	
Themes	*f*	%	*f*	%	*f*	%
Benefits	28	52.3	41	63.6	9	64.3
Drawbacks	2	18.5	3	4.5	1	7.1
Structure	4	23.1	6	9.1	3	21.4
Future Implementation	10	6.2	15	22.7	1	7.1

Note. [a] Total responses represent all responses given by student teachers, all students gave more than one response. [b] One student did not provide feedback after utilizing the tuning protocol.

Student teachers in the spring 2014 and fall 2014 semester recognized the components of the tuning protocol that were most and least helpful in revising their own as well as their peers' lesson plans on a questionnaire. Student teachers were asked to identify as many components as they felt appropriate. Table 3 reports the frequency and percentages for each category. Student teachers found *Group Discussion* (*n*=15, 46.9%) to be the most helpful when revising their own lesson plans. *Group Discussion* (*n*=8, 33.3%) and *Clarifying Questions* (*n*=7, 29.2%) were the most helpful when providing peer feedback. *Time Allowed* (*n*=8, 42.1%) per component, or the time structure, was perceived to be the least helpful revising lesson plans. One student teacher did not provide responses to the component benefits statements.

Table 3
Student Perceptions of Tuning Protocol Component Benefits, Spring 2014 and Fall 2014 (n=16[a])

	Components						
	P	CQ	SIG	GD	R	TA	DS
Helpfulness	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*
Most helpful revising own lesson plan	1(3.2)	6(19.4)	3(9.7)	15(46.9)	2(6.5)	1(3.2)	3(9.7)
Most helpful for peer feedback	3(12.5)	7(29.2)	1(4.2)	8(33.3)	4(16.7)	1(4.2)	0(0.0)
Least helpful revising own lesson plan	2(10.5)	2(10.5)	3(15.8)	1(5.3)	3(15.8)	8(42.1)	0(0.0)
Least helpful for peer feedback	2(11.1)	3(16.7)	2(11.1)	2(11.1)	4(22.2)	3(16.7)	2(11.1)

Note. Components of the tuning protocol represented in the instrument were: Presentation (P), Clarifying Questions (CQ), Silent Idea Generation (SIG), Group Discussion (GD), Reaction (R), Time Allowed per Component (TA), and Debriefing Session (DS). [a] One student did not provide responses after utilizing the tuning protocol.

Student teachers (*n* = 17) surveyed in the spring 2014 and fall 2014 semesters, participated in a tuning protocol group with three or five members plus a university supervisor. Table 4 displays the respondents' frequency and percentages of responses. Eleven student teachers (64.7%) were *Satisfied* with the outcomes of the tuning protocol process in revising their lesson plans. Three student teachers (17.6%) were *Very Satisfied* with the outcomes, two student teachers (11.8%) remained *Neutral,* while one (5.9%) was *Dissatisfied* with the tuning protocol process. As for future use in their professional careers, five student teachers (29.4%) identified *Maybe,* ten (58.8%) identified *Some* use while two (11.7%) identified that they would implement the tuning protocol often.

Table 4
Student Teacher Norms for Tuning Protocol Utilization (N = 17)

	Spring 2014 and Fall 2014	
	f	%
Number of group members		
3	12	70.6
5	5	29.4
University Supervisor present		
Yes	17	100.0
No	0	0.0
Satisfaction with Tuning Protocol outcomes		
Very Satisfied	3	17.6
Satisfied	11	64.7
Neutral	2	11.8
Dissatisfied	1	5.9
Strongly Dissatisfied	0	0.0
Future Use		
No	0	0.0
Maybe	5	29.4
Some	10	58.8
Often	2	11.7

Objective three sought to determine student teacher perceptions about the purpose of the tuning protocol and the importance of its implementation in the preservice teacher professional development process. Students answered the following question: What is the purpose of utilizing the tuning protocol? Thirteen student teachers (76.5%) felt that one of the purposes of the tuning protocol was to develop collaboration and reflective skills, six (35.3%) thought the purpose was to revise lesson plans, five student teachers (29.4%) thought the purpose of the tuning protocol was to let classmates borrow ideas for lessons, and three (17.6%) felt the purpose was to involve themselves in higher-order thinking skills. Table 5 displays the frequency and percentages of the student teacher responses.

Table 5
Student Teacher Perception of Purpose of Tuning Protocol (n=16)

	Spring 2014 and Fall 2014	
Purpose	*f*	%
Revise Lesson Plans	6	35.3
Let classmates borrow ideas for lessons	5	29.4
Develop collaboration and reflective skills	13	76.5
Involve ourselves in higher-order thinking skills	3	17.6
Other	4	23.5

Note. Student teachers could choose more than one purpose.

Conclusions and Discussion

Pre-service teacher candidates found peer feedback beneficial when reflecting on previously implemented lesson plans. Feedback was generated to provide for future improvement of lesson design, implementation, and the impact of teaching. Easton (2009) stated the purpose of the tuning protocol was to provide an environment for professional discussion and to initiate conversation that encourages "…groups to explore ideas deeply through student work, artifacts of educator practice, texts relating to education, or problems and issues that surface during the day to day lives of educators" (p. 8).

One student teacher in this study expressed the concern to better serve her students. By recognizing concerns and tailoring educational materials through the tuning protocol, pre-service teachers acknowledged concerns about learner motivation that could positively influence student achievement (Fuller and Brown, 1975; Stair, Warner, & Moore, 2012). Another student stated, "through this protocol, I have learned the importance of peer review." Several studies have noted positive effects of pre-service peer-evaluation (Ozogul, Olina, & Sullivan, 2008). The pre-service teacher being evaluated and the peer performing the evaluation can both benefit from the peer review process (Topping, Smith, Sawnson, & Elliot, 2000).

It was evident that the purpose of the tuning protocol was not clear to all of the student teachers as a range of results emerged from student perceptions. In fact, every option provided on the survey displayed a purpose of the tuning protocol: develop collaboration and reflective skills, to involve student teachers in higher-order thinking skills, revise lesson plans, and borrow ideas from colleagues (Breidenstein, et al., 2012; McDonald, et al., 2007). Student teachers may have mistaken the meaning of 'borrow ideas from colleagues' as having a negative connotation. The idea of using colleagues' ideas and work is more of a collaborative idea where student teachers can take the ideas of others and apply them to their own setting. Preservice teachers need a process such as the tuning protocol to help them develop ideas that are successful and encouraging to their pupils as they further develop skills to be a successful teacher.

Implications and Recommendations

This study is limited to the student teachers who participated; however it serves as contribution to the body of research regarding instructional planning during the student teaching experience. Though the responses deem the tuning protocol to be a beneficial tool, it is important to closely examine drawbacks noted by student teachers. Easton (2002) suggested that the tuning protocol can be adapted to fit specific needs. One student stated, "not sure if this activity was beneficial to me at the current moment—I am unaware if I will be teaching these lessons in the future." During further implementation, student teachers should be informed that the tuning protocol can be used for educational problems beyond lesson design improvement. Though lesson plan improvement is a focused outcome, it is also important that students learn how to effectively collaborate with their peers which is a critical part of professional development (McDonald et al., 2007).

For future studies, it would be purposeful to use control groups who have a university supervisor present in a group and groups without a university supervisor. The use of a facilitator may change the way the students respond to one another, provide feedback, and use decision-making skills during tuning protocol utilization (McDonald et al., 2007). Conclusions are not readily drawn from the student teachers' responses for items that provided the most or least help for revising lesson plans. Further studies should investigate each component of the tuning protocol to gain further student perceptions. Future implementation would be appropriate for undergraduate courses where student teachers are developing mini lesson plans. This would give preservice teachers experience with the tuning protocol, as well as peer feedback for lesson design.

The addition of the tuning protocol to the preservice teacher preparation experience assists student teachers in developing the "habit of reflective thinking and knowing-in-action" (Greiman & Bedtke, 2008, p.56). To further enhance the reflective practice of preservice teacher education candidates, it is recommended that the tuning protocol be introduced in coursework and practicum experiences prior to the capstone student teaching experience. By utilizing the tuning protocol earlier in the teacher education program, candidates will further develop skills to enhance open and honest inquiry and reflection (McDonald et al., 2007) regarding their teaching practice. It is recommended that further research be conducted with agricultural education teacher preparation programs throughout the nation in order to clarify and add breadth to this line of study.

"Teachers seek out one another for advice and feedback, and not just in the formal processes of the tuning protocol" (Easton, 2002, p. 30). With this in mind, time for collaboration during the student teaching experience must be set aside for student teachers to have the opportunity to seek collaboration with one another. Upon further implementation of the tuning protocol and peer evaluation process, teacher preparation programs will be able to assist pre-service teachers in building confidence in lesson plan and activity design. With this confidence, agricultural educators will be able to better motivate future generations of learners in agricultural education.

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Preliminary Development of an Attrition Risk Assessment Instrument for Secondary Agricultural Educators

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Secondary agricultural education has consistently faced a shortage of teachers for the past several decades. Since there are not enough newly qualified teachers certified annually to fill all the vacancies, attrition is the more logical component to address. The purpose of this research was to develop and pilot test an attrition risk assessment instrument. Principal components analysis resulted in a 25-question instrument, with 17 questions measuring attrition risk in four constructs. Cronbach's alpha indicated overall instrument reliability was $\alpha = .76$*. Recommendations include further development and refinement of constructs and questions. Additionally, longitudinal data should be collected in order to identify the threshold magnitude of each risk factor which results in actual exit of a teacher from the profession.*

Introduction

There is a perpetual shortfall of teachers in the secondary agriculture classroom (Kantrovich, 2010) and the broad profession of agricultural education recognizes this shortage of quality teachers. The National Council for Agricultural Education (The Council) and the American Association for Agricultural Education (AAAE) have both placed an emphasis on ensuring a sufficient quantity of high quality teachers to provide agricultural education (Doerfert, 2011; The National Council for Agricultural Education, 2000). In fact, three of the six research priority areas published in the current AAAE National Research Agenda relate either directly or peripherally to ensuring an adequate supply of agriculture teachers (Doerfert, 2011).

In 2009, 667 (6.3%) of the 10,600 secondary agricultural education positions nationwide called for replacements (Kantrovich, 2010). Despite nearly 400 emergency certifications, 21 programs were unable to operate due to the lack of a qualified teacher (Kantrovich, 2010). Two solutions have been proposed to address this shortage: preparing more newly qualified teachers to be recruited into the profession, and reducing the number of teachers who choose to leave the profession. Ingersoll (2003) suggested that retaining qualified teachers is of greater value than increasing the number of newly certified teachers entering the profession. In order to keep qualified agriculture educators in classrooms and reduce attrition, we must identify and address their reasons for leaving the profession.

A number of studies have investigated variables in current teachers such as satisfaction with their job or problems faced by agriculture teachers (Cano & Miller, 1992; Murray, Flowers, Croom, & Wilson, 2011; Myers, Dyer & Washburn, 2005; Walker, Garton, & Kitchel, 2004), while other studies have investigated teachers' intent to remain in or commitment to the profession (Edwards & Briers, 2001; Kelsey, 2006; Knobloch & Whittington, 2003; Rice, LaVergne, & Gartin, 2011; Thobega & Miller, 2003). Few studies have investigated agriculture teacher attrition from the perspective of those who already exited the profession. No studies, identified by the researchers, have attempted to quantify the level of attrition factors which ultimately result in a teacher's decision to leave. In addition, no instrument has been consistently used in the profession to identify the presence and magnitude of attrition risk factors in secondary agricultural educators. In a meta-analysis of research on teacher retention and attrition, Borman and Dowling (2008) suggested the problem of attrition could be addressed through policies and initiatives. However, with continually diminishing resources, the agricultural education profession would benefit from the ability to identify the most prevalent and pressing attrition risk factors. It is toward this end that the researchers developed an instrument used to assess the presence of known attrition risk factors for secondary agricultural educators.

Literature and Theoretical/Conceptual Framework

Literature on instrument development supports the use of several steps for the identification and development of salient scales, including review of existing literature related to the research topic, review of existing instrumentation previously designed to measure constructs related to the research topic, qualitative investigation with relevant participants to confirm/contribute items and information associated with the research topic, and connection of developed scales to relevant theory (Aude, Mitchell, & Cordes, 2005; Milton, Watkins, Studdard & Burch, 2003; Walker & Fraser, 2005).

The attrition risk assessment instrument developed in this study was informed by Chapman's (1984) model of influences on teacher retention and the theory on teacher attrition as proposed by Grissmer and Kirby (1987). A review of literature regarding retention and attrition was conducted and helped to guide the development of the instrument. Finally, the instrument items and scales were influenced by qualitative interviews conducted with former secondary agriculture teachers regarding their decision to exit the profession (Lemons, Brashears, Burris, Meyers & Price, 2014).

Chapman (1984) proposed that a teacher's decision to remain in the profession is the result of several factors including 1) personal characteristics, 2) educational preparation, 3) initial commitment, 4) quality of first employment, 5) integration into teaching, 6) external influences, and 7) career satisfaction. Grissmer and Kirby (1987) proposed a complementary theory of teacher attrition, suggesting that a teacher's exit from the profession is influenced by natural life and career cycles, where attrition occurs more frequently among novice teachers, decreases as experience increases, and then rises again as teachers near retirement age. In addition to this natural cycle, Grissmer and Kirby (1987) suggested that the following factors contribute to a teacher's decision to leave the profession: 1) the amount of human capital possessed in regard to teaching, 2) the amount and accuracy of information possessed when deciding to enter the profession, 3) previous work and teaching experience, 4) the likelihood of changes in family status after becoming employed, 5) salary and working conditions, and 6) characteristics and compensation of alternative job opportunities.

Literature related to teacher retention and attrition, including literature specific to CTE teachers, and even more specifically to agriculture teachers, lends support to the factors presented in these models. Novice and experienced agriculture teachers have reported problems related to low salaries, extensive responsibilities, lack of administrative support, balancing home and work life, and experiencing burnout (Boone & Boone, 2009; Cano & Miller, 1992; Chenevey, Ewing, & Whittington, 2008; Delnero & Montgomery, 2001; Foster, 2001; Murray, Flowers, Croom, & Wilson, 2011). Furthermore, while some literature differs slightly from the model of teacher retention and the theory of teacher attrition, specifically research regarding personal characteristics, studies investigating teacher commitment and intent to remain in the profession largely support them. It has been found that agricultural work experience, commitment to teaching agriculture, self-efficacy, and human capital investment in teaching agriculture all have a positive relationship with career longevity (Edwards & Briers, 2001; Kelsey, 2006; Knobloch & Whittington, 2003). Previous research has also shown that positive working environments including being surrounded by supportive people and having positive past experiences in high school and post-secondary agricultural education are related to teachers' decisions to enter and remain in the profession (Rice et al., 2011; Thobega & Miller, 2003; Todd, 1983).

Finally, Chapman (1984) illustrated job satisfaction as the final influence on teachers' decision to remain in the profession. Research on agriculture teachers largely disputes this, indicating that both leavers and stayers reported being satisfied with their agriculture teaching position (Bennett et al., 2002; Walker et al., 2004). Additionally, teachers currently teaching agriculture do not indicate dissatisfaction (Bennett, et al., 2002).

Lemons, et al.'s (2014) preceding qualitative research with leavers revealed themes supporting the model of teacher retention (Chapman, 1984), the theory of teacher attrition (Grissmer & Kirby, 1987) and existing literature on agricultural educators. Five themes emerged based on former agricultural educators' statements about the career they exited: 1) Passions for the profession, 2) Alternative opportunities, 3) Expectations, 4) Burdens, retrospectively and 5) People. Sub-themes of students, agriculture and competition were identified under passions for the profession. Expectations resulted in sub-themes of self-expectations for the profession and expectations of others. Finally, multiple responsibilities, time, money and satisfaction appeared as sub-themes of burdens, retrospectively. Some themes described motivators for teachers to remain in the profession, such as the passion held for their career and the people with whom they interacted. Other themes addressed the factors motivating them to exit the profession, even if these factors were recognized retrospectively.

The supporting nature of the four components; Chapman's model, Grissmer & Kirby's theory, existing literature, and preceding qualitative investigation, provided a strong framework within which to begin development of a survey instrument intended to measure the presence of risk factors related to attrition of secondary agriculture educators.

Purpose/Objectives

The purpose of this research was to develop a valid and reliable attrition risk assessment instrument for current secondary agriculture educators.

The single objective of this study was:

1. Determine items and constructs for inclusion in an instrument to assess the presence of attrition risk factors for current secondary agricultural educators.

Methods/Procedures

The scope of this study extends only to the completion of the pilot test of the instrument with rigorous statistical analysis to establish its validity and reliability.

Instrument Development

According to Martinez-Pons (1997) there are four steps in developing items for an instrument; 1) determining the number of items to use, 2) generating item prototypes, 3) determining the items' format, and 4) writing the items. Several items were developed for each construct, since, as Martinez-Pons (1997) explains, one single item does not completely and accurately measure a construct, but many items are needed to measure a portion of the construct. The more items measuring a construct, the more of the construct is measured, thereby increasing accuracy of the instrument (Martinez-Pons, 1997). The number of items for the attrition risk assessment instrument was dependent on the framework previously described. Several item prototypes were drafted.

Once the items for each construct were determined, the format of a 5-point Likert scale was selected. Bradburn, Sudman, and Wansink (2004) identify the Likert scale as the most popular scaling technique in the field of attitude measurement. Furthermore, research shows that while including a median category does increase the number of respondents in that category, it does not affect the ratio of pro to con responses, therefore, Bradburn et al., (2004) recommend including a middle category unless there is a persuasive reason to not.

To ensure validity of the instrument, drafted items were reviewed by a panel of experts, including former agriculture teachers, interviewees from the qualitative phase, and university agricultural education faculty with expertise in instrument development for survey research. Based on this expert review, several items were edited for clarity or eliminated as duplicate questions.

In accordance with protocol approved by Texas Tech University Institutional Review Board, utilizing the tailored design method (Dillman, Smyth, & Christian, 2009), the instrument was administered electronically through Qualtrics™, an online survey website. An email invitation to participate in the research containing a link to the instrument was sent on January 31, 2013. A second email reminder was sent February 8, 2013. A third and final reminder was sent February 18, 2013.

Sample

The target population for this research was all secondary agriculture teachers in Texas. However, this was a pilot test with plans to implement the instrument once reliability and validity were established, therefore researchers restricted the sample to all agriculture teachers in three FFA Areas in Texas. Area I ($n = 110$), Area II ($n = 99$), and Area IV ($n = 112$) were chosen for the sample due to their proximity and existing relationship with Texas Tech University and the researcher ($N = 321$).

Gorsuch (1983, as cited in Warmbrod, 2000) suggested that to perform principal components analysis a minimum ratio of five individuals to every variable with no fewer than 100 individuals can be used when communalities are high and several items load to each factor. It was expected that adequate response would be received from the sample population (N = 321) to establish reliability and stability of factors. Further, Field (2009) reported that stability of factors can be established based on the combination of absolute sample size and absolute magnitude of factor loadings, where higher values of one can compensate for lower values of the other. So, smaller sample sizes may be acceptable if factor loadings are high enough, and smaller factor loadings may be deemed acceptable with larger sample sizes. Of the 321 possible responses, 133 were received, a response rate of 41%. However only 114 (36%) of those were complete and acceptable to be included in the data analysis. Given a sample size of greater than 100, and satisfying the minimum ratio of five responses per variable, excluding the eight demographic questions, principal components analysis was conducted on the data.

Data Analysis

Factor analysis is performed to identify groups or clusters of variables within a data set (Field, 2009). According to Field (2009), factor analysis can be used to construct a questionnaire for measuring an underlying variable. In this case, the researcher sought to construct a questionnaire to measure the underlying variable of attrition risk through a set of possible factors identified through the theoretical framework, literature review and qualitative interviews. Different types of factor analysis can be conducted, with principal components analysis being the most common. Exploratory factor analysis in the form of principal components analysis was conducted in SPSS® 18.0 to explore the data collected through the pilot test. Principal components analysis (PCA) was originally developed under the assumption that the technique would be applied to the entire population of interest, so it was recognized that results would be restricted to the sample collected (Field, 2009).

Data were exported from Qualtrics™ directly into SPSS®18.0 for analysis. Questions 13-19 and 22-25 were reverse coded so that all low scores reflected a negative response while higher scores reflected a positive response.

Reliability

Reliability was calculated using Cronbach's alpha (Field, 2009). Reliability was calculated for each of the four subscales resulting from PCA, as well as for the instrument overall. Reliability scores are reported in the results.

Results

Thirty-two items were formatted and written for inclusion in the electronic questionnaire. Eight questions collected demographic information including birth year, gender, marital status, and number and ages of children. Additionally, participants were asked to report the year they began their career as an agriculture teacher. Finally, participants were asked to list the certifications or licensures they currently possessed as well as any that were in progress.

The remaining 24 items referred to the identified potential attrition risk factors. One question (Q9) was dichotomous, requiring a “yes” or “no” response. Twenty three questions (Q10 – Q32) utilized a 5-point Likert-type scale for response (1 = strongly disagree, 5 = strongly agree) (Figure 1).

Please respond to each statement by indicating your level of agreement.	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
10. I teach agriculture because I enjoy helping students succeed.	❍	❍	❍	❍	❍
11. I teach agriculture because I want to share my passion for agriculture with others.	❍	❍	❍	❍	❍
12. I teach agriculture because I enjoy competition.	❍	❍	❍	❍	❍
13. I am often frustrated because an increasing proportion of my students are not "traditional" agriculture students.	❍	❍	❍	❍	❍
14. I struggle to maintain a good relationship with my teaching partner.	❍	❍	❍	❍	❍
15. I am often frustrated when working with students' parents.	❍	❍	❍	❍	❍
16. My administrators are often a source of frustration for me.	❍	❍	❍	❍	❍
17. I would leave my position as an agriculture teacher for a job that requires less time away from home.	❍	❍	❍	❍	❍
18. I would leave my position as an agriculture teacher for a job that provided greater opportunity for advancement.	❍	❍	❍	❍	❍
19. I would leave my position as an agriculture teacher for a job with a higher salary.	❍	❍	❍	❍	❍
20. My family depends on my income contribution.	❍	❍	❍	❍	❍
21. I expect to teach secondary agriculture until I retire.	❍	❍	❍	❍	❍
22. I expect to pursue a position in administration in the future.	❍	❍	❍	❍	❍

23. Others expect too much from me as an agriculture teacher.	❍	❍	❍	❍	❍
24. I will be willing to leave my position as an agriculture teacher when I accomplish all the goals I have set for myself.	❍	❍	❍	❍	❍
25. I am preparing to take advantage of the right opportunity to leave my position as an agriculture teacher.	❍	❍	❍	❍	❍
26. It would take a unique set of circumstances for me to leave my position as an agriculture teacher.	❍	❍	❍	❍	❍

The realities of being a secondary agriculture teacher match my expectations in:	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
27. Time required	❍	❍	❍	❍	❍
28. Amount of work required	❍	❍	❍	❍	❍
29. Type of work required	❍	❍	❍	❍	❍
30. Difficulty of work	❍	❍	❍	❍	❍
31. Number of responsibilities	❍	❍	❍	❍	❍
32. My ability to be successful	❍	❍	❍	❍	❍

Figure 1. Pilot instrument administered through Qualtrics™

Principal Components Analysis

The correlation matrix for questions nine through 32 was inspected for clusters or groups of correlations among variables. Finding that question nine only showed one significant correlation with another item, it was eliminated from any further analysis. Principal components analysis (PCA) was conducted on the remaining 23 items, using oblique direct oblimin rotation. Oblique rotation should be used when there is reason to believe that the factors should be related (Field, 2009). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, *KMO* = .68, indicating that the patterns of correlations among the variables were compact enough for factor analysis to yield distinct and reliable factors (Kaiser, 1970 as cited in Field, 2009). Any value less than 0.5 is unacceptable, while values 0.5 to 0.7 are mediocre, 0.7 to 0.8 are good, 0.8 to 0.9 are great and greater than 0.9 are superb (Hutcheson & Sofroniou, 1999 as cited in Field, 2009).The KMO values for each item were also inspected, revealing a less than acceptable value for question 14, *KMO* = 0.43. Therefore, question 14 was excluded from any further analysis.

Bartlett's test of sphericity X^2 (231) = 953.42, $p < .001$, indicated that correlations between items were sufficiently large for PCA.

An initial analysis was run with the remaining 22 components, using the Kaiser criterion (Field, 2009) to extract factors with Eigenvalues greater than 1. This resulted in seven factors being extracted with too few items loading per factor, causing difficulty in interpretation. The scree plot was inspected and found to have a clear point of inflection at four factors (Figure 2). The four components had Eigenvalues over Kaiser's criteria of 1 and in combination explained 51.58% of the variance, therefore four factors were retained for the final analysis.

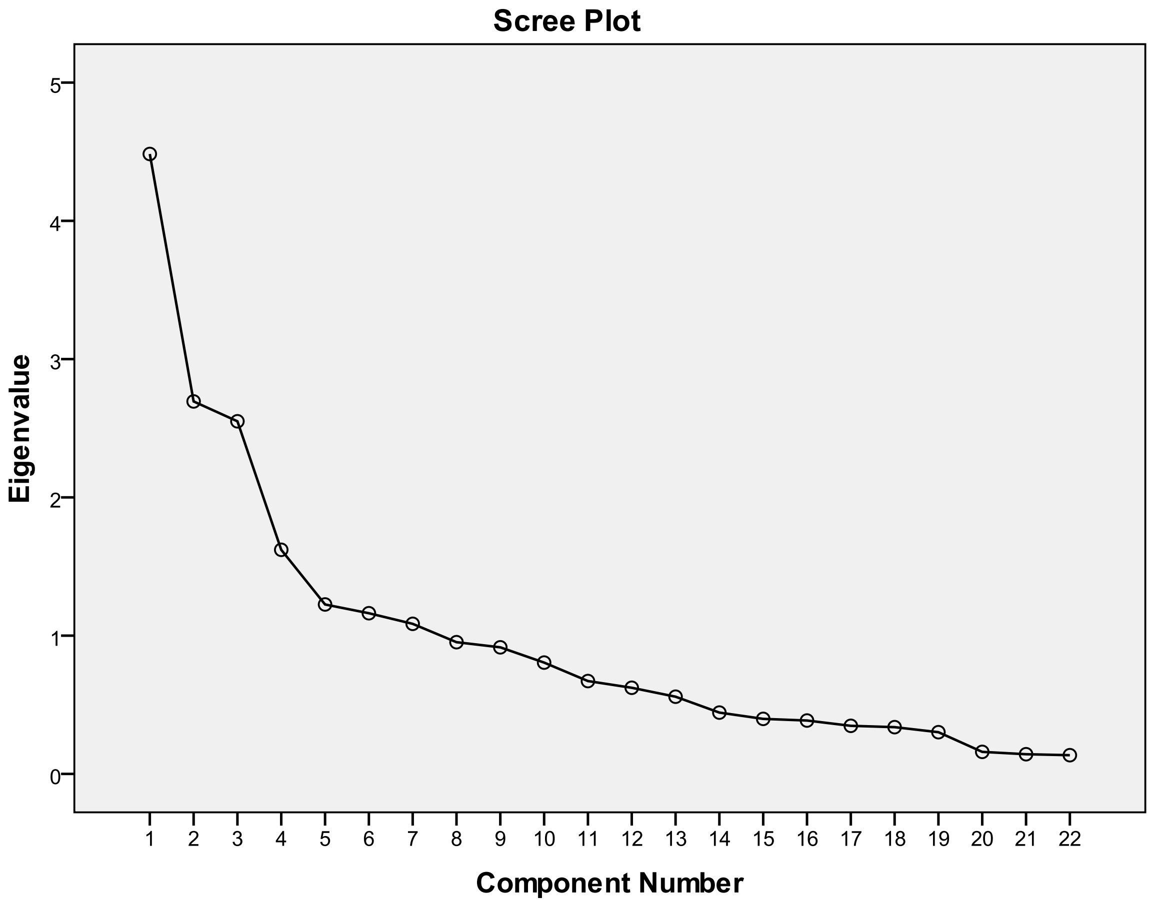

Figure 2. Scree plot depicting Eigenvalues of components

Oblique rotation, was selected, under the assumption that factors were not theoretically likely to be independent (Field, 2009). Specifically, direct oblimin, known as direct quartimin rotation, was selected to ensure high correlation of factors was not allowed (Field, 2009). Table 1 shows the pattern matrix factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents alternative career opportunities, component 2 represents expectations versus realities, component 3 represents passions, and component 4 represents people frustrations.

Table 1
Summary of PCA with oblique rotation results (Pattern Matrix) (N = 114)

	Rotated Factor Loadings			
Question Number	Alternative Career Opportunities	Expectations versus Realities	Passions	People Frustrations
18	.85			
19	.78			
25	.76			
17	.69			
21	.60			.51
26	.60			
24	.57			
16	.47			
23				
28		.85		
31		.77		
27		.74		
29		.63		
30		.60		
32		.53		
10			.90	
11			.89	
12			.80	
13				-.76
15				-.51
20				.50
22				.45
Eigenvalues	4.48	2.69	2.55	1.62
% variance	20.38	12.25	11.59	7.37

Note: only factor loadings above .40 are reported, bolded items are those retained

Only items loading above the critical value .512 were retained (Stevens, 1996, p. 371 as cited in Warmbrod, 2000). Additionally, items which cross-loaded on more than one factor at the critical value of .512 were eliminated. This resulted in five items being eliminated, including questions 21, 16, 23, 20, and 22. The remaining 17 items comprising each component are summarized in Table 2.

Table 2
Summary of retained items comprising each component

Component	Question Number	Item
Alternative Career Opportunities		
	18	I would leave my position as an agriculture teacher for a job that provided greater opportunity for advancement.
	19	I would leave my position as an agriculture teacher for a job with a higher salary
	25	I am preparing to take advantage of the right opportunity to leave my position as an agriculture teacher.
	17	I would leave my position as an agriculture teacher for a job that requires less time away from home.
	26	It would take a unique set of circumstances for me to leave my position as an agriculture teacher.
	24	I will be willing to leave my position as an agriculture teacher when I accomplish all the goals I have set for myself.
Expectations versus Realities		The realities of being a secondary agriculture teacher match my expectations in:
	28	Amount of work required
	31	Number of responsibilities
	27	Time required
	29	Type of work required
	30	Difficulty of work
	32	My ability to be successful
Passions		
	10	I teach agriculture because I enjoy helping students succeed.
	11	I teach agriculture because I want to share my passion for agriculture with others.
	12	I teach agriculture because I enjoy competition.
People Frustrations		
	13	I am often frustrated because an increasing proportion of my students are not "traditional" agriculture students.
	15	I am often frustrated when working with students' parents.

Reliability

Reliability indicates how consistently an instrument reflects the construct it is designed to measure (Field, 2009). Cronbach's alpha was calculated for each of the attrition risk assessment sub-scales, as well as for the instrument overall (Table 3).

Table 3

Summary of reliability scores (Cronbach's alpha)

Scale	Cronbach's alpha	N of Items
Alternative Career Opportunities	.83	6
Expectations versus Realities	.79	6
Passions	.85	3
People Frustrations	.57	2
Overall	.76	17

Cronbach's alpha indicates high reliability on sub-scales alternative career opportunities (α = .83), expectations versus realities (α = .79), and passions (α = .85), as well as for the attrition risk assessment instrument overall (α = .76). Reliability for the fourth sub-scale, people frustrations, was relatively low (α = .57). However, the reliability statistics for the overall instrument were not affected by the deletion of the two items in the sub-scale people frustrations, so those items were retained on the final instrument.

Conclusions/Recommendations/Implications

This study sought to develop a valid and reliable attrition risk assessment instrument for current secondary agriculture educators. The research resulted in a 25-question instrument; eight demographic questions and 17 questions related to possible attrition risk factors. The 17 items retained loaded onto four factors, including passions, alternative career opportunities, expectations versus realities, and people frustrations. Together, these four factors explain 51.58% of the variance. The first factor, passions, accounted for 20.38% of the variance. The second factor, alternative career opportunities, accounted for 12.25% of the variance. The factors expectations versus realities and people frustrations accounted for 11.59% and 7.37% of the variance, respectively. High reliability scores on three of the four sub-scales as well as the instrument overall indicate that the instrument is capable of collecting data identifying the presence of attrition risk factors among a sample of current agriculture teachers.

The fours factors retained as a result of PCA reflect the four components from which the items were developed: Chapman's (1983) model of teacher retention, Grissmer & Kirby's (1987) theory of teacher attrition, existing literature related to agriculture teacher retention and attrition, as well as the preceding qualitative findings of the researchers (Lemons, et al., 2014). The factor loadings and reliability scores for the developed instrument imply that the combined components provided accurate instrument items and constructs, which were similar to the perceptions of current agriculture teachers. Strong reliability scores further confirmed that the instrument items and constructs consistently represented the factors.

While these results and conclusions come with limitations, due to the nature of the sample and the sample size, it remains a logical conclusion that the attrition risk assessment instrument can be utilized to begin identifying attrition risk factors present in a sample of current agriculture teachers. Once identified, those factors might be addressed and possibly reduced in some manner.

The primary recommendation for further research is continued development and refinement of this preliminary instrument, followed by implementation of the attrition risk assessment instrument on a larger sample of agriculture teachers. As with any instrument development, it is necessary to create additional items as well as edit or remove items that do not contribute to the intended purpose of the instrument. Specifically, the fourth sub-scale, people frustrations, currently consists of only two items. If that factor is to be retained, additional items should be written and analyzed for loading onto this factor.

The researcher suggests administering the instrument to the full population of secondary agriculture teachers in Texas, then expanding to populations of agriculture teachers in other states. It is recommended that reliability be recalculated as larger samples complete the instrument. Currently, no scoring guide has been developed for the instrument. The researcher recommends that as baseline information is collected, follow-up studies are conducted with participants to determine who chose to exit. This may provide opportunity to identify the presence of a threshold score at which stayers turn into leavers.

Qualitative interviews with current teachers may be able to shed additional light on the cognitive process they go through in weighing their alternative career options and assessing the net return for staying or leaving.

Further, it is recommended that a model adapted from Chapman's (1984) model of teacher retention and the theory of teacher attrition from Grissmer and Kirby (1987) be constructed and specified to the uniqueness of the discipline of agriculture. This model should incorporate the exiting literature on agriculture teacher retention and attrition, including this study.

Given the factors identified and loaded on the pilot instrument, a recommendation for current teachers as well as teacher educators is to mentor young teachers as they enter the profession so that they develop realistic expectations and sustainable work ethics. It is also recommended that experienced teachers validate the effort and successes of younger novice teachers. A structured, multi-year mentor program may be beneficial in providing a positive first experience for novice teachers, and bolstering their commitment to the profession. It may also help novice teachers to build a strong network of their peers, increasing the human capital and thereby creating a barrier to exiting the profession.

From a teacher educator perspective, there may be value in promoting and supporting a teacher preparation model that includes an extended field experience. Giving pre-service teachers additional time in the field might allow them to develop more realistic expectations. As indicated by the presence of the expectations versus realities construct, teachers may be entering the field with faulty expectations. An extended field experience could provide a more in-depth and accurate representation of the multitude of responsibilities and time agriculture teachers actually dedicate to their career. Not only would this result in teachers having realistic expectations of the career upon entry, it may also result in some pre-service teachers recognizing that they do not want to teach before they ever accept a position, which would avoid their eventual exit from the profession.

Finally, it is recommended that once the attrition risk assessment instrument is implemented, the identified risk factors be addressed in that population or sample. This may come in the form of professional development workshops for current teachers or administrators, changes or modifications to teacher preparation programs, development of teacher mentor programs, legislative lobbying, or open discussions about the current agricultural education paradigm.

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What's All the Pinning About? A Descriptive Content Analysis of Agricultural Communications Students' Pinterest Activity

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Abstract

Pinterest is one of the fastest growing social media sites to date and is currently the fastest growing online content-sharing platform (Delo, 2012; Griswold, 2013; Merrett, 2013). Pinterest's popularity has drawn attention from a variety of fields, including education and marketing, which see Pinterest as a potentially powerful tool. Few studies have been conducted on the use of Pinterest in the university classroom, and none have focused on the specific content students have pinned. To gain a better understanding of what students are pinning, a descriptive content analysis was conducted of the Pinterest activity of agricultural communications students at Texas Tech University. Tens of thousands of pins were found in this study with only a small amount of content related to agriculture or agricultural communications; however, the variety of information and content available on Pinterest makes it a unique option for students and educators. Researchers recommend that Pinterest be considered as an addition to agricultural communications course requirements because of its potential as a learning tool, its visual nature, and its marketing potential. Future research should be conducted to expand the scope of this study to other universities and disciplines so a broader understanding of Pinterest use by students can be obtained.

Introduction

Social media has caused a change in society, especially when considering the ways in which people want to consume information (Qualman, 2009). In 2013, 73% of all adult Internet users engaged in social media use of some kind (Brenner, 2013). Internet users age 18-29 were found to be the most likely to use social networking with approximately 83% of users in this demographic participating in social media (Duggan & Brenner, 2013). It is obvious that college-aged students are engaging in social media use, but its use in the academic realm is less understood.

Increasingly, digital natives, students accustomed to the culture of digital technologies including social media, are entering university classrooms (Prensky, 2001). University faculty are faced with the challenge of finding new ways to meet these students' unique learning styles and must rethink their instructional approaches to deliver information in fresh, new ways that capitalize on what, how, where, and when today's students learn (LaBelle, 2012; Wisniewski, 2010). The learning these students engage in is relevant, real-world, and in many cases, technology-based (Wisniewski, 2010). According to Baird and Fisher (2005), effective and engaging content for today's students must implement multiple sources of Web-based media, including social media, into the university classroom. A study by Moran, Seaman and Tinti-Kane (2011) found that university faculty have been using social media tools in their courses both as an element of the course structure as well as an integrated portion of course assignments. Social media provides students with a variety of benefits including greater student engagement, greater interest, and students taking more control of and responsibility for their education (Blankenship, 2010).

Pinterest is a social bookmarking site that was launched in 2010 and allows users to share content with others by "pinning" visual content to online boards. Each pin contains a visual element, usually a photo, but may be video, that links to external online sites where the content originated when users, also known as pinners, click on the visual image. Pinners also create captions or descriptions for each pin to make their content searchable by other users. Pins can be originally created from other websites or uploaded content. Pins can also be re-pinned from other users. Pinners bookmark items they wish to save by pinning those items to a variety of boards where pins can be categorized however the pinner wishes. Pinterest provides pre-set boards when users create their accounts, but pinners can edit and create new boards to fit their own preferences. Beyond creating and re-pinning content to boards, pinners can like, comment, and tag pins to interact with other pinners.

Pinterest is one of the fastest growing social media sites to date and is currently the fastest growing online content-sharing platform (Delo, 2012; Griswold, 2013; Merrett, 2013). According to the Pew Internet Research Project, in 2012 Pinterest was used by 15% of Internet user compared to Twitter's 16%, and in 2013 grew to 21% surpassing Twitter's 18% share (Lunden, 2013). Pinterest currently has approximately 70 million users and gains an average of 1.9 billion page views per month (Kuang, 2012; Smith, 2014). It is most popular among the 18-29 and 30-49 age groups (Duggan & Brenner, 2013), making both traditional and non-traditional college students part of the target demographic for the site. The Pew Internet Research Project (2013) also found that women were about five times more likely than men to use Pinterest, marking a greater gender difference than is seen for any other social media site.

The rapid popularity of Pinterest has drawn attention to this social media tool from a variety of audiences, including marketing, public relations, education, and communications professionals. Marketers especially have recognized that Pinterest can become a powerful channel for content marketing (Romeri, 2013). Pinterest not only allows individual users to create and share content, but has also introduced pages for business use allowing companies to visually share their products, services and related content to millions of Pinterest users. As of July 2013, approximately 500,000 Pinterest business accounts existed (Smith, 2014). With so many people, students and communication specialists included, utilizing Pinterest for a variety of activities, it is important that agricultural communications faculty understand how Pinterest is being utilized so they can better implement Pinterest into their curriculum or discussions with students about using social media to market and promote businesses.

Approximately 40% of college students are visual learners (Clarke, Flaherty, & Yankey, 2006; Hanson, Nowlan, & Winter, 2012), making a visual platform such as Pinterest particularly interesting as an educational and marketing tool. Hanson, Nowlan, and Winter (2012) stated that Pinterest has great potential for allowing educators to take advantage of the visual aspect of teaching and meeting the needs of their students. Further, with the influx of digitally native students, different approaches to learning must be found. Some educators have found that using Pinterest fosters collaboration between students, especially through the use of group boards when creating and sharing resources (Hanson, Nowlan, & Winter, 2012; Holt, 2012). Utilizing

Pinterest in the classroom provides a new way for students to learn and can improve classroom learning (Holt, 2012). In addition, the agricultural communications student population at Texas Tech University is approximately 75% female. With Pinterest being such a female-driven medium, incorporating it into the classroom creates unique learning activities that are embraced by most students (Gibson, Ahrens, & Irlbeck, 2013). Few studies have been conducted on the use of Pinterest in the university classroom and none have been found that focus on the specific content students have pinned making this study an important addition to our understanding of Pinterest use in the university classroom.

Theoretical Framework

Katz, Blumler, and Gurevitch (1974) developed the theory of uses and gratifications as a means of explaining how people use media to meet, or gratify, a specific need or goal they have. In this theory, media use is determined by individuals based on the expected ability of the media to satisfy the needs they have (Katz, Blumler, & Gurevitch, 1974). Four major qualifications surround this theory as it pertains to media use: (1) media is sought out by individuals intentionally, (2) media choice is driven by the needs or goals of the individual, (3) media use is capable of satisfying a variety of needs, and (4) individuals select and use media that they feel will best satisfy their needs (Baldwin, Perry, & Moffitt, 2004; Katz, Blumler, & Gurevitch, 1974).

Uses and gratifications can also be used to look at the perceived benefits of using new communications technology, including social media (Baldwin, Perry, & Moffitt, 2004). Several studies have investigated social media tools using the theory of uses and gratifications. Smock, Ellison, Lampe, and Wohn's (2011) study found that Facebook users were motivated to use the social media outlet because of its relaxing environment, open information sharing, and the opportunity for social interaction. Kaye (2010) found that blogs were used primarily because of their ease and convenience of use and the wide variety of information and opinions that were shared. Social media outlets have brought a new dimension to the theory of uses and gratifications as the use of these media forms have led to the gratification of the use of media as a social environment (Stafford, Stafford, & Schkade, 2004; Sundar & Limperos, 2013). The ability of Pinterest users to share, comment, like, and tag content with other users promotes a social environment in which users can meet their needs of searching and finding content and information, meeting the social needs and wants that have been explored by earlier uses and gratifications research (Baldwin, Perry, & Moffitt, 2004). Mull and Lee (2014) found that Pinterest users sought five main gratifications, or motivations, when using the site. These motivations included fashion, creative projects, entertainment, virtual exploration, and organization, with the creative projects and organization motivations being unique to Pinterest use (Mull & Lee, 2014). As new media technologies are introduced to users it becomes increasingly important that those seeking to provide information to the public become aware of the motivations and satisfactions presented to those seeking to be informed.

Purpose and Objectives

According to the National Research Agenda Priority Area 2, social science research goals should address "the use of new technologies and social networking tools for communication to selected target audiences" (Doerfert, 2011, p. 17). With a growing number of social media outlets available to and being used by students, it is important that educators understand the motivations behind their social media use, particularly when looking to use this media in the classroom. If students use social media sites because they satisfy a need vital to their ability to learn, educators can better utilize these tools to promote student learning and engagement in course content. Also, as faculty train future agricultural communicators, ensuring that these students understand how to use popular social media sites is important since sites like Pinterest are becoming an integral part of many organizations' marketing schemes (Mangold & Faulds, 2009).

This study sought to determine what agricultural communications students were pinning as a first step to better understanding college students' Pinterest use. The purpose of this study was simply to investigate and describe the frequency and content of agricultural communications students' pins as a means of helping agricultural communications faculty understand how this social media outlet is utilized by students. The following research objectives were used to guide this study:

1. Determine the amount of activity pinned by agricultural communications students.
2. Describe the content pinned by agricultural communications students.

Methodology

To achieve the research objectives, researchers conducted a descriptive content analysis of the content pinned by agricultural communications students on Pinterest. Content analysis encompasses "textual analysis that involves comparing, contrasting, and categorizing a corpus of data" (Schwandt, 2007, p. 34), and its methods involve examining any type of document or communication medium, including online media (Gall, Gall, & Borg, 2007). An advantage to using this type of methodology is its ability for making replicable and valid inferences from texts to the contexts of their use (Krippendorff, 2004). A content analysis is an unobtrusive research technique that allows for the analysis of data for the meanings, symbolic qualities, and expressive contents they have and the roles they play for the data's sources (Krippendorff, 2004).

The target population for this study consisted of agricultural communications undergraduate students at Texas Tech University. From this target population, a convenience sample was drawn from which students were selected based on their fit within this study and their availability to the researchers (Gall, Gall, & Borg, 2007; Teddlie & Tashakkori, 2009). The convenience sample consisted of all students enrolled in a senior-level, capstone, agricultural communications course in which Pinterest use was included as a student engagement tool and learning enhancement for the course from three semesters – Fall 2013, Spring 2013, and Fall 2012. Their use of Pinterest in this course allowed the instructor, and the researchers, to have access to each student's public Pinterest boards. At the beginning of the course, students were asked to follow the designated class board. Once students had followed this board, the instructor then followed each student's Pinterest account gaining access to view each of their public boards. A total of 56 students were included in the sample for this study, of which 12 students were male and 44 were female, which is representative of the undergraduate agricultural communications student population at Texas Tech.

Since Pinterest is a relatively new form of social media, the researchers were unable to find a similar study on which to base the methodology. Therefore, the researchers based the coding book and methodology off a previous online media analysis (Gibson, Ahrens, Meyers, & Irlbeck, 2012). Prior to data collection, a preliminary coding book was developed by the researchers to aid in the data collection. Having a coding book is important when multiple coders are involved as it allows for consistency within the coding of the data (Creswell, 2009). The initial coding book for this study contained a variety of themes and categories the researchers thought would be found in the content of the students' Pinterest boards and outlined initial categories of content students' pins were categorized in. Several other themes emerged throughout the coding process and were added to the book.

Data collection and analysis was conducted in the late fall of 2013. Two researchers examined each student's Pinterest account looking at each board and the pins within. The researchers began the coding process with a pilot sample of 10 pin boards outside of the sample to establish intercoder reliability. Each researcher coded the boards independently then met to discuss any discrepancies. Once the researchers felt they were consistent in their coding, they coded the remaining sample. The researchers came together three times throughout the coding process to analyze each other's coding procedures, discuss any issues, and ensure consistency.

Due to the large amount of pins found from this sample, the researchers coded each student's pins based on the board they were pinned to. Most boards were clearly labeled and a thorough examination of the pins within each board allowed researchers to determine if the majority of the pins within fit within a specific content category. Boards that had no coherent theme to the pins within were labeled as miscellaneous content.

Using a Microsoft Excel spreadsheet, researchers totaled and entered the number of pins each student's Pinterest boards displayed for each corresponding category. The researchers looked for categories and themes in the data collected using constant comparative methods, in which content codes were revised throughout data collection to reflect the emerging categories of content found within the data set and to best represent all major categories and themes of content found within the students' pins. The constant comparative method allows researchers to take information from the data being collected and compare it to existing and emerging categories so that codes can be refined and revised to best represent the data (Creswell, 2013). At the conclusion of data collections, 25 unique categories of content were identified by the researchers. According to Creswell (2013), 25-30 categories or codes of information are sufficient for any size database of collected information. To analyze the data, the researchers calculated descriptive statistics including measure of central tendency, such as the mean, median, and mode, and measures of dispersion, such as standard deviation, to provide further insights on the data.

Limitations

Due to the fact that a convenience sample was used, some sampling error may be present in this study. Only students who were enrolled in one specific class within the past three semesters were selected to be included in the sample. As this course is a senior-level capstone course, only upperclassmen students were included in the study. The exclusion of underclassmen may lead to some error and makes the results of this study applicable to only the students sampled.

Another limitation of this study was the amount of pins under investigation. There were tens of thousands of pins amongst the 56 students investigated in this study. Pins were coded based on the board they were pinned to, which may lead to some error if pins were misplaced within a student's boards. Also, some boards were found to contain a wide variety of content that was difficult to classify into one category. Such boards were coded as miscellaneous, even though much of their content could have been sorted into a variety of other categories. It was also important for the researchers to pay close attention to the pins contained within the boards as it was often found that board titles were vague or misleading. This may have led to some miscategorization by the researchers if close attention was not paid to the actual pins within each board. This could also have led to some inconsistencies within the data reported.

Finally, the issue of inter-rater reliability may have affected the internal validity of this study. The data for this study was coded by two researchers which could have created an extraneous variable that may have affected the results (Creswell, 2013; Gall, Gall, & Borg, 2007). Even though the researchers collected and coded the data at the same time and place, there may still have been some discrepancies in their actual coding of the content. Both researchers discussed any unclear or possibly problematic items in an effort to bring intercoder agreement to the data being collected (Creswell, 2013). Again, it should be noted that the data gathered through this study is only applicable to the sample from which it was collected and cannot be generalized to a larger population.

Findings

Determine the amount of activity pinned by agricultural communications students.

In total, 63,696 pins and 883 boards were found amongst the 56 students investigated in this study. On average, each student had a total of 1,137 pins (N = 56, SD = 1458.86) and an average of 16 (SD = 12.59) boards on their account. The amount of pinning activity per student varied greatly with total pins ranging from nine to 7,751 pins while the total number of boards per student ranged from one to 70 boards.

The total amount of pins found for all male students (n = 12) was 683 (1.1%) on a total of 45 boards (5.1%). Individually, total pins found for male students ranged from nine pins to 218 pins (M = 56.9, SD =70.19), and total boards ranged from one board to 13 boards (M = *3.8,* SD =3.72). For female students (n = 44), a much higher amount of activity was seen. The total amount of pins found for female students was 62,985 (98.9%) on a total of 838 boards (94.9%). Individually, total pins found for female students ranged from 11 pins to 7,751 pins (M = 1,431.5, SD = 1,649.53), and total boards ranged from three boards to 70 boards (M = 19.1, SD = 14.12).

Students in this sample had all completed at least one agricultural communications course that included Pinterest as a learning enhancement and engagement tool. A majority (n = 47, 83.9%) of these students had only one class-related board on their Pinterest account. However, a few students (n = 9, 16.1%) had multiple class boards with one student having as many as four course boards. Course boards were identified as boards containing a course number and/or name in the title (i.e. ACOM 4305 – Ag Comm Campaigns) and were boards set up as group boards in which multiple pinners could pin content to that board.

Describe the content pinned by agricultural communications students.

A wide variety of content was found in the pins of the students in this study. Twenty-five unique categories of content were identified by the researchers as part of the coding book developed during this study. Because of the large amount of data under investigation, individual pins were coded based on the categorized board they were pinned to. Boards that were found to contain a wide variety of content making them difficult to classify into one category were coded as miscellaneous.

Most Popular Content

Recipes. The most popular category of content pinned by the students in this study was recipes. In total, 8,863 (13.91%) pins were found to be related to recipes and food content with students (see Table 1). Of the 56 students in this sample, 45 (80.4%) pinned content that was categorized as recipes or food-related topics. Recipe pins consisted of a variety of food types and preparations, some of which were categorized into separate boards by recipe type (desserts, breakfasts, snacks, entrées, side dishes, etc.). The recipe category also included food cooking tips and tricks and links to restaurants and sites where food could be purchased.

Table 1
Summary of content pinned by agricultural communications students.

	# pins	% of total pins	# of students who pinned content	% of total students with this pin board topic
Category of Content				
Recipes*	8,863	13.91%	45	80.4%
Fashion*	6,545	10.28%	34	60.7%
Miscellaneous Pins	6,211	9.75%	39	69.6%
Home Décor/Building*	6,054	9.50%	42	75.0%
Humor*	5,364	8.42%	23	41.1%
Health, Beauty, & Fitness*	4,747	7.45%	36	64.3%
Quotes	4,379	6.88%	30	53.6%
Crafts	3,716	5.83%	34	60.7%
Weddings	3,138	4.93%	28	50.0%
Communication	2,525	3.96%	30	53.6%
Holiday	1,100	1.73%	22	39.3%
Travel	1,026	1.61%	22	39.3%
Animals	923	1.45%	16	28.6%
Children	803	1.26%	14	25.0%
Entertainment	755	1.19%	13	23.2%
Event Planning/Party Ideas	284	0.45%	12	21.4%
Job Related	238	0.37%	9	16.1%
Sports	188	0.30%	7	12.5%
Gifts	178	0.28%	10	17.9%
Misc. Tips & Tricks	170	0.27%	9	16.1%
Love**	81	0.13%	4	7.1%
Agriculture & Nat. Resources**	27	0.04%	5	8.9%
Religion**	19	0.03%	2	3.6%
Inspirational People/Stories**	13	0.02%	3	5.4%
Finance**	6	0.01%	1	1.8%

N = 56, Total number of pins = 63,696
Note. * denotes most popular content, ** denotes least popular content

Fashion. Slightly fewer pins (6,545, 10.28 %) were found to be related to fashion, which was found to be the second most popular category of content pinned by students in this study. Fewer students (n = 34, 60.7 %) pinned content that was categorized as fashion compared to recipes. Fashion content constituted a wide range of pins. The researchers found that students pinned individual clothing items and entire clothing ensembles, as well as a large variety of accessories such as shoes, handbags, jewelry, watches, eyewear, and others. Fashion was distinguished from beauty as being clothing or accessories that were worn and could be removed.

Home Décor/Building. The next most popular category of content pinned was home décor/ building ideas with 6,054 (9.5%) pins. Seventy-five percent (*n* = 42) of students pinned home décor/building related content. This category originated as two individual categories, home décor and home building ideas, but was later refined into one category. Pins in this category included home decorating ideas, tips, and tricks, floral arrangements, home décor items and artwork, room arrangement guides, furniture, wallpaper, paint colors, home building plans, renovation ideas, do-it-yourself home improvement projects, and dream home images.

Humor. Humor was another popular category found for pin content with 5,364 (8.42%) total pins. However, less than half (n = 23, 41.1%) of the students in this sample pinned items in this category. In this category, researchers found pins containing memes, a cultural item in the form of an image, video or phrase that is spread via the Internet and often altered in a creative or humorous way (see Figure 1 for an example); greeting card parodies, photos, links to videos and songs, jokes, and other content pinners had labeled as humorous.

Figure 1. Example of an agricultural meme by Dyer, J. (2013, January 4).Freedom! [Web log image]. Retrieved from http://nerdfarmer.com/blog/2013/01/04/freedom/

Health/Beauty/Fitness. Health, beauty, and fitness related pins accounted for 7.45 % (4,747) of all pins found in this study. Thirty-six (64.3%) students in the sample pinned content that fell within this category. This category was combined and refined from three original categories of content to become one category that encompassed all pins related to self-image. Pins in the health/beauty/fitness category contained content including hair tips and tricks, haircut and color ideas, hair styling techniques, makeup and beauty techniques and routines, beauty secrets, links to makeup and beauty items, nail polish, nail art ideas, fitness routines and techniques, fitness goals and inspiration, workout equipment, workout trends, and health tips, tricks and trends.

Least Popular Content

Finance. From the sample used for this study, finance-related items were the least pinned content found. Only six (0.01%) pins were found to be pinned by one student (*N* = 56, 1.8%) in this category. Finance pins contained content that included tips on how to pay off debt, advice on how to create and maintain a budget, strategies for building wealth, tips on setting up a bill paying system, and advice for organizing personal financial documents.

Inspirational People/Stories. Three students ($N = 56$, 5.4%) in this sample pinned a total of 13 (0.02 %) pins with content related to inspirational people and stories. Pins in this category included success stories of people overcoming their fears or incredible odds, letters encouraging people to strive for their goals, and videos showing inspirational acts.

Religion. Nineteen (0.03%) pins were found that contained content related to religion or religious material. Only two ($N = 56$, 3.6%) students were found to have pinned religious content in this study. Religious pins included videos with spiritual songs and sermons, scriptures and versus, quotes about religious devotion, and ways to be more devoted to God.

Agriculture & Natural Resources. Another unpopular category of content pinned by students in this study included content related to agriculture and natural resources. Five ($N = 56$, 8.9%) students pinned 27 (0.04%) pins with content related to this category.

Love. Love related pins accounted for a total of 81 (0.13%) pins in this study and were pinned by only four (7.1%) of the students in this sample. Love pins included quotes and sayings about love, acts and gifts to show your love, photos and videos that show unconditional love, and relationship tips and advice.

Content Related to Agricultural Communications

Four categories identified in this study were found to be directly related to agricultural communications and courses related to this field. These categories included communications, event planning/party ideas, job related items, and agriculture and natural resources.

Communications. Communications related content was pinned by 53.6% ($n = 30$) of the students in this study with a total of 2,525 (3.96%) pins. Communications pins contained content related to a variety of communication aspects including photography tips and tricks, Adobe Creative Suite tricks, tutorials, and shortcuts; marketing strategies; design inspirations, ideas, tips and tricks; social media facts, tips, and strategies; and communication tools, tips, and facts.

Event Planning/Party Ideas. Another category of pins that was found to be related to agricultural communications were pins related to event planning and party ideas. Few students ($n = 12$, 21.4%) pinned content related to this category with only 284 (0.45%) total pins related to event or party planning. Pins in this category included party ideas, tips, and advice; party themes; and event planning advice, tips and inspiration. Event planning is a part of the agricultural communications curriculum at Texas Tech.

Job Related. Nine students (16.1%) in this sample pinned 238 (0.37%) pins with job related content. Job related pins included interview and job search advice and tips, strategies for succeeding on the job, and work attire ideas and advice.

Agriculture & Natural Resources. Statistics for this section were included in the previous section. Pins related to agriculture and natural resources included advertising campaigns for agriculturally-related products, photos and videos depicting agricultural awareness and support, various aspects of country or farm life, and information and facts about agricultural practices or industries.

Conclusions and Recommendations

This research sought to determine the activity and content agricultural communications students pinned on Pinterest, and for the most part, they are using it for fun, entertainment, and their own personal situations. As shown by Duggan and Brenner (2013), a majority of college-aged students are actively using Pinterest. Although only 4.82% (3,074) of the pins found in this study contained content directly related to agricultural communications courses, Pinterest use by the students in this sample portrayed a wide variety of content in a number of fields of interest. The variety of content available to students and the public via Pinterest presents a unique opportunity for agricultural communicators and the agricultural industry to not only explore and discover relevant content, but to disseminate it as well.

Agriculture and natural resources were found to be one of the least popular categories of content pinned. As agricultural communications faculty, attention should be paid to promoting the agricultural industry on social media sites such as Pinterest as a means of sharing and disseminating knowledge and facts to the general public. As educators, this push could start in the classroom with agricultural communications faculty encouraging students to find, create and/or re-pin agriculture and natural resources-related content on Pinterest as a means of advocating for agriculture.

As suggested by Hanson, Nowlan and Winter (2012) and Holt (2012), Pinterest has the ability to foster collaboration between students and can provide a new way for students to learn and improve their performance in the classroom. At most, one student had four class-related boards, indicating that a few instructors are using Pinterest as either a learning supplement, or possibly even a course requirement. With today's digitally native students seeking new and creative ways to learn and collaborate with fellow students in their courses, Pinterest may be a valuable tool in engaging students in a way that is relevant and interesting to them. Although Pinterest use is certainly not appropriate for all subjects and course content, its use could be much more widespread. With approximately 40% of college students identified as visual learners (Clarke, Flaherty, & Yankey, 2006; Hanson, Nowlan, & Winter, 2012), Pinterest offers university faculty a unique tool for reaching students in the visual realm in which they thrive. Considerations for using Pinterest as a tool in university courses should be encouraged by agricultural communications faculty.

Female students accounted for 98.9% (62,985) of the total pins and 78.6% (n = 44) of the population from this study. With 80% of all Pinterest users being female (Smith, 2014), these results were found to be fairly representative of the average Pinterest user. Although the results of this study cannot be generalized outside of the sample, it can be noted that Pinterest seems to be quite a bit more appealing to women than men. The five most popular categories of content pinned by the students in this study, recipes, fashion, home décor/building, humor, and health/beauty/fitness, also seem fairly representative of the mostly female demographic.
The findings of this research are limited to the sample from which data were collected; therefore, further research should be conducted to explore how university students are utilizing Pinterest

nationwide. Students at Texas Tech may not represent other university students and their use of Pinterest, so this study should be replicated to include multiple agricultural communications programs across the nation. Additionally, this study should be expanded to include a larger sample of students from all disciplines. The content pinned by the students in this study may show a bias toward content related to their upbringing or interests related to their major, especially when compared to content pinned by students from other disciplines. Replicating this study with a larger sample would allow researchers to have a more thorough understanding of Pinterest use by university students as a whole.

Further research should also be encouraged to explore students' perceptions of using Pinterest as part of their courses. Gibson, Ahrens, and Irlbeck (2013) found that students in one agricultural communications course held positive perceptions about Pinterest use in their course. It is important for faculty to understand how their students feel about using a particular tool as part of a course to better understand its use as an educational tool.

Another important line of research that should be conducted focuses on the gratifications students experience from using Pinterest, both in and out of the classroom. As suggested by Katz, Blumbler, and Gurevitch (1974), media are selected by individuals based on its expected ability to satisfy the needs they have. Future research could provide insights into the reasons why students use Pinterest for personal and academic reasons and how it helps them obtain goals or needs they have. Gaining this understanding would allow educators, researchers, and marketers to target their own use of Pinterest, as well as the content they share, to better serve the goals and needs of students and the public.

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A Comparison of Beginning Teacher Competencies as Perceived by Idaho First Year Teachers, Building Administrators, and Mentor Teachers

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Abstract

Retaining beginning teachers could help minimize the shortage of agricultural education instructors across the nation (Katrovich, 2010). Comparing the perceptions of beginning teacher competencies in professional development areas (Touchstone, 2014) provided insight to allow building administrators and mentor teachers to support Idaho beginning teachers in the induction phase of their career (Christensen & Fessler, 1992) while developing skills in motivational and hygiene areas described by Herzberg, Mausner, and Snyderman (1959). The 2014 - 2015 first year teachers, assigned mentors, and building level administrators participated in the study (n = 36, 83.7%). Beginning teachers were more confident in their ability to communicate with stakeholders and work with at risk students. Mentor teachers were slightly less confident in induction teachers completing state and local reports, balancing volume of work, program planning and prioritizing, and using state funds. Building administrators agreed that beginning teachers could manage time effectively, properly complete local and state paperwork, and find alternative funding, contrary to beginning teachers and their mentors. All respondent groups disagreed that Idaho beginning agricultural education teachers were prepared to integrate common core standards. The results of the study should be used to direct professional development and targeted mentoring for induction teachers in Idaho.

Introduction

Retention of secondary agricultural education instructors in Idaho has been limited, especially for industry certified teachers. In the 2013-2014 school year, 13.2% of secondary teachers within the state were industry (alternatively) certified, increasing to 17.3% in the 2014-2015 school year ("Agricultural Education Directory," 2014; "Mailing List and Educational Directory," 2014). Not only has the percentage of industry certified teachers increased, the state has seen a 36% change in secondary agricultural education instructor positions in the past two years alone ("2014 Initiative for Secondary Agricultural Education Improvement," 2014). Previous studies of Idaho teachers have shown that retention of industry certified teachers has been especially low with none of the industry certified respondents having over five years' secondary classroom experience (Touchstone, 2014). Both a shortage of graduates as well as attrition from the profession have contributed to the shortage of agricultural education instructors (Kantrovich, 2010), and beginning teachers were one area on which to focus retention in the profession. Assessment of the needs of beginning teachers should be conducted on a regular basis (Joerger, 2002) and information used to design professional development (Mundt & Connors, 1999; Myers, Dyer, & Washburn, 2005) for training and retention. In the past five years, Idaho has had 99 position changes: 17 were filled by graduates from the teacher education program at the University of Idaho; 17 were filled by graduates from other institutions; 31 were filled by transferring teachers from other agricultural education programs in Idaho or another state; and the final 34 were filled by industry (alternatively) certified individuals ("Agriculture and natural resources program area history," 2014). The number of graduates have been insufficient to meet the needs of state vacancies, and increasing retention rates of current teachers could potentially narrow the gap between vacancies and certified graduates. Beginning teachers continued to be in need of professional development coursework to prepare for and retain their teaching positions (Ruhland & Bremer, 2002). Nationally, research has been conducted regarding beginning teacher challenges for over three decades (Joerger, 2002; Joerger & Boettcher, 2000; Miller & Scheid, 1984; Mundt & Connors, 1999; Nesbitt & Mundt, 1993; Rayfield, McKim, Lawrence, & Stair, 2014; Reilly & Welton, 1980; Stair, Warner, & Moore, 2012) and the need for professional development to address those transitional, induction, and mentorship needs. The need existed to not only identify the professional development needs of Idaho beginning teachers (Touchstone, 2014), but also to describe the level of competency beginning teachers were perceived to have in professional development areas. Understanding levels of competency as perceived by beginning teachers, mentor teachers, and building administrators had the potential to direction to professional development activities offered at the district, state, and national levels and aligned directly with the AAAE National Research Agenda (Doerfert, 2011) priority area 4 – Meaningful, Engaged Learning in All Environments and priority area 5 – Efficient and Effective Agricultural Education Programs. This study sought to specifically describe the perceived competency of first year agricultural education instructors in the areas of teacher skills and knowledge, program concerns, and personal and professional development as perceived by the beginning teachers, assigned mentor teachers, and building administrators.

Research has been conducted to identify professional development needs of teachers in career and technical education areas (Boone & Boone, 2007; Rayfield et al., 2014; Wolf, 2011) and specifically beginning teachers in agricultural education (Garton & Chung, 1997; Mundt & Connors, 1999; Nesbitt & Mundt, 1993; Rayfield et al., 2014; Reilly & Welton, 1980; Touchstone, 2014). Although first year teachers were generally satisfied with their positions (Walker, Garton, & Kitchel, 2004), Joerger (2002) found that managing student behavior, determining curriculum content, and motivating students to learn were the three highest priorities identified by beginning agricultural education instructors. Reilly and Welton (1980) also identified public relations, student motivation, student discipline, and vocational funding as areas of needed professional development and training. Classroom management, curriculum development, and working with special populations were identified as the highest in-service priority across all CTE areas (Ruhland & Bremer, 2002). Similarly, balancing volume of work, classroom management, time management, paperwork, budgets and funding, and program prioritization continued to be high areas of concern for beginning teachers (0-5 years' experience) as perceived by beginning teachers, veteran teachers, and building administrators (Touchstone, 2014). External funding, advisory committees, and AET record book use were the top three priorities of induction teachers in Oregon (Sorenson, Lambert, & McKim, 2014).

The role school administrators play in the development of secondary instructors was key for educators and should be included in decisions regarding the enhancement of professional practice (Danielson, 2007). The level of support and understanding provided by the administration and school organization was also a key factor in job satisfaction and stress levels of beginning teachers in Minnesota (Joerger & Boettcher, 2000), and dissatisfaction with administrative support was one of the reasons secondary agricultural education instructors left the profession (Walker et al., 2004). Research has recommended that administrators be made aware of not only the shortage of agricultural education instructors, but also the resources needed to equip teachers to be successful and encourage retention (Reilly & Welton, 1980). In Idaho, administrators perceived the greatest professional development need of CTE teachers was motivating students to learn, followed by teaching students to think critically, and integration of reading and writing standards into the CTE curriculum (Cannon, Kitchel, Tenuto, & Joki, 2012).

Theoretical Framework

The theoretical framework for this study was couched in the Herzberg's Motivational-Hygiene Theory (Herzberg, Mausner, & Snyderman, 1959). Herzberg's hygiene factors address the work and organizational environment and include the organization and its policies, supervision, work conditions, interpersonal relationships, salary, status, and job security. The motivators on the job included achievement, recognition, growth and advancement, as well as the individual's interest in their job (Herzberg et al., 1959). Identifying hygiene and motivational factors of job satisfaction may contribute to the long-term success and retention of teachers in the classroom. Herzberg, Mausner, and Snyderman (1959) suggested that both long range (motivational) and short range (hygiene) goals contributed to job satisfaction and success in the long term. First year teachers experienced high levels of stress in the first 7 to 8 weeks of classroom instruction (Joerger & Boettcher, 2000). This induction phase of the teaching career cycle expands well past this early time of stress, continuing as long as 5 years into the teaching career (Huberman, 1989; Fessler, 1992; Mundt & Connors, 1999) as they began to adjust to hygiene (short term) factors in their positions before being able to transition to focus on motivational (long term) goals. The teacher career cycle model also comes into play as professional development activities should be designed to assist them in developing and enhancing competencies that will allow beginning teachers to move past the induction phase of teaching (Christensen & Fessler, 1992; Fessler, 1992; Letven, 1992). The first three to five years in the classroom were classified as the induction/career entry phase to teaching (Huberman, 1989) before maturing in the profession to reach the competency building and career stability phases (Fessler, 1992). By definition, induction is a comprehensive, coherent, and sustained professional development process that can be supported by quality mentoring (Wong, 2005). Beginning teachers should be adequately prepared for teaching, but if they are not well equipped to deal with hygiene or motivational factors, teachers could have a negative experience, preventing them from moving past the induction phase of the career cycle, and thereby encouraging attrition from the profession.

Purpose and Objective

The purpose of this study was to describe the perceptions of competency levels of beginning agricultural education instructors in teacher knowledge, personal and professional development, and program concerns and determine whether a difference exists between the perceptions of first year instructors, mentor teachers, and building level administrators. The objective of the study was to compare and contrast the groups and identify areas of targeted professional development that could be provided to the first year instructors in order to, potentially, increase successful transition into the classroom as well as long-term retention rates of secondary instructors.

Methods and Procedures

In the 2014-2015 school year, 16 secondary agricultural education instructors were new to Idaho. Of these 16, 14 were new to the profession: 8 industry (alternatively) certified and 6 university trained ("Agricultural Education Directory," 2014). The 14 new professionals were assigned mentor, veteran teachers who were responsible for being a point of contact for the new instructors as well as providing supervision from a colleague within the profession. The three groups included in this study were the 14 new professionals, their mentor teachers (N=15 as one new instructor was assigned 2 mentors), and a building level administrator with supervisory responsibility for the new instructor (N=14). Given the small size of the population, all individuals in all three categories were invited to participate in the study (Gay & Airasian, 2003). Multiple attempts to contact potential respondents was essential (Dillman, 2007). Non-respondents were sent four follow-up emails, and contacts were made with the beginning teachers to encourage administrator participation and to increase the final response rate.

In this study, the three groups were sent an online survey via SurveyMonkey consisting of Likert-type scales where the respondents were asked to rate the perceived competency of the first year instructors in teacher skills and knowledge, program concerns, and personal and professional development areas. Dillman (2007) supported the use of online surveys to minimize inconvenience and provide a simple venue potential participants could respond to the survey. Portions of the data were descriptive in nature, providing an overview and description of the participants. The data were collected as part of a cross-sectional survey designed to gather information about the group perceptions at the beginning of the school year regarding first year teacher competencies. The data was then examined and the responses of the groups used to describe over all perceptions of beginning teacher competencies as well as to compare the responses across groups to identify areas of similarity and significant differences regarding Idaho first year agricultural education instructors skills and abilities.

Of the 43 potential respondents, 36 completed the survey for a response rate of 83.7%. Control for non-response was addressed by comparing early and late responders. The total respondent pool (n=36) was sorted by response date and time, and the first half of the responders (n=18) were identified as early responders and the second half (n=18) were identified as late responders (Lindner, Murphy, & Briers, 2001). No significant differences were found between the two groups' responses ($\alpha = 0.05$). Additionally, the demographics of the respondents (age, gender, role in the agricultural education program, type of certification) were similar to the entire respondent pool. As a result, non-response threat was minimized.

Results and Findings

The total participants of the study (n=36) provided demographic information as well as indicated their perception of the preparedness of the first year agricultural education instructor in their local school. Of the respondents, 9 were building level administrators, 13 first year secondary agricultural education instructors, and 14 were assigned mentors for first year teachers. One building level administrator only provided a portion of demographic data and then did not respond to the remainder of the survey, The respondents were 67.6% (n = 25) male and 27.0% (n = 10) female with one respondent not answering. The majority of the respondents (n = 28, 75.7%) were university trained while the remainder (n = 8, 21.6%) were industry certified. All of the industry certified respondents (n = 8) were first year agricultural education instructors (57.1% of beginning teachers). Respondents sorted themselves into age categories from 18 – 24 years of age to 55 – 64 years of age. None of the respondents indicated their age to be 65 years or older. The largest percentage of respondents (n = 13; 37.1%) were aged 35 to 44. The building administrators were all 34 years and older while the beginning teachers were all 44 years and younger. One of the respondents declined to identify their age range.

The largest percentage of respondents (n = 16, 44.4%) held a Master's degree as their highest degree followed closely by BS degree earners (n = 15, 41.7%). The fewest respondents (n = 2, 5.6%), all building level administrators, held an Educational Specialist. The remaining 3 respondents (8.3%) were first year teachers who held an Associate's Degree (Table 1).

Table 1. Highest level of education of administrators, first year teachers, and mentor teachers

Education Level	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
AA/AAS	0	0.0	3	23.1	0	0.0	3	8.3
BS/BA	0	0.0	8	61.5	7	50.0	15	41.7
MS	7	77.8	2	15.4	7	50.0	16	44.4
EdS/PhD	2	22.2	0	0.0	0	0.0	2	5.6
Total	9	100.0	13	100.0	14	100.0	36	100.0

Respondents were then asked to rate the level to which they agreed that the beginning teachers with whom they were working or they themselves as beginning teachers had the skills or training related to the 21 professional and personal skill areas identified through a study of beginning teacher professional development needs in the previous year (Touchstone, 2014).

The responses regarding competency levels of first year teachers concerning curriculum development indicated no significant difference across the response groups. When considering curriculum development, 65.7% of the 35 respondents to the question (n = 23) agreed or strongly agreed that the beginning teacher was adequately prepared. Curriculum development was the only skill area in which no significant differences were identified among the respondent groups (X^2 = 0.055). The beginning teachers were slightly less confident in their curriculum development abilities than were the building administrators or mentor teachers.

The confidence the three groups had in all other skill areas differed significantly (α=0.05). When considering classroom teaching experience, a significant difference (X^2 = 0.006) was identified among the three groups at the 0.05 significance level as established *a priori* in the perception of the first year teacher had sufficient classroom experience to be successful. Of the 34 respondents to this question, the majority (n = 20, 58.8%) agreed or strongly agreed that the first year teachers had adequate classroom teaching experience while the remaining 41.2% (n = 14) disagreed or strongly disagreed. First year teachers had the highest confidence their classroom experience while mentor teachers were evenly split as were building administrators (Table 2).

Table 2. Perceptions of adequate classroom teaching experience of first year teachers

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	1	7.7	4	28.6	5	14.7
Disagree	3	42.9	3	23.1	3	21.4	9	26.5
Agree	4	57.1	7	53.8	4	28.6	15	44.1
Strongly Agree	0	0.0	2	15.4	3	21.4	5	14.7
Total	7	100.0	13	100.0	14	100.0	34	100.0

The ability of the beginning teacher to communicate effectively was perceived significantly differently (α=0.05, X^2 = .004) among the respondent groups. Building administrators were confident in the communication ability of their beginning teachers with 7 (87.5%) agreeing or strongly agreeing and one responding administrator (12.5%) disagreeing. Mentor teachers were also generally confident in the communication skills of the beginning teachers with 13 (92.9%) agreeing or strongly agreeing that beginning teachers possessed this skill. One mentor teacher (7.1%) perceived a strong weakness in stakeholder communication skills. First year teachers had a higher perceived confidence in their communication abilities than either of the other groups.

Beginning teachers and building administrators were significantly more confident in the ability of the beginning teachers to employ a variety of teaching strategies within classroom than were the mentor teachers (α=0.05, X^2 = 0.007). Mentor teachers were split with 7 (50%) agreeing or strongly agreeing that the beginning teachers would be able to employ varying teaching strategies and the other 7 (50%) disagreeing or strongly disagreeing. Building administrators agreed (n = 6, 75%) more than disagreed (n = 2, 25%), while beginning teachers strongly agreed or agreed (n = 8, 61.6%) more than they disagreed (n = 5, 38.4%) with the statement.

The perceived competencies of beginning teachers in regard to classroom management varied significantly among the groups as well (X^2 = 0.017). The majority of building administrators (n = 6, 75%), first year teachers (n = 9, 69.2%), and mentor teachers (n = 9, 64.3%) agreed or strongly agreed that beginning teachers had the needed classroom management skills to be successful in the classroom. Mentor teachers and beginning teachers were the least confident in the classroom management skills of the beginning teachers. Over 30% (n = 4) of beginning teachers as well as 35.7% (n = 5) of mentor teachers disagreed or strongly agreed (1 mentor teacher) that beginning teachers had the appropriate classroom management skills (Table 3).

Table 3. Perceptions of beginning teacher skills related to classroom management

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	0	0.0	1	7.1	1	2.9
Disagree	2	25.0	4	30.8	4	28.6	10	28.6
Agree	6	75.0	8	61.5	6	42.9	20	57.1
Strongly Agree	0	0.0	1	7.7	3	21.4	4	11.4
Total	8	100.0	13	100.0	14	100.0	35	100.0

Time management has been identified as a challenge to agricultural educators in previous studies for the past several decades (Boone & Boone, 2007; Cannon, Kitchel, & Duncan, 2010; Kitchel, Cannon, & Duncan, 2009; Mundt, 1991; Mundt & Connors, 1999; Nesbitt & Mundt, 1993; Touchstone, 2014). The three groups in this study generally perceived time management to be a challenge to beginning teacher success in the classroom, but significant differences were observed among the expected responses of the groups ($X^2 = 0.009$). Of the 35 respondents, 30 (85.7%) agreed or strongly agreed that beginning teachers had developed adequate time management skills. Building administrators all agreed (n = 8, 100%) with the statement, while beginning teachers (n = 2, 15.4%) and mentor teachers (n = 3, 21.4%) had a slightly more negative perception of time management skills.

Managing volume of work was also perceived significantly differently among groups (α=0.05, $X^2 = 0.009$). Building administrators all agreed or strongly agreed that beginning teachers could effectively manage their volume of work (n = 8, 100%). Beginning teachers mostly agreed or strongly agreed (n = 10, 76.9%) that they could manage volume of work and three of the beginning teachers (23.1%) disagreed that they had the needed skills. Mentor teachers were more pessimistic about beginning teacher skills in this area with six (42.8%) disagreeing or strongly disagreeing while eight (57.1%) agreed or strongly agreed (Table 4).

Table 4. Perceptions of beginning teacher skills related to managing volume of work

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	0	0.0	1	7.1	1	2.9
Disagree	0	0.0	3	23.1	5	35.7	8	22.8
Agree	7	87.5	7	53.8	7	50.0	21	60.0
Strongly Agree	1	12.5	3	23.1	1	7.1	5	14.3
Total	8	100.0	13	100.0	14	100.0	35	100.0

A significant difference was also identified among the groups regarding the ability of the beginning teacher to balance life and work demands on the individual ($X^2 = 0.007$). A majority of all three groups agreed or strongly agreed that beginning teachers could appropriately balance life and work needs. Only one beginning teacher (7.7%) strongly disagreed in their ability to adequately balance life and work while 6 of the mentor teachers responding (42.8%) disagreed or strongly disagreed that beginning teachers exhibited the necessary skills.

The skills required to work with at risk students and students with individualized educational plans was also perceived significantly differently among groups (α=0.05, X^2 = 0.015). Building administrators were less confident in the skills of first year teachers in this area considering 6 out of the 8 administrator respondents (75.1%) disagreed or strongly disagreed. Beginning teachers perceived themselves to be much more prepared in this area with 9 of the 13 (69.2%) beginning teacher respondents agreeing or strongly agreeing with their ability to work with these students. Mentor teachers were split with half of the respondents (n = 7) agreeing or strongly agreeing and half of the mentor teacher respondents (n = 7) disagreeing or strongly disagreeing that beginning teachers were prepared to work with at risk and IEP students (Table 5).

Table 5. Perceptions of beginning teacher skills working with at risk and IEP students

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	1	12.5	1	7.7	2	14.3	4	11.4
Disagree	5	62.6	3	23.1	5	35.7	13	37.1
Agree	2	25.0	8	61.5	5	35.7	15	42.9
Strongly Agree	0	0.0	1	7.7	2	14.3	3	8.6
Total	8	100.0	13	100.0	14	100.0	35	100.0

Completing state and local paperwork and reports was a necessary skill to successfully transition into the secondary classroom. The responses were significantly different among the groups (X^2 = 0.006). The majority of building administrators (n = 6, 75%) and beginning teachers (n = 7, 53.8%) along with half of the mentor teachers (n = 7, 50%) agreed or strongly agreed that beginning teachers were prepared to complete local and state paperwork as needed. However, nearly half of beginning teachers (n = 6, 46.2%) and half of mentor teachers (n = 7, 50%) disagreed or strongly disagreed that beginning teachers had the necessary skills in this area. Only 25% (n = 2) of building administrators disagreed with the statement.

The ability of beginning teachers to integrate common core standards into teaching and agricultural education curriculum was also perceived significantly differently among the groups (X^2 = 0.024). The majority of building administrators (n = 5, 62.5%), first year teachers (n = 7, 53.9%, and mentor teachers (n = 10, 71.4%) all disagreed or strongly disagreed that beginning teachers were prepared to adequately integrate common core standards into the classroom. Beginning teachers were the most confident in their ability with 46.2% (n = 6) agreeing or strongly agreeing that they possessed the necessary skills.

When considering program planning and prioritization, a significant difference was identified among the respondent groups (X^2 = 0.003). The majority of building administrators (n = 7, 87.5%) and beginning teachers (n = 10, 76.9%) along with half of the mentor teachers (n = 7, 50%) agreed that beginning teachers had adequate skills in program planning and prioritization. Mentor teachers were the least confident in program planning ability of new teachers with half (n = 7, 50%) disagreeing that beginning teachers were prepared (Table 6).

Table 6. Perceptions of beginning teacher skills related to program planning and prioritzation

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	0	0.0	2	14.3	2	5.7
Disagree	1	12.5	3	23.1	5	35.7	9	25.7
Agree	7	87.5	10	76.9	5	35.7	22	62.9
Strongly Agree	0	0.0	0	0.0	2	14.3	2	5.7
Total	8	100.0	13	100.0	14	100.0	35	100.0

Idaho requires annual reporting and forms to be completed and submitted to the State Division for Career and Technical Education. The participants were asked to identify their agreement with the statement that the beginning teacher had the skills and knowledge complete these forms appropriately and correctly, and responses differed significantly among the groups ($X^2 = 0.005$). The majority of building administrators (n = 6, 75%) and beginning teachers (n = 8, 61.5%) agreed that the first year teachers had the skills needed to complete state reports and forms correctly. On the contrary, mentor teachers disagreed or strongly disagreed (n = 10, 71.4%) that beginning teachers had attained the needed skills in this area (Table 7).

Table 7. Perceptions of beginning teacher skills related to State CTE reports and forms

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	0	0.0	2	14.3	2	5.7
Disagree	2	25.0	5	38.5	8	57.1	15	42.3
Agree	5	62.5	7	53.8	2	14.3	14	40.0
Strongly Agree	1	12.5	1	7.7	2	14.3	4	11.4
Total	8	100.0	13	100.0	14	100.0	35	100.0

Alternative funding for programs, working with program and school budgets, FFA funding, using state program funding, and using program resources were also considered by the participants. With continuing constraints on available state and federal funding, teachers are required to spend time dealing with budgeting concerns in all aspects of the program. The ability of beginning teachers to identify and use alternative funding sources for the agricultural education program was perceived differently among the three groups ($\alpha=0.05$, $X^2 = 0.021$). The majority of building administrators (n = 6; 75%) agreed or strongly agreed that beginning teachers had the skills necessary regarding alternative funding sources. To the contrary, the majority of first year teachers (n = 8, 61.6%) and half of the mentor teachers (n = 7, 50%) disagreed or strongly disagreed that the beginning teachers possessed adequate skills in this area.

Program and school budgets were also an area of skill and knowledge identified by previous study within the state (Touchstone, 2014). Significant differences were identified among the groups' perceptions of beginning teacher skills regarding program and school budgets ($X^2 = 0.24$). Building administrators indicated the most confidence in beginning teacher ability to adequately work with school and program budgets with 75% (n = 6) agreeing with the statement and only 25% (n = 2) disagreeing. The majority of beginning teachers, however (n = 7, 53.8%) disagreed or strongly disagreed that they possessed the necessary skills in this area. Mentor teachers were evenly divided, with half (n = 7, 50%) agreeing and half (n = 7, 50%) disagreeing that the beginning teachers were prepared to work with budgets.

The participants were asked to identify their agreement that the beginning teacher had the skills and knowledge necessary to work with and utilize FFA funds, and the responses were significantly different among the groups ($\alpha=0.05$, $X^2 = 0.010$). Although the majority of respondents (n = 22, 62.9%) agreed that the first year teachers could adequately handle FFA funds, the majority of building administrators (n = 7, 87.5%) agreed that beginning teachers were prepared in this area. The majority of beginning teachers (n = 7, 53.8%) also agreed they had the needed skills, but nearly half (n = 6, 46.2%) disagreed or strongly disagreed that they were prepared to adequately deal with FFA funds. Mentor teachers were similarly divided with 57.1% (n = 8) agreeing or strongly agreeing and 42.9% (n = 6) disagreeing or strongly disagreeing.

A portion of the funds used in the local agricultural education programs was provided by state added cost funding and understanding the proper use of these funds was identified as a concern for beginning teachers A significant difference ($X^2 = 0.013$) was identified among the three respondent groups. Overall, 51.4% of the respondents (n = 18) agreed and 48.6% (n = 17) disagreed that beginning teachers had the needed training in regarding to state program funding. Mentor teachers were the least confident in the beginning teachers' skills with 64.3% (n = 9) disagreeing or strongly disagreeing with the statement while a minority of beginning teachers (n = 5, 38.5%) and building administrators (n = 3, 37.5%) disagreed with the statement (Table 8).

Table 8. Perceptions of beginning teacher skills related to proper use of state program funding

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	0	0.0	2	14.3	2	5.7
Disagree	3	37.5	5	38.5	7	50.0	15	42.8
Agree	4	50.0	7	53.8	3	21.4	14	40.0
Strongly Agree	1	12.5	1	7.7	2	14.3	4	11.4
Total	8	100.0	13	100.0	14	100.0	35	100.0

Utilizing program resources responses were also significantly different among the response groups ($X^2 = 0.009$). A super majority (n = 7, 87.5%) of building administrators agreed that the beginning teachers were prepared to properly use program resources. A large majority (n = 9, 69.2%) of beginning teachers also agreed that they were properly prepared in this area, but a smaller majority (n = 8, 57.2%) of mentor teachers agreed and 42.9% (n = 6) disagreed that beginning teachers were prepare to properly use program resources.

In order to maintain a quality agricultural education program, students needed to be recruited into the local program and building administrators needed to understand the local program. Significant differences were identified among the response groups in both student recruitment ability of new teacher ($X^2 = 0.016$) as well as providing administrative understanding of the local program ($X^2 = 0.006$). In all response groups, respondents agreed that beginning teachers would be able to recruit students into the local program. All building administrators (n = 8, 100%), 84.6% of first year teachers (n = 11), and 71.4% of mentor teachers (n = 10) agreed with the statement. Mentor teachers had the least confidence (n = 4, 28.6%) that beginning teachers had the adequate skills to recruit students into the local agricultural education program.

Administrative support of the local program was a key component to successful transition of the beginning teacher into the classroom (Joerger, 2002; Walker et al., 2004). Especially considering the influence the administrator has on the teacher and the local program (Danielson, 2007). The perception of the beginning teacher to promote administrative understanding of the local program was significantly different among respondent groups ($X^2 = 0.006$). The majority of building administrators (n = 5, 62.5%), first year teachers (n = 8, 61.5%) and mentor teachers (n = 11, 78.6%) agreed with the statement. First year teachers were the least confident in their ability to explain the program to the administrator (n = 5, 38.4%) followed by building administrators (n = 3, 37.5), and mentor teachers (n = 3, 21.4%).

Low pay for teachers was also a concern identified by Idaho stakeholders (Touchstone, 2014). Significant differences were identified among the response groups in ability of beginning teachers to deal the challenge ($\alpha=0.05$, $X^2 = 0.021$). The majority of building administrators (n = 5, 62.5%), beginning teachers (n = 9, 69.2%), and mentor teachers (n = 9, 64.3%) all agreed with the ability of beginning teachers to deal with low pay. Mentor teachers had the least confidence in the ability of beginning teachers in this area (n = 5, 35.7%) (Table 9).

Table 9. Perceptions of beginning teacher ability to deal with low teacher pay

Level of Agreement	Building Administrators		First Year Teachers		Mentor Teachers		Total	
	n	%	n	%	n	%	n	%
Strongly Disagree	0	0.0	0	0.0	2	14.3	2	5.7
Disagree	3	37.5	4	30.8	3	21.4	10	28.6
Agree	5	62.5	8	61.5	8	57.2	21	60.0
Strongly Agree	0	0.0	1	7.7	1	7.1	2	5.7
Total	8	100.0	13	100.0	14	100.0	35	100.0

Conclusions/Recommendations/Implications

Overall, there were differences among the response groups in nearly all of the skill areas assessed. Most often, beginning teachers were more confident in their skills and abilities than their assigned mentor teachers. Building administrators were also generally more confident in the abilities of the beginning teachers than were the mentor teachers. Of the 21 skills assessed, 18 would be considered hygiene factors while the remaining 3 skills were motivational according to Herzberg's Motivational-Hygiene Theory (Herzberg et al., 1959). This variance could be contributed to the fact that the beginning teachers needed to address hygiene factors related to the organizational areas of the profession prior to being able to focus on motivational factors within the program. The beginning teachers were all in the induction or career entry phase of the teacher career cycle while the mentor teachers and building administrators ranged from the enthusiasm and growth to the career stability and approaching career wind down phases (Fessler, 1992). This study was conducted in an attempt to prioritize the professional development needs of beginning, induction phase (Christensen & Fessler, 1992; Fessler, 1992) teachers in Idaho.

The three Idaho groups differed in their perceptions of beginning teacher abilities. Beginning teachers were slightly less confident in their competencies related to curriculum development than were building administrators or mentor teachers. Building administrators and beginning teachers were more confident than mentor teachers that beginning teachers had the needed classroom experience to be successful in the secondary arena. Similar responses were given in relation to teaching strategies. Building administrators had more confidence in the beginning teachers' abilities to manage their time effectively (motivational factor) and in their ability to complete required state and local paper work than either the first year teachers or mentor teachers. Similarly, 75% of building administrators agreed that beginning teachers had the ability to identify and use alternative funding sources. In this particular area, beginning teachers had the least confidence in their ability, similar to the needs of beginning teachers in Oregon (Sorenson et al., 2014). Administrators expressed confidence in the beginning teachers dealing with program and school budgets, contrary to the perceptions of both mentor teachers and the beginning teachers themselves.

Beginning teachers were more confident in their ability to communicate effectively with stakeholders and in their ability to work with at risk and IEP students than were building administrators and mentor teachers. On the contrary, mentor teachers were the least confident in the beginning teachers' abilities in 4 of the skill areas assessed: motivational factor - balance and manage the volume of work; and hygiene factors - plan and prioritize the local program; completion of the necessary reports and forms for the state career and technical education office; and properly using state added cost funding. Addressing hygiene factors in the induction phase of the teacher career cycle (Fessler, 1992; Herzberg et al., 1959) could help increase teacher retention and allow more teachers to advance to the career stability stage of the teacher career cycle (Fessler, 1992) where motivational factors become a higher priority in professional practice and development.

All three groups has similar perceptions regarding eight of the skills assessed. All three groups displayed limited confidence in the ability of Idaho beginning teachers to effectively incorporate common core standards and instruction into their program. On the opposite side, all three groups expressed confidence that beginning teachers could appropriately utilize funds for their local FFA chapter. The groups were overall confident in the beginning teachers' ability to utilize program resources appropriately, to recruit students into the local program, and to promote administrative understanding of the total program. However, beginning teachers were the least confident in their ability to communicate the importance of their program to the local administration. On the personal level, all three groups also agreed that beginning teachers were able to deal with the perceived lower salary of teachers within the state. Similarly, the ability of beginning teachers to implement appropriate classroom management was generally agreed upon by all groups, however beginning teachers and mentor teachers were slightly less confident than building administrators. Finally, the majority of the population agreed that beginning teachers could balance the demands of life and work, but mentor teachers were the least confident in the ability of these induction teachers to maintain this motivational factor (Herzberg et al., 1959).

The respondent groups had differing perceptions of the level to which beginning teachers could adequately performs tasks related to teaching in the secondary agricultural education classroom. This study was designed to be a pre-test at the beginning of the first year of teaching. The survey should be replicated with the same respondents at the end of the first school year to identify and describe any changes in perceptions within or across the groups. The observed lower confidence of the mentor teachers as compared to first year teachers and building administrators could relate to their stage on the teacher career cycle (Christensen & Fessler, 1992) and their classroom experience. The information from this study can be used as a baseline for long-term professional development for induction year agricultural education instructors in Idaho. Similarly, the results of the study should be used to provide targeted professional development to Idaho beginning, induction phase teachers. The high percentage of industry certified induction teachers (57.1%) should be considered when planning induction program training and professional development. Further study may be needed to identify differences in professional development needs between university certified and industry (alternatively) certified instructors. The administrator responses should be used to provide insight into professional development at the building level as well as providing resources to beginning teachers to better communicate their program purposes, needs, and priorities to the local school and administration. The results of this study should also be used by Idaho mentor teachers to target areas perceived as greater weaknesses of the beginning teachers to help them develop skills needed to stay in the profession long enough move past the induction phase of teaching (Fessler, 1992) and to assist induction teachers to become successful in the program and the profession.

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Mentoring Expectation Congruency, Interaction, and Psychosocial Support in an Agriculture Teacher Mentor Program

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Abstract

Educational leaders have widely implemented mentoring and induction programs to support beginning teachers as they enter the profession. A variety of contextual factors within the school and mentoring dyad may impact the support received by the beginning teacher. The purpose of this study was to describe the relationship between mentoring Expectation Congruency, Interaction, and Psychosocial support received by agriculture teachers participating in Beginning Teacher Mentor/Induction program. It was concluded that differences in Expectation Congruency and Perceived Similarity each explained a large (d >1.0) proportion of variance in support received in the Acceptance, Counseling, Friendship, and Role Model functions. Variation in interaction time did not explain significant portions of variance in support received.

Introduction

Teaching is a difficult and complicated task. Although beginning teachers have many years of classroom experience as a learner, these experiences as students may provide limited support in the novice teacher's transition into their role as teacher (Darling-Hammond & Bransford, 2005). Ten percent of beginning teachers who began teaching in 2007-2008 did not teach past the first year; over one-half of beginning teachers leave the profession after year five (Kaiser, 2011; NCTAF, 2003). Young teachers who left the profession early report feeling ineffective because they were overwhelmed with the job responsibilities placed upon them (Bennett, Iverson, Rohs, Langone, & Edwards, 2002; Johnson & Birkeland, 2003). Beginning agriculture teachers face issues of isolation and often feel overwhelmed and underprepared to handle their assigned duties (Greiman, Walker, & Birkenholz, 2005; Mundt & Connors, 1999). Beginning agriculture teachers must also fulfill additional roles beyond the classroom instructor, including the management of laboratories, student leadership organizations, and cooperative work programs (Joerger, 2003; Torres, Lawver, & Lambert, 2009). Two-thirds of beginning agriculture teachers in Missouri work in excess of 56 hours/week; these teachers feel tensions about how they actually spend their time as compared to how they would like to spend their time (Lambert, Ball, & Tummons, 2011; Torres, Lambert, & Tummons, 2012). Further, Missouri agriculture teachers feel stress levels higher than normative manager data from excessive paperwork, working overtime, meeting deadlines, frequent interruptions, insufficient personal time, and critical on the spot decisions (Torres et al., 2009). These findings underscore the concerns the agricultural education profession should have in regard to attrition.

In response to these concerns, educational leaders have widely implemented induction/ mentoring programs to support beginning teachers as they transition into the classroom. Smith and Ingersoll (2004) reported 83% of public schools received some form of induction assistance in their transition from student to professional educator; ninety-three percent of beginning agriculture teachers in Missouri reported having a formal mentor (Greiman et al., 2005). Although most beginning teachers receive support, there is much variation in how induction programs are administered, including differences in duration, components, scope, populations, intensity, and support/sponsorship (Ingersoll & Strong, 2011; Nasser-Abu Alhija & Fresko, 2010; Wayne, Youngs, & Fleischman, 2005; Wong, 2005). In a meta-analysis of teacher mentoring programs, Hobson, Ashby, Malderez, and Tomlinson (2009) proposed contextual factors such as program design, mentor selection and pairing, mentor preparation and support, and the culture of the school play an important role in the perceived purposes of induction and the subsequent behaviors and strategies implemented to achieve these goals.

Nearly all induction programs include a formal mentoring component (Ingersoll & Smith, 2004; Wong, 2004), and mentoring is often the most prominent characteristic of induction programs (Fideler & Haselkorn, 1999; Horn, Sterling, & Subhan, 2002). The mentor is often the face of the induction program and is responsible to deliver the school's induction policy to the beginning teacher (Carver & Feiman-Nemser, 2009). Although the most common goal of teacher mentoring is to retain teachers in the profession, other purposes can include teacher assessment, or perhaps weeding out, teachers who are not suited to the job (Ingersoll & Kralik, 2004; Ingersoll & Smith, 2004). Beginning Oklahoma agriculture teachers participating in a state-mandated induction program reported their mentor teacher provided the greatest amount of support; however, some beginning teachers viewed the purpose of the induction program to be evaluative, rather than supportive (Peiter, Terry, & Cartmell, 2005).

Theoretical Framework

Fletcher and Ragins (2007) suggest mentoring is best understood by examining the micro-level, growth-fostering interactions, or episodes, between mentor and protégé. The perceived quality of the mentoring relationship is based on the quality of the individual mentoring exchanges, or episodes, within the relationship. After a mentoring episode, both mentors and protégés evaluate the exchange against the predetermined role expectations held by both parties for the other person in the relationship (See Figure 1). Individual episodes which support initial relationship expectations lead to positive evaluations of mentoring episodes, whereas exchanges which do not meet expectations will decrease perceived relationship quality (Murphy & Freiheit, 2013; Ogilvie & Ashmore, 1991; Ragins & Verbos, 2007). A work relationship becomes a meaningful mentoring relationship when the number of positive episodes reaches a "tipping point" of development (Fletcher & Ragins, 2007).

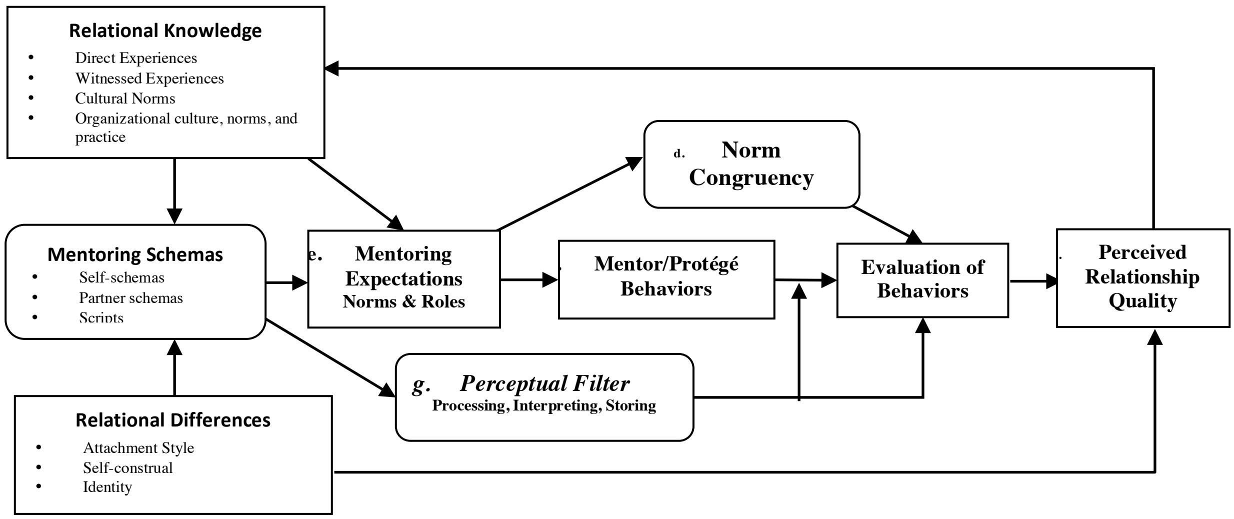

Figure 1. Mentor Schema Theory (Ragins & Verbos, 2007)

An individual's expectations for mentoring are driven by his or her mentoring schema. Mentors and protégés may differ in perceptions of support needed and corresponding expected role behaviors (Smith, Howard, & Harrington, 2005; Young & Perrewe, 2000). Further, beginning teachers may enter formal mentoring programs with inflated or unrealistic expectations for mentor and program support; unmet expectations are a common issue among beginning teachers participating in beginning teacher mentor programs (Blake-Beard, 2001; Eby & Lockwood, 2005). Conversely, mentors and protégés who share similar, or congruent, expectations for mentoring relationships report increased relational self-value and relationship quality; mentoring expectation congruency was significantly and positively related to feelings of interpersonal comfort and perceived similarity in a population of formal and informal mentors (Murphy & Freiheit, 2013). Young and Perrewé (2004) reported a significant relationship between protégés' general expectations for career and psychosocial mentor support and reports of the corresponding support received.

The structure of formal mentoring programs may restrict the formation of high-quality mentoring connections between mentor and protégé (Baugh & Fagenson-Eland, 2007). Early meetings between formal mentor and protégé are often marked with feelings of awkwardness, anxiety, tentativeness, and feelings of skepticism for both mentors and protégés and have been referred to as similar to "blind dates" (Blake-Beard, O'Neill, & McGowan, 2007). Other roadblocks for formal mentors and protégés can include varying levels of commitment to the relationship and organization, no personal knowledge of their partner, and no sense of the partner's expectations or desired mentoring function (Blake-Beard et al., 2007). To reap the expected benefits of informal relationships, mentor program administrators have enacted policies to imitate the relationship development found in naturally-occurring informal mentoring relationships (Ragins, Cotton, & Miller, 2000).

Although it is clear good mentoring is important to support beginning teachers, what is less conceptually clear is what "good" mentoring looks like (Feiman-Nemser, Schwille, Carver, & Yusko, 1999). The broad implementation of mentoring programs has created confusion about the definition of mentoring and expectations for what mentors can provide a beginning teacher (Mertz, 2004). Mentoring is complex; each mentoring relationship is a unique partnership between mentor and protégé (Fletcher & Ragins, 2007). Despite the intentions of formal mentor program administrators, the assignment of a mentor to a beginning teacher does not necessarily guarantee mentoring will occur (Wang & Fulton, 2012).

Mentoring relationships vary along a continuum of quality; the ability for a mentor to provide support functions is contingent on the quality of the mentor/protégé relationship (Ragins et al., 2000). A recent study (Murphy & Freiheit, 2013) suggests congruent mentoring expectations can significantly predict relationship quality for formal and informal mentoring relationships. A gap in the literature exists in what role congruent expectations and mentoring interactions play in formal beginning teacher mentoring programs, specifically regarding the psychosocial support received by beginning teachers.

Purpose/Research Questions/Hypotheses

The purpose of this study was to describe the relationship between mentoring Expectation Congruency, Scope of Interaction, and Psychosocial support received by beginning agriculture teachers participating in a state-supported formal mentoring program. This inquiry aligns with the AAAE National Research Agenda priority four in describing the "design, development, and assessment of meaningful learning environments which produce positive learner outcomes" (Doerfert, 2011, p. 9).

1. To what extent did beginning agriculture teachers and their formal mentors share congruent expectations for the relationship?
2. What was the frequency and scope of formal mentoring activities in the formal mentoring relationship as reported by beginning agriculture teachers?
3. To what extent did beginning agriculture teachers receive support in the psychosocial (Acceptance, Counseling, Friendship, Role Modeling, and Social) mentor functions?
4. To what extent did Expectation Congruency and Interaction predict variation in beginning agriculture teacher perceptions of psychosocial support received?
    Ho_1: Differences in Expectation Congruency and Interaction will not explain a significant ($p > .05$) proportion of variance in each of the psychosocial support functions received by beginning agriculture teachers from their in-subject assigned mentor.
    Ha_1: Differences in expectation congruency and interaction will explain a significant ($p < .05$) and unique proportion of variance in each of the psychosocial support constructs.

Methods

This descriptive-relational quantitative inquiry employed descriptive and causal-comparative research methods to address questions about the mentoring experiences of beginning secondary agriculture teachers with their formal agriculture mentors. The target population for this study was beginning secondary agriculture teachers participating in the Missouri Agriculture Teacher Induction and Mentoring Program. The accessible population consisted of all Missouri agriculture teachers completing their first year of teaching in 2012-2013 (n =33) or 2013-2014 (n = 53). The author determined the beginning agriculture teachers were a time and place sample of the population (Oliver & Hinkle, 1982); the use of inferential statistics was justified, as the beginning teacher population could be considered representative of future populations of beginning agriculture teachers in Missouri.

The investigator used components of five instruments to measure both the variables of interest and other predictors of mentor support, as identified in the review of literature. These instruments were assembled into one questionnaire. Each instrument was assumed to be reliable, as all reliability estimates (a) exceed the minimum .70 threshold suggested by Nunnally (1978). The first instrument used was the Mentoring Expectations Congruency Scale (MECS) developed by Murphy and Freiheit (2013). This instrument sought to examine to what extent beginning teachers perceived their expectations for the mentoring relationship were similar to their mentor, using a 7-point Likert-type scale, with anchors of 1= *strongly disagree* to 7 = *strongly agree* and a reported reliability estimate of a =.92. The second instrument utilized was the Mentor Relationship Questionnaire (MRQ), designed to assess mentor psychosocial support from the perspectives of the beginning teacher (Greiman, 2003). Beginning teachers responded to 15 items using a 7-point Likert-type scale, anchored as 1 = *not at all*, 3 = *some extent,* 5 = *large extent,* and 7 = *very large extent*. The third instrument utilized was the Turban, Dougherty, and Lee (2002) Perceived Similarity instrument. The purpose of this instrument was to estimate the perceived similarity protégés experienced to their mentor. The five-question instrument had a reported reliability estimate of a= .87. The fourth instrument utilized was Allen, Eby, and Lentz's (2006) Program Understanding instrument. Participants responded to four questions concerning their understanding of the mentoring program using a 5-point Likert-type scale, with a reliability estimate reported at a=.82. The fifth instrument was the Seibert, Crant, and Kraimer (1999) Proactive Personality Scale. The ten-question instrument utilized a 7-point Likert-type scale and a reported reliability of a= .86. Information was collected regarding frequency and scope of mentor meetings per week, gender composition of their mentoring dyad, and certification type. Same-race dyad, match input, and training differences were also identified in literature as potential covariates; however, no variation among beginning teachers and mentors in these variables was identified so they were excluded from the current study. A panel of experts reviewed the hard copy of the questionnaire and provided the author input on the content and face validity of the paper instrument.

Participant data were collected using procedures outlined in Dillman, Smyth, and Christian's (2009) Type III mixed-mode survey method. Using a paper and pencil instrument, the author collected 64 usable responses from first-year and second-year agriculture teachers who attended the required statewide meeting in January, 2014. Following the statewide meeting, the investigator distributed an identical electronic questionnaire to all non-respondents, guided by Dillman et al. (2009) web survey implementation protocol. An additional 18 usable responses were received, yielding a total response rate of 95.35% (n = 82). This response rate exceeded the 85% response rate suggested by Linder, Murphy, and Briers (2001) for non-response concern; therefore, the author conducted no additional procedures for control of non-response error.

All research questions were answered from the perspective of the beginning agriculture teacher. Researchers calculated mean, median, mode, variance, and standard deviation to address research questions one, two, and three. For research question four, the author identified Expectation Congruency and Interaction Scope as the two independent variables of interest and the five psychosocial mentor functions received as the dependent variables. The researcher utilized a hierarchal multivariate regression to explain what unique variance in psychosocial support received could be attributed to differences in Expectation Congruency and Interaction. Based on teacher mentoring research (Hobson et al., 2009) suggesting contextual factors could influence mentoring received, the author identified eight potential predictors of psychosocial support specific to protégé and dyad characteristics from previous research [same-sex dyad (Allen & Eby, 2003), perceived similarity (Burris, Kitchel, Greiman, & Torres, 2006), certification type (Roberts & Dyer, 2004), (Allen et al., 2006), proactivity (Wanberg, Kammeyer-Mueller, & Marchese, 2006), same-race dyad (Ragins, 1997), orientation, program understanding, and match input (Allen et al., 2006)]. Among these predictors, five factors (same-sex dyad, perceived similarity, certification type, program understanding, and proactivity) were identified as covariates or rival explanations and were entered into the first hierarchical regression block. After the researcher accounted for potential covariates, the independent variables were entered simultaneously into a second regression block, since no literature was found supporting the influence of one independent variable over the other (Field, 2009). Researchers tested and found the nine required assumptions for inferring conclusions to a population as tenable (Field, 2009). For research question four, the investigator calculated and reported the unstandardized beta coefficient *(B)* and accompanying standard error, the adjusted coefficient of determination (R^2), *t*-value, significance (*p*), and effect size (*d)* for all covariates in step one (Model 1) and covariates and independent variables in step two (Model 2) of the regression model. The author calculated and reported the R^2 change (DR^2) and the *F* statistic for both Model 1 and Model 2, in addition to the *F change (*D*F)* statistic generated by the addition of the independent variables to the regression model.

Findings

Research question one sought to determine to what extent beginning agriculture teachers perceived they held congruent expectations for the relationship with their mentor. On a scale from 1 = *strongly disagree* to 7 = *strongly agree,* beginning teachers *moderately agreed* (*M* = 5.72, *SD* = 1.59, *Range* 1.00-7.00) they shared congruent expectations with their mentors about the roles, functions, and outcomes of the mentoring relationship (See Table 1).

Table 1
Descriptive Summary of Congruency and Psychosocial Measures by Beginning Agriculture Teachers (n = 82)

Variable	*M*	*SD*	Range
Congruency	5.72	1.59	1-7
Number of Interactions	1.65	2.51	0-15
Hours Per Week Interacted	1.44	1.73	0-10
Psychosocial Support Construct			
Friendship	5.55	1.67	1-7
Acceptance	5.54	1.38	1.33-7
Counseling	5.48	1.61	1-7
Role Model	5.21	1.66	1-7
Social	4.29	1.97	1-7

Note. Scale for psychosocial constructs was 1 = *not at all*, 3 = *some extent*, 5 = *large extent*, 7 = *very large extent.*

Research question two queried the frequency and scope of formal mentoring activities in the formal mentoring relationship as reported by beginning agriculture teachers. Beginning teachers reported they interacted with their formal mentors an average of 1.65 times per week (SD = 2.51), with a range of 0-15 developmental interactions each week. Beginning agriculture teachers reported they interacted with their mentor an average of 1.44 hours each week (SD = 1.73), with a range of 0-10 hours each week.

Research question three examined to what extent beginning agriculture teachers received support in the psychosocial (Acceptance, Counseling, Friendship, Role Modeling, and Social) mentor functions. Beginning teachers reported they felt supported to a *large extent* (M = 5.55, SD = 1.67) in the Friendship and Acceptance (M = 5.54, SD = 1.38) psychosocial functions. Additionally, beginning teachers reported they were supported to a *large extent* in the Counseling (M = 5.48, SD = 1.61) and Role Model (M = 5.21, SD = 1.66) functions. Beginning agriculture teachers felt supported to *some extent* (M = 4.29, SD = 1.97) by their assigned mentors in the Social psychosocial mentoring function (See Table 1).

For research question four, researchers tested the null hypothesis, which stated differences in Expectation Congruency and Interaction did not explain a significant ($p > .05$) proportion of variance in each of the psychosocial support functions received by beginning agriculture teachers. For Social Support, the investigator regressed Social support against potential covariates in Model 1 (See Table 2). The covariate regression model was significant, F = 21.61(5,76, $p < .05$), as the contribution of Same-Sex Dyad, Perceived Similarity, Certification Type, Program Understanding, and Proactivity explained a significant (adjusted $R^2 = .56$) proportion of the variance in Social support received. Among the covariates, only Perceived Similarity had a *large* (Cohen, 1992) effect size (d = 1.57) in explaining variation in Social support. For Model 2, Expectation Congruency and Interaction were added as independent variables into a second regression block. Model 2 was also significant, F = 15.59 (7, 74, $p < .05$), whereas Expectation Congruency, Interaction, and covariates explained a significant (adjusted R^2 = .56) proportion of variance in Social support received. However, the addition of Expectation Congruency and Interaction in Model 2 added only one percent to the predictive capability of the regression, as compared to Model 1 (DR^2 = .01). The author identified a non-significant change in DF = 0.82 (2, 74, p = .45) between Model 1 and Model 2; therefore, researchers failed to reject the null hypothesis for Social support (See Table 2).

Table 2
Hierarchical Regression of Social Mentor Support Received on Interaction and Congruent Expectations (n = 82)

	Model 1			Model 2		
Variable	*B*	*SE B*	*d*	*B*	*SE B*	*D*
(Constant)	-2.35	1.56	0.34	-2.68	1.60	0.39
Same-Sex dyad [a]	-0.28	0.35	0.18	-0.26	0.36	0.17
Similarity	0.82*	0.12	1.57	0.71*	0.15	1.10
Program Understanding	0.45	0.24	0.43	0.33	0.26	0.30
Certification Type [b]	-0.09	0.42	0.05	-0.01	0.43	0.00
Proactivity	0.17	0.21	0.19	0.21	0.21	0.24
Congruent Expectations				0.18	.015	0.28
Interaction (hours/week)				0.02	0.09	0.05
Adjusted R^2		0.56			0.56	
R^2 Change		0.59			0.01	
F		21.61*(5,76)			15.59* (7, 74)	

Note. [a] coded as 1 = *same sex dyad* and 2 = *different sex dyad*. [b] coded as 1 = *traditional certification* and 2 = *certification other than traditional* * = *p* < .05

For Counseling support, the covariate model was significant, $F = 32.67(5, 76, p < .05)$. The variation in Same-Sex Dyad, Perceived Similarity, Certification Type, Program Understanding, and Proactivity explained a significant (adjusted $R^2 = .66$) proportion of variance in Counseling support received by beginning teachers(See Table 3). Perceived Similarity was the only covariate to have a *large* (Cohen, 1992) effect size ($d = 1.97$) for predicting variation in Counseling function. Regression Model 2, which included the independent variables of interest with the covariates, was also significant, $F = 37.85$ (7, 74, $p < .05$), (adjusted $R^2 = .76$) for the Counseling function. The addition of the Congruent Expectations and Interaction explained an additional 10% of variance (DR^2 = .10) in Counseling support received. The author identified a significant DF = 16.82(2,74, $p < .001$) difference between Models 1 and 2; therefore, the researcher rejected the null hypothesis in favor of the alternative hypothesis, which stated Expectation Congruency and Interaction accounted for a significant ($p < .05$) proportion of variance in the Counseling function, when controlling for known covariates.

Table 3
Hierarchical Regression of Counseling Mentor Support Received on Interaction and Congruent Expectations (n = 82)

	Model 1			Model 2		
Variable	*B*	*SE B*	*d*	*B*	*SE B*	*d*
(Constant)	0.98	1.12	0.20	-0.07	0.96	0.02
Same-Sex dyad [a]	-0.09	0.25	0.08	-0.04	0.21	0.04
Similarity	0.74*	0.09	1.97	0.44*	0.90	1.15
Program Understanding	0.45*	0.17	0.61	0.23	0.15	0.34
Certification Type [b]	-0.05	0.30	0.03	0.13	0.26	0.12
Proactivity	-0.18	0.15	0.28	-0.10	0.13	0.18
Congruent Expectations				0.50*	0.09	1.34
Interaction (hours/week)				-0.08	0.06	0.31
Adjusted R^2		0.66			0.76	
R^2 Change		0.68			0.10	
F		32.67*(5,76)			37.85*(7,74)	

Note. [a] coded as 1 = *same sex dyad* and 2 = *different sex dyad*. [b] coded as 1 = *traditional certification* and 2 = *certification other than traditional* * = *p* < .05

For Friendship, the covariate regression model explained a significant, $F = 32.72(5, 76, p < .05)$, (adjusted $R^2 = .66$) proportion of variance in support received. Again, Perceived Similarity ($d = 2.11$) was the only covariate to explain a *large* (Cohen, 1992) proportion of variance in the Friendship function (see Table 4).

Table 4
Hierarchical Regression of Friendship Mentor Support Received on Interaction and Congruent Expectations (n = 82)

	Model 1			Model 2		
Variable	*B*	*SE B*	*d*	*B*	*SE B*	*d*
(Constant)	0.65	1.16	0.13	-0.35	1.02	0.08
Same-Sex dyad [a]	0.14	0.26	0.12	0.20	0.23	0.20
Similarity	0.82*	0.09	2.11	0.53*	0.10	1.29
Program Understanding	0.35*	0.17	0.46	0.12	0.16	0.16
Certification Type [b]	0.06	0.31	0.05	0.24	0.27	0.21
Proactivity	-0.18	0.15	0.27	-0.10	0.14	0.17
Congruent Expectations				0.49*	0.93	1.22
Interaction (hours/week)				-0.48	0.60	0.18
Adjusted R^2		0.66			0.74	
R^2 Change		0.68			0.09	
F		32.72*(5,76)			35.22*(7,74)	

Note. [a] coded as 1 = *same sex dyad* and 2 = *different sex dyad*. [b] coded as 1 = *traditional certification* and 2 = *certification other than traditional* * = *p* < .05

The addition of Expectation Congruency and Interaction to the covariates in Model 2 for Friendship also yielded a significant, $F = 35.22$ (7, 74, $p < .05$) regression model, The addition of Expectation Congruency and Interaction explained an additional nine percent of variance (DR^2 = 0.09) and significant DF = 13.83(2, 74, $p < .001$) as compared to Model 1. The investigator rejected null hypothesis one for the Friendship function in favor of the alternative hypothesis, which stated expectation congruency and interaction accounted for a significant ($p < .05$) proportion of variance in the friendship function, when controlling for known covariates.

For Role Model support, the overall covariate model was significant, $F = 33.92$(5, 76, $p <$ .05), as Model 1 explained a significant (adjusted $R^2 = .67$) proportion of the variance in Role Modeling support. Among the covariates, only Perceived Similarity ($d = 2.16$) explained a *large* (Cohen, 1992) proportion of variance (see Table 5). The addition of Expectation Congruency and Interaction to the covariates also yielded a significant, $F = 37.90$ (7, 74, $p < .05$) regression model. Model 2 also explained a significant (adjusted $R^2 = 0.76$) proportion of the variance in the Role Model support received and was significantly, DF = 15.50(2, 74, $p < .001$), more accurate in predicting support than Model 1 (DR^2 = 0.09). The author rejected null hypothesis one for the Role Model function in favor of the alternative hypothesis, which stated expectation congruency and interaction accounted for a significant ($p < .05$) proportion of variance in Role Model support received, when controlling for known covariates.

Table 5
Hierarchical Regression of Role Model Mentor Support Received on Interaction and Congruent Expectations (n = 82)

	Model 1			Model 2		
Variable	*B*	*SE B*	*d*	*B*	*SE B*	*d*
(Constant)	-0.06	1.14	0.01	-1.11	0.99	0.26
Same-Sex dyad [a]	0.12	0.26	0.11	0.18	0.22	0.19
Similarity	0.82*	0.09	2.16	0.54*	0.09	1.36
Program Understanding	0.33	0.17	0.44	0.13	0.16	0.19
Certification Type [b]	0.12	0.31	0.09	0.28	0.26	0.07
Proactivity	-0.11	0.15	0.17	-0.04	0.13	0.06
Congruent Expectations				0.49*	0.09	1.28
Interaction (hours/week)				-0.10	0.06	0.40
Adjusted R^2		0.67			0.76	
R^2 Change		0.69			0.09	
F		33.92*(5,76)			37.90*(7,84)	

Note. [a] coded as 1 = *same sex dyad* and 2 = *different sex dyad.* [b] coded as 1 = *traditional certification* and 2 = *certification other than traditional* * = $p < .05$

Researchers regressed the Acceptance support construct against potential covariates in Model 1 (see Table 6). The covariate model was significant, $F = 32.98$(5,76, $p <$. 05), as systematic variation in Same-Sex Dyad, Perceived Similarity, Certification Type, Program Understanding, and Proactivity explained sixty-six percent (adjusted $R^2 = .66$) of the variance in the beginning teacher Acceptance function. As with the other support constructs, Perceived Similarity (d = 2.08) explained a *large* (Cohen, 1992) proportion of variance in the covariate model. The full regression model, Model 2, was also significant, $F = 32.29$ (7, 74, $p < .05$), whereas the contribution of Expectation Congruency, Scope of Interaction, and covariates explained a significant (adjusted $R^2 = 0.73$) proportion of the variance in the Acceptance function. The addition of Expectation Congruency and Interaction explained an additional seven percent of variance in the acceptance function of mentors (DR^2 = 0.07) and accounted for a significant change in the predictive capability of the regression model, DF = 10.33(2, 74, $p < .001$) as compared to Model 1. Therefore, the author rejected null hypothesis one for the acceptance function in favor of the alternative hypothesis, which stated expectation congruency and interaction accounted for a significant ($p < .05$) proportion of variance in the acceptance function when controlling for known covariates.

Table 6
Hierarchical Regression of Acceptance Mentor Support Received on Interaction and Congruent Expectations (n = 82)

	Model 1			Model 2		
Variable	*B*	*SE B*	*D*	*B*	*SE B*	*d*
(Constant)	0.99	0.95	0.24	0.31	0.87	0.08
Same-Sex dyad [a]	-0.05	0.22	-0.06	-0.01	0.19	-0.02
Similarity	0.66*	0.07	2.08	0.44*	0.08	1.27
Program Understanding	0.25	0.14	0.40	0.05	0.14	0.08
Certification Type [b]	-0.16	0.26	-0.14	-0.01	0.23	-0.01
Proactivity	0.06	0.13	0.10	0.13	0.12	0.26
Congruent Expectations				0.35*	0.08	1.03
Interaction (hours/week)				0.02	0.05	0.09
Adjusted R^2		0.66			0.73	
R^2 Change		0.69			0.07	
F		32.98*(5,76)			32.29*(7,74)	

Note. [a] coded as 1 = *same sex dyad* and 2 = *different sex dyad*. [b] coded as 1 = *traditional certification* and 2 = *certification other than traditional* * = $p < .05$

Conclusions/Implications/Recommendations

This inquiry was the first study to utilize the Mentor Expectations Congruency Scale (MECS) to study interactions in formal teacher mentoring programs. First, it was concluded that Expectation Congruency is a unique and important predictor of mentor support received by beginning teachers in the Counseling, Friendship, Role Model, and Acceptance functions, even when accounting for potential covariates. For beginning agriculture teachers participating in the Missouri formal mentoring program, increased levels of Expectation Congruency, on average, should lead to higher levels of Counseling, Friendship, Role Model, and Acceptance support received. Researchers conclude differences in Expectation Congruency do not explain a significant proportion of variance in the Social support function.

It was concluded that beginning teachers, on average, *moderately agreed* they shared congruent expectations with their mentors. Murphy and Freiheit (2013) suggested receipt of training was significantly predictive of expectation congruency, and mentors who receive high-quality training report significantly higher levels of commitment and program understanding (Allen et al., 2006). All mentors and protégés received identical training at the start of the experience, which could explain the high level of congruency but raises questions about why responses varied the entire range of the instrument. A recommendation for administrators would be to emphasize the importance for mentors and beginning teachers to generate shared mentoring goals and outcomes, particularly in the beginning stages of the relationship (Dansereau Jr., Graen, & Haga, 1975; Young & Perrewé, 2004). The author also recommends administrators prioritize practices which can facilitate congruent expectations among beginning teachers and their assigned mentor. Researchers recommend future investigation on how and which training and practices can facilitate congruent expectations. Future research should also test remaining components of the Mentor Schema Theory model for beginning teacher mentoring programs.

Among the independent variables included in this study, Perceived Similarity was the best predictor of mentor psychosocial support received for beginning agriculture teachers. The author concludes Perceived Similarity has both practical and statistical significance in explaining differences in psychosocial support received across all five psychosocial support constructs. These findings support previous research by Greiman (2003), Kitchel (2005), and Burris et al. (2006) who described a *very strong* positive correlation between perceived similarity and satisfaction with the mentoring relationship. Saucier, Tummons, Terry, and Schumacher (2010) reported 88.50% of Missouri agriculture teachers reported being an active FFA member in high school. These numbers suggest the pool of available mentors is somewhat homogeneous in background; an implication for beginning teachers who are similar to the agriculture teacher population is that similarity between mentor and beginning teacher may catalyze the mentoring relationship. Conversely, for beginning teachers with non-traditional backgrounds, the mentoring relationship could be constrained by issues with lack of Perceived Similarity. Although the researcher found no perfect multicollinearity among independent variables, the researcher notes multicollinearity may influence the regression equation, as the average VIF statistic exceeded the 1.0 threshold suggested by Bowerman and O'Connell (1990). However, the researcher concludes both Expectation Congruency and Perceived Similarity have unique and significant predictive capabilities for psychosocial support received by beginning agriculture teachers. It is recommended that program administrators consider Perceived Similarity as an important criterion when matching mentor dyads. Further, mentors should focus early interactions on identifying similarities and defining the terms of the mentoring relationship. Future qualitative research could investigate the phenomenon of a beginning teacher experiencing an induction program or experiences of non-traditional teachers.

The researcher concluded differences in Interaction time between mentors and beginning teachers had limited capability in predicting psychosocial support received. Previous research on interaction and mentoring functions is inconclusive. Interaction was chosen as a variable of interest based on previous research (Greiman, 2003) where agriculture teacher mentors and protégés stated that a lack of time to meet, mentor, and observe were the biggest barriers to mentoring. Although lack of time was not directly addressed, an implication of this study is that increased interaction time does not necessarily lead to increased mentor support. Other mentoring research (Allen, 2007; Allen & Eby, 2003; Lankau, Riordan, & Thomas, 2005) has suggested interaction frequency is not related to reports of psychosocial mentoring support. Further research should examine how mentors interact with beginning teachers and if variation in time explains variation in career support functions.

Researchers conclude that beginning teachers, on average, feel supported to a *large extent* in the psychosocial constructs of Friendship, Acceptance, Counseling, and Role Model functions. These four functions are the original psychosocial support constructs initially identified by Kram (1985). Beginning teachers, on average, feel supported to *some extent* by their mentor teachers in the Social function; the Social function was added as a potential psychosocial function at a later date by Ragins and McFarlin (1990). The results of this study are consistent with Greiman's (2003) findings regarding beginning agriculture teachers and their mentors, and his assertion that that mentors from a different school may not be able to provide Social functions (i.e. "socializing with you one-on-one outside of work") at the same level as the other psychosocial support functions. Perhaps beginning teachers don't expect Social support from their assigned mentor?

It was concluded the average beginning teacher spends a small part of their workweek interacting their formally assigned mentor. Torres et al. (2012) reported two-thirds of beginning agriculture teachers were working in excess of 55 hours each week, yet today's beginning agriculture teacher interacts with their mentor an average of 1.44 hours each week. Although today's mentors are interacting with beginning teachers, on average, almost two hours less per week today than in the 2001-2002 cohort group, today's beginning teachers are reporting similar levels of mentor support as those from 10 years previous. This could imply today's mentors are more efficient with their mentoring time when interacting with beginning teachers. Another potential implication is that technology has enhanced a mentor's ability to meet the needs of the beginning teacher. Do beginning teachers in the current study could have different expectations for support as compared to those in the 2001-2002 cohort group? Future research should investigate the variation in content and format of mentor/protégé interactions.

The variables of Same-sex dyad, Certification type, and Proactivity have limited ability to predict variations in psychosocial support received by agriculture teacher protégés. The previous research on matching dyads by sex (Allen & Eby, 2003; Scandura & Williams, 2001; Wanberg et al., 2006) is inconclusive; this study supports the notion that same-sex pairing explains little variation in mentoring outcomes. Previous researchers in Agricultural Education (Duncan & Ricketts, 2008; Roberts & Dyer, 2004) suggest traditional and alternatively certified teachers differ in their professional support needs. These findings are not supported by this study, although the author concedes it is possible traditionally and alternatively certified teachers differ in professional support needs beyond the factors included in this study. One study of formal mentoring programs (Wanberg et al., 2006) suggested protégé proactivity was related to increased psychosocial mentoring. However, this study does not support the notion that proactivity is either positively or strongly predictive of psychosocial support received by beginning agriculture teachers.

The author concluded Program Understanding has potential for explaining variation in psychosocial support received by beginning agriculture teachers, particularly in the Counseling and Friendship functions. In a study of formal mentors and protégés, Allen et al. (2006) found Program Understanding was significantly predictive of perceived Program Effectiveness for both mentors and protégé. The author concludes this study supports previous research, in that Program Understanding does explain unique variance in support received; however, the author concludes variation in Expectation Congruency and Interaction may mediate the unique predictive capability of Program Understanding for this population.

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Beginning Agriculture Teachers Approaches to Teaching Content

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Abstract

This study explored experiences of beginning agriculture teachers' approaches to teaching content. The research question guiding the study was: how does agriculture teachers' knowledge of content and students influence their process of breaking down content knowledge for teaching? The researchers employed a grounded theory approach in which five beginning teachers were interviewed and observed teaching a lesson. The researchers found beginning teachers' knowledge of content and students greatly influenced how they broke down content knowledge for student understanding. Five major themes emerged: students' prior knowledge and enrollment in sequences of courses influenced content covered, student engagement methods were not primarily driven by content, differing perceptions of content difficulty for students shaped teaching decisions, deconstructing content for students was deemed important by teachers, and teachers engaged in a form of learning egocentrism. These findings support further research on teachers' development of knowledge of content and students overtime as it was found to be an influential knowledge base and investigation into expert teachers' use of knowledge of content and students in the classroom. Recommendations include providing teachers with more opportunities to explore integrating student's prior knowledge into the curriculum and incorporating student thinking about agriculture content more specifically in teacher preparation.

Introduction

Pedagogical content knowledge (PCK) is the combination of a teachers' content knowledge with their pedagogical knowledge, creating a knowledge base specific for teaching (Shulman, 1986). Teachers with PCK can create representations for concepts, recognize student misconceptions of content, and clarify material (Shulman, 1986). Effective preparation of teachers includes a focus on PCK development. CAEP (2013) standards for accreditation of teacher preparation included content and pedagogical knowledge as the first standard. Candidates are expected to develop content knowledge and to cultivate ways to best present that knowledge to students, which includes knowledge of instructional strategies, learner development, learner differences, assessment, and application of content, among others (CAEP, 2013). To reflect the importance of PCK as a knowledge base for teachers, the Praxis II content exam, a commonly used teacher certification exam, has launched pilot tests to measure PCK (referred to as content knowledge for teaching) in some subjects (Educational Testing Service, 2011).With the increasing expectations for student learning and achievement following the No Child Left Behind (NLCB) Act of 2001 (2002) and subsequent education reforms, further examination of the PCK of teachers and how it influences their teaching practices could be one way to bridge the student achievement gap. Recent calls for empirical research in PCK include further establishing the connection between PCK and its effect on student learning (Gess-Newsome & Carlson, 2014).

Teacher and teaching quality, including teachers' knowledge about content and pedagogy, can greatly impact student achievement (Kaplan & Owings, 2002). In a quantitative study of elementary teachers, teachers' mathematical knowledge positively predicted student achievement in mathematics (Hill, Rowan, & Ball, 2005), demonstrating the importance of a strong content knowledge base for teachers. A quality teacher knows the content of their discipline and is able to communicate that content knowledge to their students (Okpala & Ellis, 2005). If teachers are not knowledgeable about their content, they are in danger of passing on misconceptions and inaccurate information to their students (Ball & McDiarmid, 1990). However, content knowledge alone, while recognized as an important knowledge base, is not the only knowledge teachers need to possess to be effective (Baumert et al., 2010). Transforming content knowledge for student understanding requires teachers to use their PCK (Halim & Meerah, 2002), making PCK the greatest single contributor to explaining student progress (Baumert et al., 2010).

One specific and important component of PCK for teachers is knowledge of content and students. In a mathematics framework for PCK developed by Hill, Ball, and Schilling (2008), teacher knowledge was divided into six domains and two groups. The first group was subject matter knowledge. The second group was specifically PCK which included: knowledge of content and students, knowledge of content and teaching, and knowledge of content and curriculum. Teachers' knowledge of content and students included a combination of knowledge of how students think and learn content with content knowledge (Hill et al., 2008). Components of knowledge of content and students as discovered by Hill et al. (2008) included: common student errors, student understanding of content, student developmental sequences, and common student computational strategies. According to Chick, Baker, Pham, and Cheng (2006) examples of teacher behaviors when using their knowledge of content and students included predicting what concepts would be most difficult for students and why and knowing where students are developmentally in terms of the content (Chick et al., 2006). Investigation into the impact of knowledge of content and students is crucial for future research on PCK. In a study of novice mathematics teachers, knowledge of content and students was a pivotal point for PCK development of some teachers (Lannin et al., 2013). Examining this knowledge base specifically in agriculture teachers could provide information to teacher educators on how to train preservice teachers and develop professional development initiatives for inservice teachers.

Review of Literature

Literature surrounding PCK and knowledge of content and students were first reviewed to determine areas of investigation. Research has been conducted within various education disciplines and numerous frameworks have been created to try and explain PCK (Chick et al., 2006; Gess-Newsome & Carlson, 2014; Hill, Ball, & Schilling, 2008; Hashweh, 2005; Lee, 2011; Loughran, Berry, & Mulhall, 2012; Magnusson, Karjcik, & Borko, 1999). Recently at a PCK summit, a consensual definition for PCK was established and elaborated on by experts in the field. PCK was defined as the knowledge of, rationale behind, planning for, and act of teaching a specific piece of subject matter, in a specific context, to support student learning of the material (Gess-Newsome & Carlson, 2014). This definition focuses on the topic specific nature of PCK (Darling-Hammond & Bransford, 2005; Etkina, 2010; Van Driel & Berry, 2012), necessitating research specifically for agricultural education, which may be unique to other disciplines due to the breadth and depth of content that can be covered in an agriculture classroom (Barrick & Garton, 2010).

In studies spanning numerous academic disciplines, it was discovered many teachers were struggling to develop PCK, particularly preservice and beginning teachers. In a case study of a mathematics student teacher, that teacher was unable to explain mathematical concepts to her students that were both relevant and developmentally appropriate, despite having an extensive background in mathematics content (Borko et al., 1992). In science education, various studies in biology, physics, and chemistry found preservices teachers struggled to transform the subject matter to promote student understanding (Diakidoy & Iordanou, 2003; Halim & Meerah, 2002; Van Driel, Verloop, & DeVos, 1998). Beyond the core content areas, researchers investigating the PCK of preservice music education teachers found those teachers were unable to apply their music knowledge and skill to the classroom (Ballantyne & Packer, 2004). This finding resulted in a recommendation by the researchers for music teacher preparation programs to focus more explicitly on PCK development (Ballantyne & Packer, 2004). Experience in the field is one of the most effective ways to develop PCK (Hashweh, 2005; Nilsson, 2008); however, without a guiding framework beyond teacher preparation, teachers may not be developing these skills.

Science education is at the forefront of developing research related to PCK that can be used in practice. Pedagogical and Professional experience Repertoires (PaPeRs) and Content Representations (CoRes) were developed by Mulhall, Berry, and Loughran (2003) to make explicit teachers thinking about content. An important component of these frameworks included information related to how knowledge about student thinking influences the teaching of an idea including: predicting students difficulty with particular content, developing specific strategies to make sure students are understanding content, and withholding certain content for students developmental and contextual needs, among others (Loughran et al., 2012). A recent study with science preservice teachers documented use of this tool and confirmed its value in raising awareness for and building teachers' PCK (Hume & Berry, 2011). Teachers' knowledge of student thinking in terms of content is an important piece of transforming content for student understanding (Kennedy, 1998), emphasizing a need for a focus on knowledge of content and students in research and practice. Using the contextual framework of PCK, teachers skills can be examined and understood (Abell, 2008). Focusing on beginning agriculture teachers in the crucial stages of developing their PCK and describing their process of breaking down content knowledge could be an important starting point for research in agricultural education.

Central Research Question and Purpose

The central research question for this study was: How does agriculture teachers' knowledge of content and students influence their process of breaking down content knowledge for teaching? The purpose of this study was to explore the impact of teachers' knowledge of content and students on their process of breaking down agriculture content utilizing grounded theory methods. This research question aligns with the National Research agenda for agricultural education priority four, meaningful and engaged learning in all environments (Doerfert, 2011).

Methods

The data analyzed were part of a larger study that sought to examine the process beginning agriculture teachers engage in when breaking down their content knowledge for student understanding in the classroom. This specific data analysis focused on teachers' knowledge of content and students and its influence on their teaching. Grounded theory methodology was utilized for data collection and analysis because it is an appropriate method for investigating an undefined process (Corbin & Strauss, 2008). Other empirical studies have successfully used grounded theory methodology in their investigation of PCK (Van Driel, Verloop, and De Vos, 1998). Additionally, research on agriculture teachers' deconstruction of content knowledge and specifically knowledge of content and students is limited in agricultural education. Specifically, my methodology was guided by the work of Corbin and Strauss (2008). Similarly to Corbin, I identify as a pragmatist. My goal for this research is to answer questions that can help to improve practice, particularly of teacher preparation programs and inservice teacher professional development initiatives. Corbin and Strauss's (2008) guidelines for conducting grounded theory fit well with my theoretical lens and therefore were appropriate in guiding this research study.

Site and Participants

Approximately five to seven years teaching experience in the field is when expertise begins to be achieved (Darling-Hammond & Bransford, 2005). With this in mind, Missouri agriculture teachers with a range of two to four years of classroom experience were chosen to keep the focus on beginning teachers. First year teachers were excluded from consideration of this study because they would not be able to compare their thoughts and strategies over the course of multiple years. All participants recruited were purposefully graduates of the University of Missouri and had similar teacher preparation courses and experiences. Thirteen teachers fit these criteria; in addition to being within a 180 mile radius of the university so fieldwork could be conducted. Out of these thirteen teachers, five agreed to participate in the study. Due to the variation in content that can be taught in an agricultural education program, the decision was made to focus on a lesson integrating science concepts, primarily plant or animal science. The participants consisted of two males and three females. Two of the participants were teachers in the same school district. One teacher had two years' experience, three teachers had three years' experience, and one teacher had four years' experience. One of the teachers was in a single teacher department and the rest were currently in a multi-teacher department but may have worked in a single teacher department in previous years. Four of the teachers were employed in schools in rural school districts and one of the teachers was employed in a suburban school district.

Data Collection

Multiple forms of data were collected as this was part of a larger study. First, data were collected using video recorded classroom observations of one class period for each teacher lasting at least 45 minutes in length. Second, field notes were taken during the observation of the lesson to capture reactions of students and interactions between the teacher and students not captured on video. Observations were an important data collection point to create a comprehensive picture of the deconstructing phenomenon because often people are either not aware of what they are doing or are unable to recall what actually happened (Corbin & Strauss, 2008). Finally, one-on-one, semi-structured interviews were conducted after the observation and lasted 30-45 minutes each. Questions evolved throughout the grounded theory process to meet the needs of the concepts being investigated (Corbin & Strauss, 2008). As data collection and analysis continued, the teachers in the study were contacted via e-mail for follow-up information as a part of the constant comparative analysis of grounded theory (Corbin & Strauss, 2008). All video and audio recordings were transcribed verbatim.

Data Analysis

To analyze the data, field notes from the observations, transcriptions of the teaching videos, and transcriptions from the interviews were used to achieve triangulation of the data (Creswell, 2013). As recommended by Corbin and Strauss (2008), analysis involved open, axial, and selective coding. To form initial codes, NVivo 10 software was utilized. As data were collected, a constant comparative method was used to compare data against data (Corbin & Strauss, 2008). Additionally, interview questions were adapted to follow emergent categories. A good portion of the analysis stage was spent in the axial coding phase of the analysis looking for relationships amongst the data. These relationships were then used as the basis for the selective coding phase and subsequently the findings.
Because this study was exploratory, the findings are discussed in themes, and a substantive theory was not developed based on the data. In developing the themes, engaging in the writing process through memoing and through writing up the final findings helped to make sense of the data. Using writing as a tool for meaning making fits with Denzin and Lincoln's (2000) argument that writing is not simply the end product of the research process but a way to inquire into the process. To ensure trustworthiness of the original data, member checking was utilized as the study evolved (Creswell, 2013). Credibility of the data was insured by the richness of the data obtained and reflexivity through memoing throughout the data collection and analysis process. Additionally, relevant literature in the field provided sensitizing concepts for this study (Corbin & Strauss, 2008).

Findings

Beginning teachers' knowledge of content and students (and lack thereof) greatly influenced how they broke down content knowledge for student understanding. Specifically, five major interwoven themes emerged through data analysis regarding how this unique knowledge base influenced teaching agriculture content.

Students' Prior Knowledge and Enrollment in Sequences of Agriculture and Science Courses Influenced Type and Depth of Content Covered by Teachers

All of the teachers in the study referenced making effort to consider their students' prior knowledge in the content when planning and teaching their lessons. This included prior knowledge from other agriculture classes the students had taken and prior knowledge from core content classes such as biology or chemistry. In my field observations, multiple teachers referenced to students they had learned certain pieces of content in 6th and 8th grade. Often, the students recognized their own prior knowledge and communicated to the teacher. In an observation of a plant science lesson with Tiffany, one of the students commented they had to know the formula for photosynthesis for their biology class, as well. Tiffany responded by emphasizing the cross-curricular nature of the content. In the same lesson, when she was explaining cellular respiration, Tiffany asked the students if they had learned this yet in their biology course, possibly prompted from the previous student interaction.

In the interview following the lesson, Tiffany stated, “We do talk about plant science in 8th grade, I reminded them of that today. I want to be a step up from that, but I also want to leave them something to learn in plant science in greenhouse class.” Tiffany was from a single teacher department, so she knew she would be having many of these same students in future classes. Agriculture teachers have to balance curriculum across multiple courses and attempt to avoid unnecessary repetition or leaving out certain content. Jordan discussed how he had to balance content across multiple agriculture courses in order to teach all of the content he felt was important for students to learn. “You just look for ways to maybe incorporate [content] in other classes or try to switch out your class and that’s where you can cover the information you want to cover.”

In some schools, there was an effort to teach complimentary curriculum across subject areas to increase transfer. Tiffany stated,

> So I am kind of getting a sense now of stuff that I either withhold or go ahead and teach them. I know where they are at in their other classes, so it’s trying to work with that so they are hearing the same level of stuff in my class that they are hearing in other classes.

In multi-teacher departments sometimes the pressure wasn’t just to teach complimentary content across the different disciplines, but also to be consistent with other agriculture courses. Melissa reflected on her efforts to keep the content the same. “There’s a big push to make your classes similar. If another agriculture teacher is teaching wildlife, then our curriculum is the same.” As the newest and youngest teacher in her department, Melissa often felt like she was the one who had to adapt her content. “I know that they are not going to change what they are teaching since they have been here, so I have been trying to take the big idea of what they are teaching and teach that.”

Student Engagement Methods in the Classroom were not Primarily Driven by the Nature of the Content

A common method to engage students in the classroom was to have them participate in activities. Lecture does not work best as a delivery method for understanding and retention (Halpern & Hackel, 2003). Engagement of students seemed to be a struggle for many of the teachers. Jeff discussed his engagement strategies for a parliamentary procedure lesson and his frustration with keeping students engaged in the content. “I throw the video in there. That’s the number one problem I run into though is engagement and keeping kids focused on the topic, especially on some very hard and boring stuff.” Jeff referred to learning how to take minutes in a meeting, the content he was covering that day in class, as difficult and boring on multiple occasions throughout the interview.

When I asked Melissa about how she decided what methods were best suited for teaching specific content, her answer had very little to do with the actual content.

> It probably depends on whatever I have done in the class before because I don't want to do lecture every time. If I have just done a research project, I don't want to do that same thing with kids that next class period. For me, that is probably the driving factor in whether I am going to study and read up on this or am I going to create a project for them to research or do a group project on. Right now that is probably my driving factor, making the class different so I can try to engage them.

While student engagement is important for learning to take place, the role of content was often absent in the decision. Instead, the focus was more on keeping the students entertained than how to best represent a particular piece of content for student understanding.

Differing Perceptions of what Content is "Difficult" for Students Shaped Teaching Decisions and Reflection

Another component of knowledge of content and students influencing how the teachers approached the content was the difficulty or perceived difficulty of the content for the students. Tiffany described her experience with teaching content in a farm management course during her interview. "When I taught it the first time, elasticity of demand blew a few kids' minds. It was to the point where we took a test and they just didn't even try it." Jeff commented on how effort was one of the biggest problems he saw with teaching content to students. Students' negative experiences with difficult content in previous classes also influenced how teachers created interest and tried to motivate them to be excited about agriculture content. Tiffany described how this unfolded in her plant science unit. "They bring negative opinions about the content. I say this is biology to try and get them to relate to biology class. Turns out they hate biology class and they just shut down." Plant science was not the only content area Tiffany experienced students shutting down. She described a similar instance in the aforementioned farm management course showcasing how students' negative experiences with content extended beyond the sciences. "There are kids that refused to take a math class beyond what they had to and they are sitting there during any of our equations and they are shutting down, not listening, and not even trying." In response to the perceived difficulty or negative experiences, sometimes the teacher decided to focus more on particular content because they felt it was important for the students to learn. Jeff illustrated this with his agriscience class.

> The reason I thought to teach parli [parliamentary procedure] is our FFA meetings were disasters last year. Nothing happens at their meetings, kids hate going to them, they are not enjoying being around their friends, and it's because they're not getting things accomplished. So I thought this was important to do.

Often the teachers experienced frustration with teaching content the students struggled with but they perceived as lower level knowledge. Many of the teachers discussed identification as a topic many of their students struggled to master. Since identification is a component of many career development events (CDE's) within FFA (National FFA, 2012), it was also an important part of the agriculture classroom curriculum and the foundation for future knowledge.

In the lesson on monocots and dicots I observed, I asked Tiffany afterwards what was the most difficult part of the lesson for her students to understand. She responded, "Maybe just the sight identification of monocots and dicots, like they can describe them but they can't identify them….There will be times when they seem to get it and then something will throw them." Tiffany began spending more time on identification in plant science because her students were struggling. "Identification with the plant science stuff is an area that they have struggled with and that's why we have started hitting it a little harder this year." Melissa described identification as being a barrier to student learning. "Weed and grass identification, that was really hard, just the ID-ing part, getting them to differentiate between plants and why is this plant this one. That was probably one of the difficult things." Beyond the plant sciences, animal science identification and terminology was also an area of concern. Mary indicated terminology in relation to veterinary science and animal science was an area in which her students struggled to grasp the content. "If they haven't taken anatomy yet then they struggle a lot with the different parts of the body and the different bones and the technicality of it."

Tiffany described her frustration with re-teaching identification and her students still not grasping the material:

> And I'm not understanding. I feel like I've been through it enough that when we go through contests I can identify all the plants and they still don't know. There's some jump that they are not making in terms of identification and like I said before I think that's a really important part of plant science.

Many of the teachers experienced frustration with this perceived "easy" content and the students' difficulty with mastery. Melissa described her reflection on re-teaching content. "I have struggled with trying to go back and say, oh shoot, I needed to teach that better because I can't just rattle that off [specific content terminology] and them [students] understand it because they don't really know."

Another component to the teachers' perceived student difficulty with content centered on where the students were developmentally in terms of content knowledge acquisition. I asked all of the teachers during the interview if there was anything they knew about the content they purposefully didn't cover in class and their rationale for excluding that content. In reference to his lesson on meeting minutes in the parliamentary procedure unit Jeff said, "I mean you don't want to overload them with information. I've seen a lot of teachers teach it with a PowerPoint and they cover twenty motions in one…but the kids don't know how to use it in action." Describing a farm management course, Tiffany expressed a similar sentiment:

> But we basically talk about the relationship, if the supply is this and the demand is this…but I don't even try to get my freshmen to really get into that. In farm management I talk about it enough for them to get the idea behind it, but I'm not going to try to get freshmen to understand economic principles like that. So yeah, with that class I definitely withhold some of it; they know what they need to know to be functional and then the rest of it they wait.

Sometimes the teachers were not sure what their students were developmentally ready for in terms of content. When asked if there was ever any content he withheld Jordan replied, "Yes, partially because of time and partially because I do think it's over their head whether it's pertinent or not." Mary expressed her concern for not knowing what to withhold from students, "Because sometimes I read through this stuff and I am like, do they know this? Should they not know this?" A lack of a defined curriculum in agricultural education could be perpetuating this uncertainty of what content is developmentally appropriate for students.

Deconstructing Content for Students was Deemed Important by Teachers

Many of the teachers discussed how they deconstructed content in a step-by-step fashion beginning with the lowest level knowledge and building from there as a strategy for teaching content. Jeff described deconstructing content in this manner when teaching a lesson in forestry. "You have to slow down and take time to explain and then you reinforce those points every single time. Because if they don't understand the simplest thing I can't move on…" Tiffany also describes her reasoning for laying out the content step-by-step. "They are either just not getting it right or they are telling you they don't get it. So that doesn't tell me specifically why or where they are lacking. So having them step by step…"

The concept of "forced learning" was one technique utilized by Tiffany when teaching content her students struggled with. To Tiffany, forced learning meant 100% of the content was learned by 100% of her students. She felt it was important to make sure each student understood the basics of content before she was able to build on that content. This technique also involved a step-by-step process of breaking down the content. Tiffany described how this technique worked for her as an intervention strategy.

> So I would sit down with them during class and go through it step by step with them until they got it and just force them to think about it. So just sitting there and hanging with them until they understand it one-on-one I think is the most effective intervention.

Often the teachers self-identified as lacking content knowledge in many areas of agriculture. However, some teachers had a specialty area of content in which they had high self-efficacy. Sometimes this expertise in a particular content area could actually be a barrier to breaking down content. When describing a lesson in meat science, an area Jeff had background in from working in a meats lab, he indicated it was hard to explain some of the concepts to the students.

> Like on quality grading- Mr. W how do you know that's prime? Well because it's prime- you know? That's a common one. Or how do you know that number three is better than number four [referring to cuts of meat]? Because it is- you know?...The hardest thing is for me to translate things that you just instinctively know into ways for them to understand it.

This frustration Jeff experienced is consistent with literature stating expertise can sometimes be a barrier to teaching because experts don't always realize the steps they are taking to solve a problem because it has become so automatic (Bransford, Brown, & Cocking, 2000). This phenomenon of struggling to break content down due to expertise in a content area may occur more often in experienced agriculture teachers and could warrant further research.

Teachers Engaged in a Form of Learning Egocentrism

Part of the concept of "forced learning" stemmed from the teacher relating students' learning with her learning. This is common in education, because teachers often teach how they were taught and how they learned best as students (Darling-Hammond & Bransford, 2005). This egocentric learning philosophy altered the approach many teachers utilized when determining the best methods for teaching content. Instead of investigating the most effective method for teaching content or how students responded to different teaching methods, the teacher taught how they would prefer to learn. Tiffany continues regarding why she used “forced learning” as a technique in her classroom for certain content:

> I think that was an area I struggle with and no one ever forced me to think through things…Forcing them to sit there and tell you why they don’t get it and then tell you why they do get it is going to help them a lot.

When referring to another content area, Tiffany again referred to how she learned and its influence on her teaching. “I tell them with math, if I can understand it well enough to teach you, you guys can understand it. I break it down to the absolute lowest level because for me to understand it that’s what I have to do.” It appeared Tiffany was attempting to empathize with her students’ struggle with particular content and wanted to assist them with mastery; however, her methods were still focused on how she personally learned best. Jordan also acknowledged how his own preferences for learning dictated what he chose to do in the classroom. “One time it just come to me in a dream or something or whatever when I’m just thinking back and think what would be cool and what I’d like to do as a student.”

Sometimes the teachers began thinking about their own learning, but were influenced by others to re-examine their thought process. This was evidenced through an interview with Melissa:

> I start looking back to when I was in high school and thinking about being on the floriculture team and how hard it was trying to remember all the plants. Now I am like what’s so hard about this? Once you learn it what’s the big deal? The other teacher that does grasslands, that I went to the practices with, I was like it is so much easier now, I don’t get this. He was like it is probably because you have a lot more background experience and knowledge now; certain things stand out more. I was like I guess that’s true. I guess you get more background knowledge as you go and you have done it. But I am sure someone else that has never done it, if they were however old, may not get it either.

It is possible many of the teachers do not realize they have engaged in learning egocentrism, as evidenced by Melissa’s passage above. Looking at the influence of teacher preparation programs on this phenomenon could be important future research.

Discussion

All teachers in the study recognized the importance of students’ prior knowledge in learning new content. This is consistent with literature stating students enter learning environments with preconceptions about content that influences how they grasp future material and the impact this can have on instructional practice (Bransford et al., 2000). However, while the teachers did recognize the importance of students’ prior knowledge, there were many instances where they did not know how to use that awareness to facilitate further learning of the agriculture content. This disconnect could potentially impede students’ learning of new content, inhibiting transfer. It is recommended teachers both at the preservice and inservice level are provided more opportunities to explore integrating students’ prior knowledge into the curriculum, possibly through inquiry based learning approaches. The majority of the time, the teachers in this study relied on students verbal assertions regarding their knowledge of content. Engaging in pretests before beginning a unit and purposefully designing instruction around those results could strengthen students’ understanding of content. Additionally, the overlap in content from the core content areas, primarily science and math, necessitates working with core content area teachers to align and compliment curriculum. With the emphasis on high stakes testing (NCLB, 2002), this could be a way to substantiate agricultural educations' role in student learning school wide. If the agriculture program or class emphasis is on agriscience, it could be important to work with other science teachers in developing those science concepts across classes and grade levels. Finally, a lack of a defined curriculum in agricultural education could also be a contributing issue in teachers' decisions related to what content to teach in which classes and the appropriate depth of content. Investigation into potential overlap of career pathways (National Council for Agricultural Education, 2009) could be important future research.

While the importance of student engagement pervades educational literature (Trowler, 2010), the emphasis for the teachers in this study was predominately centered on keeping the students entertained and less focused on using certain motivational techniques for particular content. This could lead to teachers not choosing the best methods for teaching content to facilitate student learning. Varying instructional strategies aligns with the principle of teaching and learning, variability, which was taught during teacher preparation to the teachers in this study (Rosenshine & Furst, 1973). However, has this principle, albeit important, been simplified by the preparation program or the teachers themselves to focus primarily on switching up strategies and less on which strategies are best for particular content? Selassie (1989) found the nature of students and students' intellectual development was less frequently used by teachers in the selection of the method by which material would be presented. Incorporating student thinking about agriculture content more explicitly in teacher preparation could be beneficial in agricultural education. Thinking about math as a learner and solving students' math problems was important for the preservice teachers in a content-focused methods course to be able to see how to best teach the content (Steele & Hillen, 2012). Getting into the mindset of a learner and approaching content from that mindset could encourage student engagement with the content, eliminating some of the need for superficial activities.

The difficulty of tasks can also influence student learning. If an assignment is too 'easy' a student may become unmotivated because they are bored. The reverse is true if the assignment is too 'difficult' (Bransford et al., 2000). Vygotsky's (1978) zone of proximal development describes the amount of learning a student can accomplish with and without assistance. Knowledge of what was developmentally appropriate for students to know and how much they could learn was a source of concern for teachers in this study, which is a fundamental component of knowledge of content and students (Hill et al., 2008; Loughran et al., 2012). In a self-efficacy study of beginning agriculture teachers, Wolf (2011) reported moderate to low levels of capability for teachers for adjusting lessons to proper levels for individual students. In another agricultural education study, 36% of teachers expressed doubts about students' capacity to handle integrated science material in agriculture courses (Thoron & Myers, 2009). Investigating students as learners' courses at the teacher preparation level, which would include information surrounding learning theories, could be important future research. At the university the teachers attended, often the courses on student learning focusing on development were taught by the College of Education and did not focus solely on middle and high school age students, which is the population of agricultural education programs. This could be contributing to the teachers' uncertainty about what is developmentally appropriate. Again, lack of a defined curriculum, which includes the flexibility of what content to teach and the community based approach to teaching content, could be another contributing factor related to teachers' struggles with what content is developmentally appropriate to teach and how to sequence content.

In every teacher interview the concept of identification as content students struggled to master was emphasized. The teachers expressed frustration with the students' difficulty with 'easy' content. In the revised version of Bloom's taxonomy (Anderson & Krathwohl, 2001), identification falls under the lowest level in the hierarchy- *remember* (previously called knowledge). A learning objective falling under the remember category would include recognizing and recalling information from long-term memory (Anderson & Krathwohl, 2001). The perceived importance of this knowledge could stem from its role as a foundational knowledge base in students or its prevalence in CDEs (National FFA, 2012). Perhaps the frustration with students not grasping identification related content connects to prior knowledge of students and teacher difficulty in using that knowledge in the classroom to build new content. It is also possible teachers are expecting students to have certain knowledge when they enter the classroom. Finally, it could also be related to teacher learning egocentrism and teachers having difficulty understanding why such an 'easy' concept would be difficult to master. Future research should explore this concept of identification as both an important and difficult knowledge base for students to comprehend in more detail to pinpoint the issues and determine solutions.

Primarily due to their novice status, teachers discussed feeling deficient in various aspects of content; however, some also acknowledged a specialty area in which they excelled. Difficulty in deconstructing content in these specialty areas was expressed by teachers and could be a barrier to student learning. This is consistent with literature acknowledging expertise in a subject can sometimes impede teaching because experts forget what is easy and what is difficult for students (Bransford et al, 2000). The teachers in this study emphasized the need to deconstruct content, mostly in a step-by-step fashion, but didn't always know how to go about this process for specific content. Helping preservice teachers to translate things they instinctively know for student understanding is an important component of teaching and should be addressed more explicitly in teacher preparation programs. Additionally, the step-by-step procedure assumes learning occurs in a linear fashion. This could be contrary to inquiry based learning or other learning techniques. Exploration into the repertoire of methods beginning teachers have for teaching content could uncover any potential weaknesses in or reliance on teaching methods. The teaching strategy "forced learning" was mentioned by one teacher numerous times throughout the interview. It appeared to stem from relating students learning to her learning.

Other teachers in the study also indicated how their views of how they personally learned best influenced their choices of teaching methods. Part of this phenomenon of teacher learning egocentrism could be a lack of understanding of how varied students learn. It could also be an inability to look at content in multiple ways, an important part of PCK (Shulman, 1986). Effective teachers need to know multiple ways to approaching solving problems and be able to create multiple examples and representations of challenging topics for a wide variety of learners (Grossman et al., 2005). Teachers often know how to teach content in one way, the way they learned it (Darling-Hammond & Bransford, 2005). With the variety of students in agriculture courses, this is not sufficient. It is also important to acknowledge in Melissa's interview she addressed how her learning egocentrism was identified by a more experienced teacher and caused her to reflect on her teaching strategies. Awareness of engaging in teacher learning egocentrism, strategies to avoid it, and additional knowledge and resources about how to represent material in various ways for a variety of students will be important in future preservice and inservice teacher development.

Overall, future research recommendations based on this study include examining a teachers' development of PCK (including knowledge of content and students) over time. Over the course of a class or a year in the field how does it change and grow and what aspects facilitate or impede the progression? Additionally, because PCK is developed over time as a teacher re-teaches a specific topic (Hashweh, 2005); investigation into expert teachers' use of knowledge of content and students in the classroom could be important future research. This could further illuminate how this knowledge base is being utilized in agricultural education and provide important information for future teacher preparation and inservice teacher professional development.

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Plugging the Holes in the Bucket: A Qualitative Study to Determine Perceptions of Agriculture Teachers who have Left the Agricultural Education Profession

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Abstract

Agricultural education has experienced a shortage of qualified teachers for many decades. The exodus of teachers, teacher attrition, has been identified as a large factor to the shortage of teachers. Retaining highly qualified agriculture teachers is critical to the success of not only the students but also the profession of agricultural education. The purpose of this phenomenological study was to better understand the phenomenon of agriculture teacher attrition. Semi- structured interviews were conducted with seven former agriculture teachers in order to describe how they characterized their teaching experience and identify factors that influenced the decision to leave. Results indicated teacher attrition was a complex event that was experienced differently by each individual. This study also found lack of administrative support, bureaucracy of education, and salary were among the reasons given by former agriculture teachers as to their decision to leave the profession.

Introduction

The exodus of quality teachers from the classroom has received significant attention as an issue facing the education profession (Ingersoll, 2003). Attrition rates largely determine how many teachers need to be hired each year, playing a significant role in future teacher shortages (Grissmer & Kirby, 1993). Despite efforts to address the shortage of qualified teachers in agricultural education, attrition has continued to be a contributing factor in the shortage of agriculture teachers. However, the profession's concern regarding supply and demand of agriculture teachers is not new (Kantrovich, 2010). The shortage of secondary agricultural education teachers has been documented as early as 1921 (Camp, 2002).

Ingersoll (2003) suggested teaching is an occupation that loses many of its newly trained teachers very early in their careers. Data from the Schools and Staffing Survey suggested between 40 and 50% of all beginning teachers leave the profession after five years (Ingersoll, 2003). While there is a need to recruit talented, high quality candidates to the profession, it is also critical to retain those who enter the classroom (Johnson, Berg & Donaldson, 2005). One reasonable response to retaining classroom teachers is to identify personal and situational influences on teachers who leave the profession (Chapman, 1984). The teacher turnover problem, although high for the entire teaching occupation, affects beginning teachers more than others (Ingersoll & May, 2010). Reichardt (2002) pointed out, attrition is closely tied to a teacher's age. Many teachers leave because they experience burnout, anxiety surrounding family and life balance, and poor time management skills (Boone & Boone, 2009; Clark, Brown, & Ramsey, 2012; Chenevey, Ewing & Whittington, 2008; Murray, Flowers, Croom, & Wilson, 2011; Torres, Lambert, & Tummons, 2009). Teacher attrition appears to be especially high within the agricultural education discipline (Thompson, 1986). Moore (1978) reported results of 27 research studies conducted on the problem of why agriculture teachers left the profession over the 1950's, 1960's and 1970's. Results indicated salary, time, advancement, life goals, and administration were all factors given by teachers as reasons for leaving teaching during those time periods (Moore, 1978). In a study of attrition among Alabama agriculture teachers (Clark, 1965), results indicated at least 34% of teachers left the profession within the first two years which supported Ingersoll & May's (2010) findings that teachers leave before five years. In a study conducted by Tippens, Ricketts, Morgan, Navarro, & Flanders (2013) of 390 Georgia agriculture teachers, females were more likely to leave the profession before males but return after raising children and fulfilling family responsibilities. According to Foster (2001) women agriculture teachers reported a general attitude of having to put family matters aside to put the job first. While gender is not the best factor in determining a teacher's likelihood of leaving the profession, findings make gender an important demographic to consider when predicting retention (Stair, Warner, & Moore, 2012; Stripling, Ricketts, Roberts, & Harlin, 2008; Stripling & Roberts, 2012). Torres, Ulmer, and Aschenbrener (2007) noted agriculture teachers typically have a greater workload and work longer hours than other academic teachers. Therefore, it is no surprise beginning agriculture teachers experience high levels of stress during their first year of teaching (Joerger & Boettcher, 2000). In a study conducted by Lambert, Torres, and Tummons (2012) of beginning teachers in Missouri, results indicated 95% of beginning teachers work in excess of 45 hours per week. This may be due in part to the extra expectations and responsibilities they must commit to the job, which contributes to emotional exhaustion (Croom, 2003).

A thorough understanding of factors that contribute to teacher attrition and discontent through the perspectives of those who have left the profession could help the teaching profession develop strategies to increase teacher retention.

Theoretical Framework

Three theories were used to guide this study: Maslow's (1987) theory of human motivation, Herzberg's Motivational Hygiene theory (1959) and Perception theory as described by Purkey and Schmidt (1996). Maslow's Hierarchy of Needs seeks to categorize human needs in order of intrinsic importance. Lunenberg & Ornstein (2000) translated Maslow's (1954) theory of motivation to the education profession. A new teacher's dissatisfaction and possible decision to leave the profession must be studied from the viewpoint of an individual's needs.

Building upon Maslow's hierarchy, Herzberg sought to focus on aspects of the working environment rather than how the individual perceived the degree to which the teacher's intrinsic needs were being met. Herzberg's Motivation-Hygiene model focuses specifically on the issues of satisfaction, which Herzberg, Mausner and Snyderman (1959) found to be associated with what he referred to as hygiene factors. The five motivation factors, or motivators, are connected with an individual's opportunity for finding satisfaction. The five hygiene factors are most strongly connected with the environmental aspects of a particular job (Herzberg, Mausner, Snyderman, 1959).

Perceptional tradition described by Purkey and Schmidt (1996) describes how an individual's view and experience of the world informs human behavior. A deeper understanding of an individual's perception of the agriculture teaching career will help inform why they made the decision to leave. Each participant's unique experience as an agriculture teacher who has left the classroom has shaped their perception of teaching. Perception theory posits that "what individuals choose to perceive is determined by past experiences as mediated by present purposes, perceptions and expectations" and individuals "reflect on past experiences and imagine future ones to guide their behavior" (Purkey & Schmidt, 1996, p. 29-30). Therefore, it is possible past, positive experiences can affect a person's perception of a career before actually entering it.

Purpose/Objectives

The purpose of this qualitative study was to understand the journey of former secondary agricultural educators that led them to leave within ten years of entering the profession. The following objectives were developed to guide this study:

1. Identify reasons former secondary agriculture teachers initially chose to pursue a career in agricultural education.
2. Describe the experiences of former agriculture teachers who left the profession.
3. Identify factors which influenced former teachers to leave the profession within their first ten years.
4. Identify factors which might influence former agriculture teachers to return to the profession.

Methodology

A phenomenological approach was selected for this study in an effort to explore former agriculture teachers' perspectives and experiences of leaving the profession. The specific phenomenon under study was teachers leaving the profession. Creswell (2007) further explains the basic purpose of phenomenology is to reduce individual experiences with a phenomenon to a description of the universal essence of the experience. **Seven participants were purposefully selected for this study based on the criteria that they were secondary agriculture teachers who left the classroom to pursue another career choice outside of education.** More specifically, a criterion sample (Patton, 2002) was used to select seven individuals who had graduated from a teacher education program since 2000, and had been teaching more than one year but less than ten years upon their exit from the teaching profession. In order to select participants with the specific criteria, the agricultural education faculty department chair at NC State University provided the researcher with a frame of teachers who had graduated and earned a teaching certificate from the Agricultural **and** Extension Education department since 2000. Faculty members were used to help identify those teachers meeting the selection criteria. Three participants were male; four were female. All seven participants agreed to participate and received an informed consent letter to sign prior to the interview. Interview dates and times were established upon agreeing to participate. Seidman's (2006) phenomenological interviewing technique was used as a foundation for the study. While three interviews are recommended by Seidman, only two interviews were conducted for this research study. Due to accessibility of the participants, components of Seidman's (2006) three interview strategy were combined. The researcher utilized phone interviews and a semi-structured interview protocol in order to provide flexibility in responses. Interview protocol development was based on the review of literature. Questions were designed to encourage the respondent to provide longer answers, producing richer data (Dooley, 2007). Following IRB approval, the interview guide was pilot tested with three former North Carolina agriculture teachers during the spring of 2014. Interviews were audio recorded and transcribed verbatim within 24 hours of each interview. The researcher assigned a code to each participant in order to maintain confidentiality. Data were analyzed and reported using commonly accepted qualitative procedures (Creswell, 1998). Specifically, data units were compiled by putting complete thoughts or sentences on 3 x 5 note cards. Data were sorted into categories through shuffling and unitizing data into meaningful groups by hand using Lincoln and Guba's (1985) "3 x 5 card shuffle" method. Exact statements were then categorized into similar groups and examined for specific meanings in relation to the purpose of the study.

Merriam (2009) recommends eight strategies for promoting validity and reliability. *Credibility* (Merriam, 2009) was addressed through member checks and was accomplished by emailing participants a copy of the interview transcript for verification and accuracy. Credibility was also established by sending tentative findings and emerging themes to an expert panel for peer review. Upon data analysis, emerging themes were also sent via email to each of the participants in a memorandum to further establish credibility. Interview observation documents and various research artifacts, such as literature and quantitative surveys, were analyzed to establish *triangulation* (Merriam, 2009). *Dependability* was addressed in the study by keeping an audit trail and detailed records of the data collection and analysis procedures (Merriam, 2009). A transcript of the interview was created from researcher notes and audio recordings. A copy of the interview transcript was provided to each participant for adjustment. *Confirmability* was addressed in the study by including exact statements from the interviews that supported interpretations and conclusions drawn by the researcher (Merriam, 2009). *Transferability* can be achieved by providing a rich, thick description to allow readers to determine if the findings match the results to other populations; however, some analytical generalizations can be concluded to similar groups such as other teacher populations (Merriam, 2009). *Researcher bias* cannot be removed; however, an awareness of personal bias was documented through journaling and was acknowledged during the study and analysis of results (Merriam, 2009). Draft copies of the report were sent to colleagues for *peer review* and feedback regarding the process of study, emerging themes with raw data and tentative interpretations.

Results/Findings

Seven participants agreed to participate in this study; three male and four female. Each participant was assigned a pseudonym in accordance with IRB protocol and to protect confidentiality. The following themes emerged through analysis of data:

Theme 1: The Roadmap to Becoming a Teacher

Each of the seven participants described various paths that led them to choosing a career as an agriculture teacher. They all described the positive impact either their former agricultural education teacher or another teacher had on them making their decision to pursue teaching as a career. They also described how their student teaching experience shaped their beginning year as an agriculture teacher.

Influence of agricultural education and FFA

Five of the seven participants had previous experience in agricultural education and the FFA organization. While two participants were not involved in an agriculture program in high school, they described how they were influenced by other teachers in making their decision. One had a family member who was a teacher that also influenced her decision to enter the teaching profession.

Reba was involved in agricultural education in high school and was influenced by her agriculture teacher; therefore, she felt she wanted to choose a career that she could make that same impact. Reba commented:

> My agriculture teacher had a record of success and I saw the impact that he made on his kids and the impact he had on me. I wanted to make that kind of impact. I wanted to do the same thing he did for me. (I1:R:34-37).

Garth was also in agricultural education classes in high school but was never involved in the opportunities provided by the class or the FFA because he was on track to enter a military career. Upon changing his career focus from being in the military to entering agricultural education at NC State University, he said,

> I was in love with FFA and agricultural education and even at one point, I remember saying I would teach agriculture until my arms fell off, I loved it that much. It was a complete 180 in that I had never thought about teaching in the profession and then once I got into it, at the time, I couldn't imagine doing anything different (I1:G:72-77).

Impact of student teaching

Prior to entering their very own classroom as an agriculture teacher, each of the participants shared experiences of how their student teaching experience influenced their first year as a beginning teacher. Some felt their student teaching experience prepared them thoroughly, while others felt it was an unrealistic view of the real-world they would soon experience as a first year teacher. While Terri agreed that her student teaching experience was beneficial and that she learned a lot from her cooperating teacher, she also felt it would have been helpful to have completed her student teaching experience in a program that was not quite so established, because she had to start a new program as a first year teacher. To further echo the importance of how the student teaching experience influences a first year teacher's success, Garth stated, "I think had it not been for such a great student teaching experience, I would have been more leery when I got to teach on my own" (I1:G:146-147). Willy shared that he felt his student teaching experience was not an accurate portrayal of the reality of teaching. He described it as an experience "that was laid out for me" (I1:W:460). He admitted that if he could go back and do it all over again, he would have chosen another school to student teach at to gain a more realistic perspective of the real-world of teaching.

Theme 2: Growing Pains of the First Year

Each of the seven participants shared various experiences of their first year as an agriculture teacher. Unfortunately, most of the experiences they described were negative and left a lasting impact on their perception as a beginning agriculture teacher.

When asked to describe their first year of teaching, all seven participants had similar feelings to share of it being a horrible experience. When asked to share their first year experiences with me, the four female participants responded emphatically with statements such as, “O man! It was terrible” (I1:C:66), “It was very stressful” (I1:T:107), “Girl, the struggle was real…they nailed me to the wall” (I1:R:110-115), and “Have you ever heard the term baptism by fire. It was absolutely the worst experience of my life” (I1:D:186-187).

Terri described her first year of teaching as being stressful because of the amount of time she had to put into developing her lessons and building a new program. In addition to being a recent newlywed, she spent a lot of extra time out side of the classroom preparing for lessons and learning new content. She felt as though the time commitment was taking away from her ability to be wife to her new husband. She stated, “I wasn’t giving him time and I was dragging him to certain things I had to do outside of school time and on the weekends” (I1:T:215-216). Reba realized her first year of teaching was going to be more difficult that what she first thought it would be. She gained a new respect for what her teachers had gone through as she also “realized how much time, effort, and patience is involved in managing the classroom in addition to managing a unique program like what we have in agricultural education” (I1:R:75-77). While Dolly also had a bad experience during her first year of teaching, it was for different reasons than Reba, Terri, and Carrie. Like most first year teachers, Dolly was assigned a teaching mentor as a first year teacher. However, Dolly’s mentor teacher was just the opposite of supportive and had a huge influence in her negative experience. She stated, in regards to the experience with her mentor, “In fact, she put me in the hospital. I had to wear a heart monitor for months because I was so stressed with my job. I absolutely hated it” (I1:D:198-199).Garth described his first year as having its ups and downs (I1:G:88). He was 21 years old when he agreed to take his first teaching job that was an ultimatum of either him accepting the position or the program would be closed. He stated,

> I think I was prepared for the FFA aspects of teaching, I was decently prepared for the teaching portion, I was not prepared for the discipline side of things, rather disciplining students, handling classroom management, special needs students, and writing IEP’s (I1:G:90-93).

Willy accepted the first job that was offered to him without researching the position or the community it was a part. Willy moved three hours away from home and felt alone after accepting his first teaching position. Willy also described how he didn’t have an understanding of the administrative/teacher relationship coming out of college. He described his principal as someone that made his first year a horrible experience. Willy shared an emotional story as he described overhearing a conversation in the teacher’s lounge between his principal and vocational director. He said, “I was walking to the teacher’s lounge and when I got to the door, I could hear [principal] telling my vocational director that he was ready to go ahead and let me go and I was one semester in” (I2:W:44-45). He said that he “turned around, went back to his office and cried” (I2:W:57-58). His first year experience was the reason why he chose to move schools when the opportunity arose. Willy reflected and said, “I would have rather sat out a year and worked at TGIF than have had to have gone through what I did that first year because who knows how things would have turned out?” (I1:W:485-487).

Theme 3: Reality of the Classroom

Each of the seven participants described many positive and negative experiences of their time in the agriculture classroom. While all participants described an overall love of teaching, love of the agricultural education and FFA components, and love for their students, they also shared there is a greater reality to the classroom that presented itself after entering their very own teaching position. Each of the participants described their reality through unique stories and experiences while they were teaching.

The theme, "Reality of the Classroom" emerged as a larger category as the participants described a variety of experiences they shared. This category has four sub-themes: Love of Teaching, Frustrations, Age & Gender Influences, and Unique Occurrences.

Love of Teaching

All seven participants spoke about how much they loved teaching when they were able to teach. It was abundantly clear that all former teachers truly enjoyed and were passionate about teaching their students and found reward throughout their teaching career. Participants spoke fondly of their students and sharing their love for teaching the subject of agriculture. The participants identified helping students succeed, building positive relationships with students, and providing opportunities for students as a reward in teaching. Garth shared that his love of teaching and rewards also came from his students. In describing a reward, he said, "I had outstanding kids, that really worked hard...to see the kids in this setting that otherwise normally would not achieve but started believing in something and creating success for themselves" (I1:G:243-245).

Frustrations

All seven participants discussed various frustrations they encountered during their teaching experience. Several participants talked about administrators being the biggest source of frustration while others mentioned the bureaucracy of education and poor salary. Some participants had very supportive administrators while others felt their administration was not supportive, and even critical of their teaching practices.

Dolly experienced frustration during her first year as her agriculture class was considered a "dumping ground" (I1:D:134) for students because she felt as though the administration "did not understand what agricultural education was" (I1:D:135-136). She spent time educating her administrators about her expectations for her classes and her students. She also felt as though the education profession can be political and is easily manipulated to "the best interest of whatever power is in control at the time" (I1:D:84-85). She began to see money was influenced by politics and this was a source of frustration to her.

Carrie and Reba also echoed that the bureaucracy of education was a source of frustration. Carrie described how her school administration would implement different rules and policies that affected all students and groups differently. She also described the requirements and influence of high-stakes testing had on her teaching as another source of frustration. However, Reba's frustration came in the form of "paperwork tasks outside was I was set to do to prepare for my class" (I1:R:154-155). She also laughed and stated, "I felt like I had to fill out a form to go to the bathroom. With agriculture teachers having such a unique set of needs with equipment and trips, this proved to be difficult and was a huge source of frustration for her. Willy also described administration and the bureaucracy of education as being a large source of frustration to him as well. He felt there was too much emphasis placed on high-stakes testing by his administrators. Tim also echoed frustrations in regards to the bureaucracy of education. He became very frustrated with the emphasis that was put on standardized testing in his school and felt as though he was "teaching to the test" (I1:TM: 108).

Age & Gender Influences

All seven participants shared that they felt the age they were upon entering their first classroom had a great impact on the experiences of their teaching career. Dolly was the oldest of the participants at 23 years of age when she entered her teaching career. Carrie was 22 years old and the rest were all age 21 when they started teaching. Reba had the realization that she was actually younger than one of her students because he was still in school at the age of 21. Garth shared that one of his students refused to call him by his last name and would only refer to him as "Garth." Garth also felt as though his young age had more of an impact in the way his administrators and other teachers treated him, rather than his students. Carrie's first teaching job was in the same home town in which she grew up, therefore, she reflected on stories of teaching students that she babysat. She stated, "I was only four years older than they were. That was weird too trying to instruct people that I had actually grown up with" (I2:C:73-74). She recalled students asked her about drinking alcohol and they tried to tell her stuff that she really did not need to know about as a teacher, trying to be a professional. She also said, "I think it is because they see you as close to their age, so she knows what I am going through or get better advice because she knows what I am going through" (I2:C: 87-88). Willy echoed the fact that he was only four years older than most of his students during his first year and this proved to be challenging for him. He said, "I couldn't be confident in what I was saying and justified in the classroom because of [age]. It was very intimidating to someone fresh out of college" (I2:W:154-156).

While the female participants shared similar experiences of being put into situations with male students that made them feel uncomfortable, one male participant also shared a story about a female student as well. This uncomfortable feeling resonated with all four of the female participants because they felt as though they were young, attractive females in a classroom environment with male students. Terri, Dolly and Carrie had one class of all male students their first year of teaching. Carrie described her experience of having all male students in an agricultural mechanics classroom and feeling less confident about the curriculum because the male students "knew so much more about mechanics" (I2:C:67) than she did. Terri's experience was different than Carrie's because Terri's classroom was outside the main school building, in a portable trailer. She said, "I felt uncomfortable being in a classroom, in a trailer, outside of the school building with a bunch of guys. I felt like it could be a set up for a bad situation" (I2:T:115-117). She specifically described a situation with one student who made her feel very uncomfortable because he was "very flirtatious" (I2:T:102). Dolly shared Terri and Carrie's perspective on the challenges of being a female agriculture teacher. She too, like Terri, reflected on stories of older male students who made sexual gestures to her. She said, "As a teacher, no one prepares you for this. If something like this happens, this is what you do…the insinuation is if you don't do anything, it can mark you for the rest of your career" (I2:D:93-97). Tim shared a similar story of how a female student accused him of making an obscene gesture about her that required him to defend to his administration. He felt this was something unnecessary he had to deal with and was an uncalled for action by the female student.

Unique Occurrences

For three of the participants, they reflected and shared stories of incidents that involved their own personal safety or health that stood out to them during their teaching career. These types of occurrences had either impacted their immediate safety or were a health concern at some point during their experience as a teacher.

Garth described an incident during his first year when a student pulled a knife on him. He stated,

> I had been teaching for three weeks when a student pulled a knife on me in the classroom and said 'I'm going to cut you.' At that moment, I didn't know what to do. No one ever said if a kid pulled a knife, this is what you do (I1:G:174-177).

Terri described a situation where she had a special needs student in her classroom who became visibly upset during a storm. She felt unsafe as he had a history of becoming violent, and throwing desks during an episode of anger. Not only did Dolly encounter health issues due to her mentor teacher, Dolly was also assaulted by a student during a subsequent year in the classroom. She described how she was in the parking lot on bus duty one morning and needed to confront a student from the alternative school who was misbehaving. She stated,

> I told him to get back to where he was supposed to be. Little did I know, this certain student had no respect for women, especially women in authority. In a split second, he was in my face telling me I had no right to tell him what to do and he hit me (I2:D: 61-64).

Theme 4: Influences to Leave

When asked to describe factors that influenced them to leave the agriculture classroom, the majority of participants shared multiple reasons for making their decision. Each of the participants described how making the decision to leave was hard, but also shared various internal and external influences that helped them make the ultimate decision. They also unanimously agreed there was not much that could have influenced their decision to stay at that specific time in their lives. For Terri and Carrie, having children and starting their own family was a huge factor. Terri felt "convicted that I wasn't giving my family life as much time as I was giving my career" (I1:T:219-220). Carrie's decision was influenced by personal and family reasons to leave the classroom as well. However, she hopes to return to the agriculture classroom soon as she still considers herself an agriculture teacher. Reba also loved teaching and really struggled making the right decision to leave. She felt unappreciated by her teaching partner and had begun looking into returning to graduate school to pursue a higher degree in agricultural education.

Dolly and Garth both left initially to pursue the missionary field. However, upon returning from the mission, Dolly returned to the classroom for several more years while Garth joined the military and did not return. Garth admitted that he never expected to leave the classroom. He said, "I completely expected to be teaching into my 60's and be that ag teacher that would be there for 30 years and teaching the rest of my life" (I1:G:80-81). However, he felt "worn out" (I1:G:276). Garth also grew up in a military family and felt the need to serve his country. After returning from her mission trip in Australia, Dolly returned to the agriculture classroom for six and one-half more years. Dolly experienced an administrator that was not supportive, which ultimately led to her decision to leave the profession the second time. She talked about her current job, the possibility of returning again, and stated, "I currently have a home office, a state vehicle, a state gas card and I am doing something I actually love and have a huge passion for. It just wasn't worth it for me personally" (I1:D:181-183). Tim's ultimate decision to leave the classroom was one based on bureaucratic influences in his school district and the need for better salary. He described how his school district hired a new superintendent who then proceeded to cut local funding from classroom teachers. However, he ultimately left to pursue a career in industry making significantly more money to support his family.

Theme 5: Rear View Mirror: Looking Back

While making the decision to leave the agriculture classroom was a difficult decision for most participants, they all reflected upon their decision and described how they do not regret leaving. The participants reflected in two ways: giving advice to either beginning teachers or someone choosing to pursue a career in agricultural education and secondly, describing things they are able to enjoy since they left the classroom.

Advice to others

Reba felt that a new teacher has to understand that when they walk into their very own classroom, it will be different than all the training they have had up until the point of having their own classroom. She said "You may not see the immediate change or immediate results, but at some point, you will look back and see what you have done has made a difference with your kids"(I1:R:290-292).

Garth and Carrie emphasized the importance of building a foundation in the classroom during the first year and allowing the other responsibilities to fall into place after that. Garth made this emphasis and stated, "You can model your program after a successful one but it is not going to happen in a day or in a year. It will take time…lay a solid foundation on the education piece" (I1:G:383-386). He continued and described how if a teacher builds a foundation for learning, the other pieces will follow. He described this as having balance because the knowledge piece completes the "puzzle" (I1:G:396). Carrie emphasized the importance of building a foundation in the classroom and stated, "You have to pace yourself. Pick something you want to be good at and start there" (I1:C:250-251). She also felt that if the classroom component is missing, the other pieces will be missing as well.

Things they enjoy now

All seven participants chuckled a bit when reflecting upon things they are able to enjoy now more so than they did when they were teaching. Some of these items include more time with family, more money or even more flexibility with their current job.

Terri and Carrie both are stay-at-home mothers, so they are able to enjoy more time together with their children and spouses. For Garth and Tim, salary is something they both enjoy now. However, Tim admitted that he works about the same, if not more, hours than he did when he was teaching. Tim also feels as though his family enjoys a “higher standard of living” (I1:TM:203). Dolly also shared additional things such as a home office, state vehicle, gas card, and an increased salary, each being an advantage to her current job she enjoys now. Willy and Reba’s enjoyment comes from the freedom and flexibility their current jobs allow them throughout their daily schedule. As an extension agent, Willy described having flexibility to work as needed in the field, making visits, or in his office. Willy described how he did not like the constraints of being a teacher tied to a school building living by a bell. Willy also described how he feels more recognized and appreciated now as an extension agent. He also attributed this recognition as helping him become more confident in his job as an agent compared to being a teacher. He felt teachers do not get thanked enough for what they do. He gets constant feedback from the administration in extension which has helped him pinpoint areas for improvement.

Reba described how she feels like more of a professional in her position. She said, “I feel like I am treated more like a professional in my current job than I was teaching…I don’t feel like the administration is looking over my shoulder to make sure I am doing my job” (I1:R:265-268). Reba also mentioned the ability to spend more time with her husband, family and friends as something she is able to enjoy now as well.

Conclusions/Implications/Recommendations

This study sought the perspectives of former secondary agriculture teachers about their experiences in the classroom and their decision to leave the teaching profession. Using the research objectives as a lens through which to view the data, it is evident that these former teachers loved their job as a teacher, viewed the relationships with their students as having an impact on them and credited various frustrations and family responsibilities as being the ultimate reason for leaving the classroom. It can be concluded that teachers, in general, have a huge influence on future teachers choosing the profession. It can also be concluded that experiences of former agriculture teachers vary. Teachers experience both positive and negative experiences during their career as an agriculture teacher. While former teachers shared experiences of a difficult first year, these teachers chose to return to the classroom for a second year. In determining factors that influenced former agriculture teachers to leave the profession, it is concluded there is not one single factor that played a role in their decision. Their decision to leave the profession was based on multiple factors, all intertwined together. Lastly, it can be concluded that there are not significant factors that could influence a former agriculture teacher to return to the profession.

In painting a vivid picture of a teacher who is likely to leave the profession, the Metlife Survey of the American Teacher (2005) indicated a teacher may feel less valued by their supervisor and also feel stress related to personal issues, low pay, discipline problems and job responsibilities. Results of this study help further paint a portrait of a teacher who may leave the agriculture teacher profession in a number of ways. Results support research that beginning teachers experience burnout early in their career surrounding personal life balance (Boone & Boone, 2009; Clark, Brown, & Ramsey, 2012; Chenevey, Ewing, & Whittington, 2008; Murray, Flowers, Croom & Wilson, 2011; Torres, Lambert & Tummons, 2009). Results also support that salary, time commitment, advancement, life goals and administration are all factors that contribute to reasons teachers leave the profession (Moore, 1978). Gender was also found as an important factor contributing to a teacher's decision to leave. This further supports Tippens, Ricketts, Morgan, Navarro & Flanders (2013) and Foster (2001) that females are more likely to leave the profession for family responsibilities. Teachers described how they experienced stress as a beginning teacher. This supports research by Torres, Ulmer and Aschenbrener (2007) and Joerger and Boettcher (2000) that teachers have increased levels of stress during their first years in the classroom and a greater workload due to the multiple responsibilities of an agriculture teacher.

As a theoretical foundation for this study, results support Maslow's third hierarchal social needs of these teachers were not being met because of the quality of supervision they received as a teacher (Lunenberg & Ornstein, 2000). This further supports Herzberg's Motivtion-Hygiene theory because the hygiene factor, interpersonal relations, was not satisfied, lending to the teachers becoming dissatisfied with their career as a teacher. While Purkey and Schmidt (1996) posit communication depends on the process of acquiring mutual understanding of one another's phenomenal field. Results of this study indicated participants felt the need to communicate with administration to not only advocate for their classroom, but also gain the administrator's perspective of their roles, responsibilities and duties as an agriculture teacher.

Recommendations for Practice

A recommendation for the profession is to seek opportunities to educate administrators about the responsibilities of agriculture teacher and further develop realistic expectations of beginning teachers. It is also recommended that beginning agriculture teachers know how to be an advocate for their classroom and students. Teachers should feel as though they have a voice in not allowing their classroom be used as a dumping ground for students. It can also be recommended that experienced and successful agriculture teachers be formally utilized as mentors to help guide novice teachers in times of need. These could include state and regional supervisors, retired agriculture teachers and retired career and technology education directors. Further, there may be value in allowing beginning teachers to find their own source of mentor, rather than being assigned to one. From a teacher educator perspective, there may be value in developing a model that includes an extended agriculture teacher induction program giving beginning teachers additional support throughout their first year. This induction model should implement ways to meet the specific needs of beginning teachers, and could include classroom management techniques, time management tools, and strategies to advocate for administrative support. It is recommended the profession maintain a database of former agriculture teachers to rely on for various needs. This database could be used to support a variety of needs in the agriculture education profession.

Recommendations for Future Research

The primary recommendation for further research is replication of this study to include multiple viewpoints of others who may have had an influence on the teachers who left. Case study research could provide unique perspectives from those other than the teachers who left. These could include but are not limited to: veteran agriculture teachers, administrators, spouses, and mentor teachers. The perspective of beginning teachers who continue their career as an agriculture teacher should also be considered as an important viewpoint to identify ways they are overcoming challenges identified by those who have left. Further research may also investigate if there is a connection between experiences of former agriculture teachers, former general education teachers and former teachers in other disciplines of Career and Technical Education in order to deepen the knowledge base. Quantitative or mixed methods research could deepen and the knowledge base concerning causes of attrition among agriculture teachers. Research should be conducted using teachers who leave the classroom and return to determine factors influencing their decision. Further, replication of this study with teachers who have remained in the profession with less than ten years of experience should also be considered. Lastly, research should be conducted to provide the profession the number and percentage of agriculture teachers who leave before their fifth year of teaching experience. While it is well documented that 40 to 50% of teachers leave the education profession before their fifth year of teaching, the percentage of agriculture teachers who leave before this same time needs to be researched.

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Undergraduate Student Course Engagement and the Influence of Student, Contextual, and Teacher Variables

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Abstract

The purpose of this study was to examine the relationship between undergraduate student course engagement and several independent variables. Total participants included 300 (N) undergraduate students. Students completed three instruments measuring course engagement, teacher verbal immediacy, and teacher nonverbal immediacy. It was concluded that class size and teacher verbal-immediacy significantly predicted student course engagement. Classes under 30 students significantly influenced factors of engagement. The unique influence of immediacy behaviors supported the researcher's assertions coupled with previous research (Frymier & Houser, 2000; van Uden, Ritzen, & Pieters, 2014; Zepke & Leach, 2010). College teachers should be aware of the role immediacy behaviors play in student engagement within their classrooms. Teachers who demonstrate energy and concern for student learning through being inclusive, encouraging, and clearly communicate expectations can positively influence student engagement in the classroom. Deconstructing large courses into smaller working groups could facilitate the opportunity for teachers to approach students more directly and intimately. Future research should use observations to assess student behaviors comparing perceived engagement in the classroom. Quantifying the frequency of teacher immediacy behaviors alongside student perceptions could provide context for teacher behaviors. Qualitative studies around factors of engagement could provide context to the cognitive processes behind student behaviors.

Introduction

College student engagement is a multidimensional concept which many researchers have studied in an effort to understand aspects leading toward student success at the secondary and post-secondary levels of education (Fredricks, Blumenfeld & Paris, 2004). Diversely defined across the literature, engagement may most succinctly be conceptualized as a students' connection to their learning and the learning environment which incorporates behavioral, emotional, and cognitive aspects. Students who are not engaged in their schooling and the process of their post-secondary education early in their career put themselves at risk to inadequately acquire the knowledge and skills needed for transfer to their future educational and work experiences (Miller, Rycek, & Fritson, 2011). Ultimately, because of these consequences, student engagement needs significant consideration by educators to better understand student behavior and in addressing students' educational needs (Christenson, Reschly, Appleton, Berman, Spanjers, & Varro, 2008). Obtaining student perceptions of their engagement within the context of their individual courses can provide instructors with data to more clearly describe student behaviors within the classroom (Handelsman, Briggs, Sullivan, & Towler, 2005; Mandernach, Donnelli-Sallee, & Dailey- Hebert, 2011; Svanum & Bigatti, 2009).

Relative to the college classroom, student engagement is not extensively addressed in extant literature. With that in mind, an issue facing the preponderance of literature in student engagement is that the distinction between the antecedents, state, and consequences of engagement is not often made (Kahu, 2013). Handelsman et al. (2005) proposed that describing and understanding student engagement and its antecedents particularly at the course level, is one avenue for continuous improvement to undergraduate education in teaching and learning environments. Further, describing the antecedents of student engagement could assist course design and instructional decision-making for college teachers. The more instructors know about what students perceive within the classroom regarding the activity taking place, the more equipped they will be to shape the learning environment. Thus, it is important to describe the perceived engagement of undergraduate students and determine the variables in and about the classroom which encourage that engagement.

Review of Literature

As previously described, engagement is a student's connection to their learning and the learning environment which incorporates behavioral, emotional, and cognitive aspects. When these aspects are evaluated together they describe the psychological processes and physical activities students conduct during a class session (Fredricks, Blumenfeld, & Paris, 2004; Newmann, Wehlage, & Lamborn, 1992). In essence, student engagement in the classroom is the thinking and doing demonstrated by the student related to learning through the discourse of the classroom. Student course engagement, the focus of the present study, is comprised of four factors including skills, participation/interaction, emotional, and performance engagement (Handelsman, Briggs, Sullivan, & Towler, 2005). Considered to sit on a continuum, student engagement can be high or low and adjusted by the student depending on the personal and environmental conditions (Barkley, 2010; Newmann, Wehlage, & Lamborn, 1992). Fredricks, Blumenfeld, and Paris (2004) encouraged researchers to study engagement at the classroom or micro-level in order to identify the appropriate antecedents of engagement at play. Studying course engagement as the interaction between the individual and components of the learning environment can help college teachers better understand the student experience and more specifically identify methods to improve engagement in the classroom (Fredricks et al.; Handelsman et al.).

Engagement in the discourse of the classroom implies the student takes an active versus passive role in their learning (Barkley, 2010). According to Chickering & Gamson (1987) the amount of time on-task a student exhibits in addition to their active participation in learning activities, partially constitutes a student's active role. This active role encourages a higher degree of information processing which consequently improves learning and student's positive perceptions of their learning environment (Handelsman, Briggs, Sullivan, & Towler, 2005). Observationally, the behaviors associated with student engagement in the classroom; including, general attentiveness, eye contact, and raising hands to ask questions, demonstrate an interest in the subject matter being discussed (Mandernach, Donnelli-Sallee, & Dailey-Hebert, 2011).

This engaged learning described, leads to higher levels of interest in the subject matter and higher levels of academic effort by the student (Miller, Rycek, & Fritson, 2011). Students making use of class time and participating in classroom activities improves their learning

(Macheski, Buhrmann, Lowney, & Bush, 2008). The results of student engagement in the classroom is linked to outcomes such as increased student satisfaction with their coursework and the schooling experience (Tinto, 2012; Zyngier, 2008), improved career development focus (Kenny et al., 2006), more efficient time use (Schilling & Schilling, 1999), and multiple measures of academic performance including course grades, college GPA, and college retention (Carini, Kuh, & Klein, 2006; Gonyea, 2006; Handelsman et al., 2005: Miller, Demoret, & Wadkins, 2009; Svanum & Bigatti, 2009). Students who reported higher levels of engagement in college activities emerged from college more academically prepared (Hu & Kuh, 2002). Although, to make a distinction, Willms, Friesen, and Milton, (2009) discussed that engagement in the broader college activities does not directly equate to academic and intellectual engagement. Even with many strategies for active learning to combat disengagement (Barkley, 2010) and an understanding of student characteristics (Kuh et al., 2005; Rocca, 2010; Zepke & Leach, 2010), student apathy as perceived by teachers is a tangible phenomenon within college classrooms (Jonasson, 2012; Kahu, 2011; van Uden, Ritzen, & Pieters, 2014).

The Classroom Environment and Engagement

The environment surrounding the student can influence their engagement within the classroom. Large classes, those with 30 or more students, can hamper an opportunity for students to participate which in-turn discourages them from engaging fully in the first place (Rocca, 2010; Pascarella & Terenzini, 2005; Weaver & Qi, 2005). Cotton (2000) found that proportionally, smaller classes allow more students to participate in discussion. The time of day in which the class is scheduled also influences engagement. Mearns, Meyer, and Bharadwaj (2007) reported students were least engaged, enjoyed the course the least, and negatively perceived teacher/tutor assistance during early morning sessions. Further, the facilities and physical spaces in which these classes take place influence student engagement (Bonfiglio, 2004). In a quasi-experimental study, Brooks (2012) concluded classroom spaces shaped students' on-task behaviors; behaviors which demonstrated students' active involvement throughout a class period.

The Teacher and Engagement

While the behaviors of students and aspects of the learning environment constitute considerable proportions of engagement, the teachers and their approaches to teaching in the classroom also encourages or discourages student engagement (Chickering & Gamson, 1987; Gasiewski, et al. 2012; Zepke & Leach, 2010). The interpersonal exchanges between students and teachers are important considerations toward understanding student engagement in the classroom (Gasiewski, et al. 2012). Frymier and Houser (2000) reported teacher communication skills positively associated with student affective learning and learning indicators. In concert with those findings, Kuh and Hu (2001) reported from a sample of over 5,000 college students, interpersonal interaction with faculty positively influenced student effort related to educationally purposeful learning activities and overall student perceptions of the learning environment.

The Student/Teacher Relationship and Engagement

The college classroom is a medium which initiates interactions between the teacher and their students. These interactions begin the development of different levels of relationships between these actors (Newmann, 1992). Some researchers (Garrett, 2011; Jonasson, 2012) suggest that at its foundation, student engagement is really about the progression of relationships with learning and the learning environment. Therefore, student engagement is enhanced and disengagement combated by the relationships developed in the learning environment (Macheski, Buhrmann, Lowney, & Bush, 2008; Rocca, 2010). Relationship development between student and teacher is essential to creating a positive classroom climate (Darling-Hammond & Bransford, 2005) and encouraging students to become involved in their learning (Rocca, 2010; Tinto, 1997).

Teacher immediacy behaviors is an area of study, with roots in Communications, associated with student-teacher relationships. Immediacy cues are the first step in relationship development (Mehrabian, 1972) and toward meaningfully capturing student interest in the classroom. Similar to engagement, immediacy behaviors employ cognitive, emotional, and behavioral aspects between the teacher and learners. Immediacy behaviors elicit behavioral and cognitive responses to social interactions which reduces psychological distance (Mehrabian, 1972) and includes such actions as facial expressions, eye contact, gesturing, tone of voice, word choice, and questioning strategies. Verbal and non-verbal immediacy behaviors are directly linked to student's perceptions of learning in addition to learning motivation (Christophel, 1990; Frymier, 1994; Kearny, Plax, Smith, & Sorensen, 1988; Velez & Cano, 2008; 2012). Kelley and Gorham (1988) found that teacher immediacy increases student arousal and attention in the classroom, which are essential elements for student engagement. The similar dynamics of engagement and teacher immediacy lends credibility to a more substantive evaluation of the impact of teacher immediacy on student engagement. In the literature, there are many assumptions based upon the behaviors teachers should elicit to facilitate student engagement in the classroom, but little if any empirical evidence connects teacher immediacy and student engagement.

Basing instructor assumptions related to student engagement solely off the observations of student behaviors in the classroom likely paints an incomplete picture of a student's engagement (Handelsman et al., 2005; Schreiner & Louis, 2008). Assessing and describing the additional dimensions comprising student engagement pertaining to their actual classes will provide instructors with a greater understanding of student engagement beyond what is skin deep. This knowledge in addition to students' perception of the teacher's behaviors could help instructors develop a more engaged classroom environment based off empirical evidence of the state of engagement and what engages students, as opposed to anecdotal assumptions.

Framework

The framework, created by the researchers, was founded in student engagement and immediacy literature. Figure 1 details the interaction between the considered independent variables identifiable in the classroom. Student course engagement is the outcome. Class size, course status, class time, and student rank were considered the covariates within the present study because each variable is represented in literature as influential on student engagement. Teacher verbal immediacy and nonverbal immediacy behaviors were considered the variables of interest for the present study, as they are believed to impact student engagement in the classroom. Thus, considered together, influence from the teacher, influence from within the individual, and environmental (contextual) influences are believed interact to produce varied levels of an individual students' engagement in each and every course.

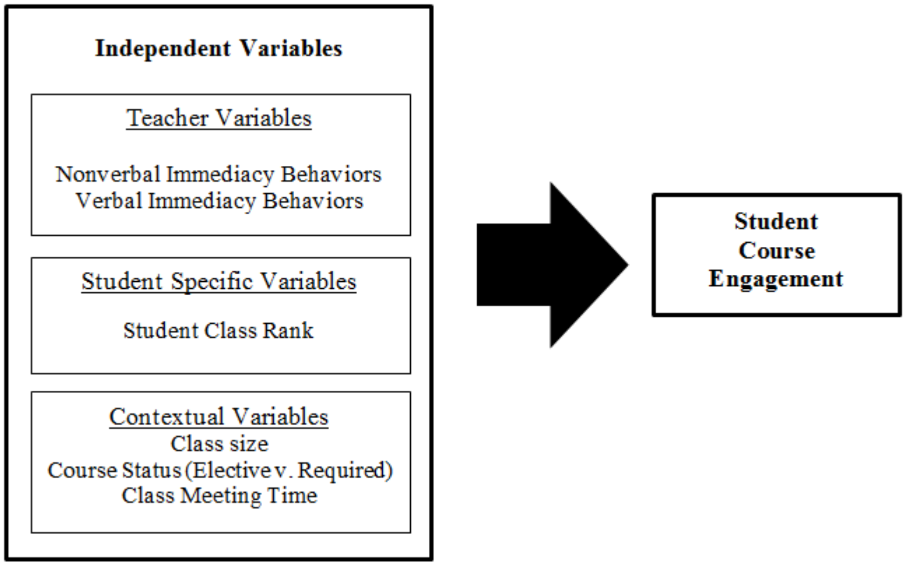

Figure 1: A Framework for Student Course Engagement

Purpose and Objectives

The purpose of this study was to examine the relationship between undergraduate student course engagement and independent variables including teacher verbal and nonverbal immediacy behaviors, college course status, class time, class size, and student class rank. The present study addressed the AAAE National Research Agenda as the authors sought to further understand effective teaching and learning processes in post-secondary environments (Doerfert, 2011). The following objectives aimed to:

1. Describe undergraduate student course engagement.
2. Describe students' perceptions of teacher nonverbal and verbal immediacy behaviors.
3. Describe undergraduate student college course status, class time, class size, and student class rank.
4. Describe the contribution of teacher immediacy behaviors and undergraduate student college course status, class time, class size, and student class rank toward undergraduate student course engagement.

Methods

This descriptive correlational study examined the relationship between the dependent variable of undergraduate student course engagement and independent variables of teacher verbal, nonverbal immediacy behaviors, college course status, class time, class size, and student class rank. The present study employed a one-measurement cross-sectional survey design (Creswell, 2009; Spector, 1981) where undergraduate student subjects completed a paper questionnaire to acquire their perceptions of the primary variables of course engagement and teacher verbal and nonverbal immediacy behaviors. To appropriately account for student perceptions, a five-point unipolar scaled question structure was utilized consistent with previous studies examining the constructs of student course engagement (Handelsman, Briggs, Sullivan, & Towler, 2005; Svanum & Bigatti, 2009) and teacher immediacy behaviors (Christophel, 1990; Gorham, 1988; Velez, 2008). University of Missouri Institutional Review Board (IRB) reviewed and approved the present study and data collection procedures prior to instrument administration. Students were informed of their rights and benefits of participation in the study through a cover letter on the instrument.

Population and Sample

The target population for this study consisted of undergraduate college students enrolled in courses during the spring semester of 2014. A convenience sample was selected from the total population of 2,093 undergraduate students enrolled in courses in the College of Agriculture, Food, and Natural Resources at the University of Missouri. Course selections were based on class size, accessibility, and the enrollment of a diverse variety of majors. In total, 359 (*N*) undergraduate students were available as potential subjects across the three courses. Thirteen (*n*) students were enrolled in more than one of the selected three courses and were asked to identify this on the instrument to prevent duplication and overrepresentation of their perspectives in the study. Total participants included 300 (*N*) students with an overall response rate of 84 percent. The 46 students unaccounted for were either absent or declined to complete the instrument. Because generalizability was not the intent of this study they were not followed up with to supply responses.

Instrumentation

In an effort to increase the scope of coursework and instructor contact, the measurement selected for this study involved students' reflection on *the course immediately preceding the course* in which data collection occurred. This method of data collection was employed in previous research studies evaluating teacher immediacy behaviors (Christophel, 1990; Christophel & Gorham, 1995; Frymier, 1994; Gorham, 1988; Kelley & Gorham, 1988; McCroskey, Sallinen, Fayer, Richmond, & Barraclough, 1996; Velez & Cano, 2008; Velez & Cano, 2012) and is believed to limit several threats to internal and external validity. The method was designed to maximize variability of coursework and instructor contact in addition to alleviating discomfort of the instructor of the course where the instrument was administered. This method was explained and held consistent across all parts of the questionnaire.

The Student Course Engagement Questionnaire (SCEQ) was created through the work of Handelsman, Briggs, Sullivan, and Towler (2005). Four factors describing course engagement emerged from exploratory factor analysis; skills, emotional, participation/interaction, and performance engagement. The SCEQ has demonstrated effectiveness in assessing student course engagement across multiple studies (Miller, Demoret, & Wadkins, 2009; Svanum & Bigatti, 2008) and consists of 23 Likert-type scaled items assessing student's perceptions of their behaviors, thoughts, and feelings within the course. The five-point scale and descriptors for each question are included in Table 1. Handelsman, Briggs, Sullivan, and Towler (2005) reported Cronbach's alpha reliability coefficients for each of the four factors ranging from .76 to .82.

The Verbal Immediacy Behaviors (VIB) instrument consisted of 20 Likert-type scaled questions assessing student's perceptions of the frequency with which they observe the teacher demonstrating a specific behavior. Previous research utilizing the present form of the VIB reported split-half and summated reliability coefficient estimates ranging from .83 to .94 (Christophel, 1990; Velez, 2008). Utilizing an identical five-point scale to the VIB, the Nonverbal Immediacy Behaviors (NIB) instrument consisted of 14 Likert-type scaled questions assessing student's perceptions of the frequency with which they observe the teacher demonstrating the specific behavior. The five-point scale and descriptors are described in Table 2. Previous research utilizing the present form of the NIB reported summated reliability coefficient estimates ranging from .82 to .94 (Christophel, 1990; McCroskey et al., 1996; Titsworth, 2004; Velez & Cano 2007; Velez, 2008).

The final section of instrumentation included eleven demographic questions and statements. Items specific to the student included: class rank, gender, college major, and age. Participants were asked to answer questions specific to the course: class size, course status, course prefix, and class meeting time. Including the contextual and demographic variables was supported by previous research in both engagement and immediacy. A panel of experts consisting of two associate professors and two assistant professors in education reviewed the instrument for face validity, only. Content validity was established for the SCEQ, NIB, and VIB in previous literature (Christophel, 1990; Handelsman et al., 2005; McCroskey et al., 1996; Velez, 2008; Velez & Cano, 2008).

Data Collection

Data were collected at a single class period at during week 12 of the spring 2014 semester. Previous research in teacher immediacy suggest no significant differences between responses collected at multiple points or at a single point midway in the semester (Christophel & Gorham, 1995; Frymier, 1994). Teachers are believed to establish their relationships and students establish their attitudes around all elements of the course after the first few weeks of the course (Christophel & Gorham, 1995). Therefore, the researchers chose to collect data during week 12 as permitted by the participating faculty.

Analysis

The data analysis included descriptive measures for variables at each level of measurement. Correlational and regression analysis were performed to create a predictive hierarchical model including the dependent variable (student engagement) and the independent variables (nonverbal teacher immediacy, verbal teacher immediacy, class size, course status, class meeting time, and student rank). Regression analysis was deemed appropriate for the purposes of this study as it was consistent with previous research analyzing both immediacy and student course engagement (Christophel, 1990; Handelsman et al., 2005; McCroskey et al., 1996) to identify the comparative importance of the contribution to student engagement offered by the identified independent variables. Field (2009) suggested completing analysis on a series of assumptions in order to accurately draw conclusions from a data set when performing regression analysis. Accordingly, all assumptions were checked and the data set was deemed appropriate to draw conclusions from regression analysis.

Findings

Characteristics of the sample include: The average age of the sample was 20.4 years with a median age of 20 years. The greatest number of respondents were of junior standing (34.6%, n = 103) whereas the fewest represented were fifth year students (2.3%, n = 7). The distribution of the sexes for the sample favored females (54.0%, n = 161) over males (46.0%, n = 137) of those who reported. Students reported 28 unique majors from across the University of Missouri. Within the top four majors, the largest number of students identified themselves as hospitality management majors (37.1%, n = 111) followed by agricultural education (11.0%, n = 33), sports management (9.3%, n = 28), and biochemistry (6.7%, n = 20).

Research Objective One

Research objective one was to describe undergraduate student's course engagement. The four engagement factors and total engagement were reported using means and standard deviations to describe the level of engagement students perceived in a single college course (Table 1). Students' mean for total engagement in the course they selected to report on was M = 3.39 (SD = 0.61) out of a possible M = 5.0. The engagement factor which produced the highest mean was the performance factor (M = 4.00, SD = 0.81) which represented students' perception of how well they anticipated doing in the class relative to grades, primarily. Less so, students reported the lowest engagement factor mean (M = 2.91, SD = 0.84) was related to their participation/interaction within the course reported. Participation/interaction engagement represented students' perceptions of their actual participation in class in addition to their interactions with other students and their instructors (Handelsman, Briggs, Sullivan, & Towler, 2005).

Table 1
Student Engagement Measures for Total Engagement and the Four Factors of Engagement as Measured by the Student Course Engagement Questionnaire (SCEQ) (N = 300).

Engagement Factor	*M*	*SD*	Range Min	Range Max
Total Engagement	3.39	0.61	1.35	4.91
Performance	4.00	0.81	1.00	5.00
Skills	3.65	0.68	1.56	5.00
Emotional	3.16	0.93	1.00	5.00
Participation/Interaction	2.91	0.84	1.00	4.83

Note. SCEQ used a five point Likert-type scale: 1 (not at all characteristic of me), 2 (not really characteristic of me), 3 (moderately characteristic of me), 4 (characteristic of me), and 5 (very characteristic of me).

Research Objective Two

Respondents were asked to reflect upon the teacher who led the course selected in the engagement section of the instrument. Students reported their perceptions of teacher immediacy on 14 nonverbal and 20 verbal immediacy items which comprised each of the two constructs of immediacy. Each construct used identical five point Likert-type scales which measured the frequency in which behaviors of teachers were observed by the student. Higher mean scores for the immediacy constructs indicates the instructor is more immediate (Christophel, 1990). Descriptive statistics were reported in Table 2. Students perceived their teachers as moderately immediate for both verbal behaviors (M = 3.01, SD = 0.71) and nonverbal behaviors (M = 2.99, SD = 0.32) because on average, teachers *occasionally* utilized immediacy behaviors in the student's classrooms.

Table 2
Student Perceptions of Teacher Verbal and Nonverbal Immediacy (N = 300).

			Range	
Immediacy Construct	*M*	*SD*	Min	Max
Verbal Immediacy	3.01	0.71	1.40	4.75
Nonverbal Immediacy	2.99	0.32	1.93	3.86

Note. Immediacy used a five point Likert-type scale: 1 (Never), 2 (Rarely), 3 (Occasionally), 4 (Often), and 5 (Very Often).

Research Objective Three

Respondents reported on personal and course-related variables utilizing predetermined categories for each item. The majority of students (85.5%, n = 253) reflected on a degree required course for the purposes of this questionnaire and 14.5% (n = 43) reported on an elective course. Over half (52.4%, n = 157) of the respondents reported on courses which were scheduled in the morning, before 11:30 am. Only six students (2.0%) reported on evening courses, those after 5 pm. Students most frequently reported data for this study based off their enrollment in courses with a population of students ranging from 1-29 (n = 102) followed by courses with 150 or more students (19.3%, n = 58), and courses with 30-59 students (15.3%, n = 46). Student class rank was reported in the first paragraph of this findings section.

Research Objective Four

Research objective four was to describe the contribution of teacher immediacy behaviors and undergraduate student college course status, class time, class size, and student class rank toward undergraduate student course engagement.

Ho_1: Teacher verbal and nonverbal immediacy behaviors did not explain a significant ($p > .05$) proportion of variance in student course engagement.
Ha_1: Teacher verbal and nonverbal immediacy behaviors explained a significant ($p < .05$) and unique proportion of variance in student course engagement.

Hierarchical regression was utilized to explain the unique variance in engagement (see Table 3). Neither skills nor emotional engagement regressed against the four covariates (e.g. class time) resulted in a significant initial model. However, initial regression models were significant for total engagement and the remaining factors of participation/interaction and performance engagement. Among the covariates, class size was the sole significant predictor for total engagement (t = 3.43), participation/interaction engagement (t = 5.33), and performance engagement (t = 2.70).

The addition of verbal and nonverbal-immediacy behaviors to the second block of each model produced a significant model for total (R^2_{adj} = .14), emotional (R^2_{adj} = .07), participation/interaction (R^2_{adj} = .25), and performance engagement (R^2_{adj} = .04). Teacher verbal immediacy behaviors produced a moderate effect (Cohen, 1988) in total engagement (d = .55), emotional engagement (d = .50), and participation/interaction engagement (d = .76). Small (d < .50) or trivial (d < .20) effect sizes were produced with all other variables within the hierarchical regression models for each dependent variable. Teacher verbal and nonverbal-immediacy behaviors explained a significant proportion (p < .05) of additional variation after controlling for the potential covariates. Therefore, leading us to reject the null hypothesis in favor of the alternative hypothesis for total, emotional, participation/interaction, and performance engagement.

Table 3
Hierarchical Multiple-Regression of Engagement on Covariates and Immediacy (n=300)

g. Engagement Factor	. Variable	B	. *B*	k. t	*d*	m. *F(df)*
Total	Constant	2.11		6.14	.73	8.54*(6,285)
	VI	.27	.31	4.67*	.55	
	NVI	.15	.08	1.27	.15	
Skills	Constant	2.68		6.60	.78	1.93 (6,285)
	VI	.12	.12	1.73	.21	
	NVI	.19	.09	1.34	.16	
Emotional	Constant	1.84		3.38	.40	4.73*(6,285)
	VI	.37	.28	4.12*	.50	
	NVI	.08	.03	.44	.05	
Participation/Interaction	Constant	1.17		2.64	.31	17.22*(6,285)
	VI	.47	.40	6.44*	.76	
	NVI	.10	.04	.67	.08	
Performance	Constant	2.72		5.66	.67	3.03*(6,285)
	VI	.13	.11	1.56	.19	
	NVI	.25	.10	1.53	.18	

Note. *p < .05, VI = verbal immediacy, NVI = nonverbal immediacy

Conclusions/Recommendations/Implications

In this study, the researchers described undergraduate student course engagement and variables which contribute to course engagement. The influence of several variables on engagement were confirmed while the influence of other variables were newly explored. Several interpretive limitations exist with the results of this study. Notably, due to the research design, the subjects selected represent a non-probabilistic sample. Consequently, the results are not generalizable beyond the respondents. Achieving student heterogeneity was attempted through selecting courses with large student populations, but not controlled for in this study.

For objective one, student perceptions of their engagement are seated squarely in the middle ground. Students showed the most engagement towards assessing their overall performance in their courses, lower emotional engagement to material and coursework, and a nearly bystander status when evaluating students' participation in the classroom. Through this baseline of empirical engagement evidence, the perception by some college teaching staff of student apathy and disinterest may be warranted (Jonasson, 2012; Kahu, 2011; van Uden, Ritzen, & Pieters, 2014). Students may not be comfortable interacting with their instructors or collaborating with classmates, which may ultimately limit learning and a deeper understanding of material (Macheski, Buhrmann, Lowney, & Bush, 2008). To counteract this, Barkley (2010) suggests incorporating diverse active learning opportunities within the classroom. Additionally, structured group activities can encourage students to consider multiple viewpoints.

In objective two, considering the entire undefined group of college teachers in this study, according to the students, the teachers are neither immediate nor not immediate. This may be an accurate portrayal as some teachers are likely highly immediate while others less so. This implies there is room for improvement in the frequency teachers' express immediacy behaviors (Frymier, 1994; Kearney, Plax, Smith, & Sorensen, 1988). Repercussions of less immediate teaching is a distinctive psychological distance between teacher and students (Mehrabian, 1981). Teachers may pay close attention to their variety of gestures, eye contact, and movement around the classroom to enhance nonverbal perceptions. Genuineness is imperative when evaluating and improving immediacy. Teachers may need to initiate more conversations, use inclusive language, and personalize course material to heighten student connection and relationships in the classroom.

In objective three, most students reflected on degree-required courses which may indicate the need to further divide the choices for this variable to increase differentiation. As degree plans are reduced toward 120 total credits at most institutions, nearly all courses within a degree plan could be considered required from the students' viewpoint. Over one-third of the respondents reflected on courses enrolling less than 30 students. Considering two-thirds of the respondents were of sophomore or junior standing, this finding implies students are gaining exposure to courses fostering an engaging environment (Rocca, 2010), even in a large institution with more than 30,000 students. Noteworthy too, is the proportion of students who reflected upon courses with 150 or more students. This characteristic of the data set is important to recognize as this group of students may experience a different classroom environment than those in substantially smaller courses. Shown across all age groups, small classes foster greater student engagement (Cotton, 2000) in addition to the opportunity for teacher connection within the classroom (Finn, Pannozzo, & Achilles, 2003).

In objective four, it was concluded that significant relationships existed between engagement and teacher immediacy behaviors. The unique contribution and significance indicate teacher immediacy has a place in explaining a part in the totality of undergraduate student course engagement. The influence of verbal and nonverbal teacher immediacy behaviors on student course engagement further substantiated evidence of the role teachers play involving students in learning (Frymier & Houser, 2000; Garrett, 2011; Velez & Cano, 2008). Additionally, it is important to note that teacher verbal immediacy explained the most variation in the participation/interaction engagement factor as that factor showed the lowest mean score among students. Again, supporting the influence of teacher behaviors on student perceptions and participation in the classroom (Gasiewski et al., 2012). It is therefore implied, the more immediate the teacher is, the more inviting and engaging the classroom environment she creates. College teachers should be aware of the manner they talk to their students, individually and as a class.

It can be concluded from these findings that class sizes of 29 students or less have a positive influence on student's total course engagement, participation/interaction engagement, and performance engagement. Although it may not be practical to reduce every class to 30 or less students, engagement benefit could be gained by grouping students to facilitate discussion in large lecture courses to facilitate the opportunity for teachers to approach students more directly and intimately (Weaver & Qi, 2005). This would theoretically increase student positive perceptions of teacher immediacy. The remaining covariates produced negligible influence on student course engagement. It may be necessary to recode and reevaluate the three variables individually to discern if any interaction exists. Also worth consideration is describing course engagement at each level of class time, course status, and student rank to provide further context to the role each variable plays in engagement.

Considered together, these findings also suggest that small class sizes and verbally immediate teachers work positively in combination to encourage students to interact with classmates and teachers, alike. While students may not exhibit the behaviors of participation regularly, class size and an immediate teacher improves the probability of these student behaviors. Being a more immediate teacher is not simply about making people feel good and making yourself more popular, it is a genuine state and mentality. Teachers who demonstrate energy and concern for student learning through being inclusive, encouraging, and ultimately realistic with communicating expectations can positively influence student engagement in the classroom (Barkley, 2010). If we as college teachers are to expect attentiveness, care, and concern demonstrated from our students in the classroom and in their work the same should be expected from us.

Future studies should explore the tipping point of influence class size has on student engagement to assist in course design decisions. Weaver and Qi (2005) purported class sizes of 30 or fewer produced more engaged students but, is there significant differences between 30 students and 50 students? Incorporating observations of student behaviors where the SCEQ is utilized could provide instructors with a better understanding of differences between what they observe and what students perceive. Thereby providing context to the question; are student behaviors indicative of their engagement?

Continued inquiry into the role of immediacy in engagement is warranted. Future studies could explore student-teacher relationships in more depth through incorporating indicators of relationship development with an assessment of teacher immediacy to predict student engagement. Additional questions worth pursuit are: Does teacher awareness of immediacy influence engagement? Does student engagement have a reciprocal effect on teacher immediacy? Further, qualitative inquiry would allow students to describe in their own words what engagement looks like to them and better contextually define engagement. Scales and current definitions may be constricting a more holistic understanding of engagement. Plausibly, much additional interference to student engagement exists within the classroom. Therefore, what is the role technology-use plays in student course engagement? Across higher education the development of online courses exceedingly increases as institutions seek to make education more accessible. Although literature exists regarding engagement in online courses, how can a teacher transmit immediacy remotely? The transferability and impact of teacher immediacy via online courses to students should be studied to facilitate engaged online learning.

The study of engagement and its' influences holds significance in all areas of education. Especially as we consider how to better prepare teachers and make them more effective in the classroom. Additionally, engagement is important in how we create a better learning environment in every classroom we enter.

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Agricultural Extension in Sub-Saharan Africa During and After Its Colonial Era: The Case of Zimbabwe, Uganda, and Kenya

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Abstract

Agricultural extension services the world over have been instrumental in ensuring agriculturists stay abreast of new developments to improve their productivity and economic livelihoods. This historical study describes the origin and practice of agricultural extension in the former British colonies of Zimbabwe, Uganda, and Kenya before their independence and during the decades afterward, and identifies the present challenges impacting extension services in these countries. Over time, in a bid to improve their agricultural sectors, these countries employed a number of approaches to providing extension/advisory services. Some methods, however, were coercive and little more than the enforcement of laws and customs prejudicial to the nations' Black farmers. This often resulted in cruel treatment, exploitation, and oppression of the would be beneficiaries, especially during the colonial era. In the post-colonial era, no single approach to extension delivery has proven to be without shortcomings (Davis, 2008). To that end, a pluralistic paradigm has shown promise in mitigating the limitations of any single approach. Additional research should be conducted to determine the longstanding impact of using chiefs and other law enforcers as extension agents on individuals' present-day perceptions about extension and its potential for meeting the needs of smallholder, resource-poor farmers.

Introduction and Background

Agricultural extension predates the Renaissance period when people advocated for practical education and science that would be used to fulfill their basic human needs (Swanson & Claar, 1984; True, 1929). According to Swanson and Claar (1984) as well as True (1929), Rabelais (1483 to 1553) was among the pioneers to advocate for practical education by teaching children about nature and encouraging them to use the knowledge acquired in their daily lives.

"[I]t took nearly three-quarters of a century after George Washington was inaugurated as our first president to establish the land-grant university system and another half-century to establish extension" (Rasmussen, 1989, p. 16) in the United States. However, the idea of agricultural extension as we know it today was borne by the American people long before passage of the Smith-Lever Act of 1914 to improve on the education and lives of rural citizens (Rasmussen, 1989; Scott, 1970; Simons, 1962). To these ends, passage of the Land-Grant College Act of 1862, which created the establishment of land-grant institutions, coupled with emergence of the farmers' institute movement about the same time, had a profound impact on development of the American extension system (Garforth & Jones, 1997; Scott, 1970). Thereafter, the Hatch Act of 1887 and the Smith-Lever Act of 1914 led to establishment of agricultural experiment stations and the cooperative extension service, respectively, and this completed the tripartite mission of land-grant universities, i.e., teaching, research, *and* extension (Garforth & Jones, 1997; Herren & Edwards, 2002; Scott, 1970).

It should be noted, however, that extension or agricultural advisory services existed in other parts of the world long before the idea was conceived in the United States. For example, according to Swanson and Rajalahti (2010) as well as Garforth and Jones (1997), advising farmers and teaching them to adopt better farming practices was reported to have existed in Mesopotamia, China, and Egypt thousands of years ago. In Egypt, advice was given to farmers on how to protect their crops and save lives from the Nile's annual floods, and in Mesopotamia farmers were often provided advice on how to irrigate their crops to control the infestation of rats as early as 1800 B.C. (Garforth & Jones, 1997).

According to True (1929), toward the end of the eighteenth century, several agricultural schools were established in different parts of Europe to promote agricultural development. For example, "the Georgicon Academy at Kezthely, founded in 1797 [was considered a] model agricultural college of Europe" for more than 50 years (True, 1929 p. 3). However, extension became more pronounced in the nineteenth century after the outbreak of potato blight in Ireland in 1845, and the attack of aphids in vine plantations, i.e., *vineyards,* in Europe, especially in Germany, which led to the appointment of agriculture teachers to conduct demonstrations for farmers (Garforth & Jones, 1997; Swanson & Claar, 1984; Swanson & Rajalahti, 2010). By the end of the nineteenth century, many countries in Europe had developed their extension systems based on the German model of *Wanderlehrer* (migratory teacher); for example, in Denmark from 1870, and in the Netherlands during the 1840s and 1850s (Garforth & Jones, 1997).

> The term *extension* itself was first used to describe adult education programs organized by Oxford and Cambridge universities in England starting in 1867; these educational programs helped extend the work of universities beyond the[ir] campus[es] and into the neighboring communities. This term was later formally adopted in the United States in conjunction with the land[-]grant universities that were originally established as teaching institutions during the 1860s. Research activities were added in 1887, and extension activities were started in the 1890s and then formally added in 1914 as part of each university's official mandate. (Swanson & Rajalahti, 2010, p. 1)

Depending on the country, different words are used to describe *extension* (Swanson & Rajalahti, 2010; Van den Ban & Hawkins, 1996). For example, in the United States and in Canada the term *extension* is used but countries such as Britain and Germany refer to extension as "advisory work or [*Beratung* in the case of the latter], which implies that an expert can give advice on the best way to reach your goal, but leaves you with the final responsibility for selecting the way" (Van den Ban & Hawkins, 1996, p. 8). In developing countries, the term used to describe agricultural extension is mainly influenced by the funding agency, although *advisory services* is now more common in Sub-Saharan Africa (Swanson & Rajalahti, 2010). Further, unlike in developed countries such as the United States, where extension is part of land-grant university systems, in many developing countries most extension services are linked to their ministries of agriculture (Swanson & Claar, 1984; Oladele, 2011). In addition, the role played by extension agents varies among countries, i.e., in the United States extension serves more of an educational role, in European countries extension is more about solving problems, and in most developing countries extension is aimed at diffusing and encouraging adoption of new technologies by farmers to foment better farming practices for increased yields (Van den Ban & Hawkins, 1996).

Although substantial literature exists describing the evolution and role of extension services in many of the *developed countries*, this is not the case with so-called *developing countries*. This study sought to examine the evolution of agricultural extension as well as the role it played in development of the agriculture sector in three former British colonies in Sub-Saharan Africa, Zimbabwe, Uganda, and Kenya, with attention to implications for future extension delivery. According to McDowell (2002), historical research enables us to understand how past events have shaped the present phenomenon as well as learn about events that may continue to have influence in the future. Further, knowledge of the past helps us to not only appreciate historical events that have shaped the present, but also to avoid past mistakes, as well as plan for the future with some degree of certainty (McDowell, 2002). In addition, Peters (2002) posited that knowledge of how extension was conducted historically helps us to better understand the role of extension as we view it today.

Purpose of the Study

The primary purpose of this historical study was to describe the origin and practice of agricultural extension in the former British colonies of Zimbabwe, Uganda, and Kenya before their independence and during the decades afterward. In addition, the study sought to identify challenges facing agricultural extension in the three countries studied.

Objectives

1. Describe the origin and practice of agricultural extension in Zimbabwe, Uganda, and Kenya while under British Colonial rule.
2. Describe the development of agricultural extension in Zimbabwe, Uganda, and Kenya, after becoming self-governing, independent states.
3. Identify challenges and recommendations for the future delivery of agricultural extension in Zimbabwe, Uganda, and Kenya.

Methodology

Historical research methods were used to obtain information and data to achieve the study's research objectives. Borg defined historical research as "the systematic and objective location, evaluation and synthesis of evidence in order to establish facts and draw conclusions about past events" (as cited in Cohen, Manion, & Morrison, 2007, p. 191). Although historical research may be quantitative, in most cases, it is qualitative in nature (Cohen et al., 2007) and increases "awareness and interest in the past, [helps researchers] understand its complexity, and [also] appreciate the forces which have brought about change in society" (McDowell, 2002, p. 5). When investigating historical events, Levstik (1997) asserted that "there [are] no such thing[s] as *just the facts*. Someone sorts through the available data, perceives some facts as more relevant than others, organizes those facts, and assigns them a place" (p. 1). Thies (2002) posited that what are considered facts may be subjective depending on the information for which the researcher sought to discover. Further, Gaddis (as cited in Thies, 2002) professed that '"*there is no such thing as a definite account of any historical episode*"' (p. 354).

In this inquiry, both primary and secondary sources were examined (Cohen et al., 2007; Creswell, 2012; McDowell, 2002; Swan & Hofer, 2008; Thies, 2002) to address the study's objectives. Historical research relies on evidence already in existence and, therefore, researchers must sift through and examine the available literature to identify the data most appropriate for their use (Cohen et al., 2007). Unlike secondary sources, primary sources contain the actual ideas of the author and have not been subjected to interpretation by others (Cohen et al., 2007; McDowell, 2002; Thies, 2002). Cohen et al. (2007), however, posited that sometimes secondary sources may have more authentic information than primary data sources. "There are numerous occasions where a secondary source can contribute significantly to more valid and reliable historical research than would otherwise be the case" (Cohen et al., 2007, p. 194).

Specific types of sources for this study included peer-refereed journals, books, reports, official publications, monographs, dissertations and theses, newspaper articles, documents cited by other authors, as well as papers presented at various scholarly and professional conferences (Cohen et al., 2007; McDowell, 2002; Thies, 2002). In doing historical research, it is imperative that researchers compare multiple sources of information to have a better understanding of the phenomenon being studied (Swan & Hofer, 2008). Cohen et al. (2007) as well as Thies (2002) urged researchers to triangulate data by comparing it with information from multiple sources to avoid *selection bias* and ensure accuracy of the evidence analyzed. The sources of information for this study were also subjected to internal and external criticism by the researchers (McDowell, 2002; Thies, 2002).

Limitations of the Study

The researchers relied mainly on primary and secondary sources that were available online and through search engines provided by Oklahoma State University's main library. The researchers, unfortunately, were not able to visit historical archives, libraries, or universities in Britain, Zimbabwe, Uganda, or Kenya, where they may have been able to access other sources of information and historical evidence relevant to the study.

Evolution of Extension in the Former British Colonies of Zimbabwe, Uganda, and Kenya

Before 1914, most of the extension activities in Africa were conducted by missionaries who established demonstration farms alongside *spreading the gospel* (Garforth & Jones, 1997). After colonization, however, and before nations gained their independence, agricultural extension in most of the British colonies in Sub-Saharan Africa was aimed at encouraging the rural populace to adopt new technologies and practices to improve production for the benefit of their *colonial masters*, i.e., for export (Alonge, 2003; Birmingham, 1999; Davis, 2008; Schwartz & Eicher, 1991; Swanson & Claar, 1984; Wichramasinghe, 1981). The supposition was that *all innovations were useful to all farmers* irrespective of their economic, cultural, and social orientations. The farmers, therefore, had little input and their views were not often considered. According to Wichramasinghe (1981), a "centre-periphery extension model" (p. 15) was followed. The extension process was a top-down approach, and was often characterized by *coercion* if the farmers did not adhere to what was expected of them in regard to the adoption of new practices (Schwartz & Eicher, 1991). In addition, Shah (1999) asserted that "[i]n Africa, both former French and English colonies inherited highly centralized systems of governance geared [toward] command and control and against responsiveness to [the] public at large" (p. 2).

According to Jones and Garforth (1997), by 1914, several departments of agriculture had been established in most of the British colonies. Zanzibar (Tanzania) was one of the first colonies to have a director in charge of agricultural research and extension as early as 1896 (Birmingham, 1999; Jones & Garforth, 1997). In the years preceding 1914, during the *scramble for Africa*, most of the established governmental or ministerial departments of agriculture were more involved in administrative roles and less focused on the delivery of agricultural extension services (Jones & Garforth, 1997). Where extension was implemented in the British colonies of Sub-Saharan Africa, it was targeted mainly on agriculture, i.e., farming and animal production, and focused less on other aspects of rural development (Schwartz & Eicher, 1991).

Zimbabwe

Although steps were taken by the British to establish formal extension services in Zimbabwe, then known as South Rhodesia (Marshall, 2001), as early as 1907 (Qamar, 2013), it did not take root until 1927. In 1927, an American missionary, Emory D. Alvord, started extension for Black farmers to address the food demands of a growing population on the *allocated land reserves* (Hanyani-Mlambo, 2000; Kramer, 1997; Qamar, 2013), i.e., they were allotted specified plots of land to settle by the colonial government. However, Alvord was criticized by "the Industrial Missionary at the mission who did not see the need for agricultural instruction" (Kramer, 1997, p. 169). These farmers had been forcibly removed from their ancestral lands by the colonial government to settle White farmers in their place. Because the colonial government was unwilling to allocate more land for food production to those it had displaced, increasing the carrying capacity of the allotted land was their only option, and it was posited that could be done by providing extension services (Kramer, 1997). Närman (1991) explained that demonstration farms were used (1930 to 1940) to teach the displaced farmers better agricultural practices to increase crop yields. Further, according to Närman (1991), during the 1920s, when Alvord initiated agricultural extension for Black farmers, he used "the Master farmer scheme" (p. 82) model to provide services which led to increased farm productivity.

The colonial government in Zimbabwe established a dual-system approach to provide separate extension services for White and Black farmers (Cobbett, 1985; Hanyani-Mlambo, 2000, 2002; Närman, 1991; Ndlela & Robinson, 2007; Schwartz & Eicher, 1991). For example, "the Department of Conservation and Extension [CONEX]" provided extension to White commercial farmers, and "the Department of Agricultural Development [DEVAG]" was mandated to provide extension services to the small-scale farmers who were predominantly Black (Hanyani-Mlambo, 2002, p. 3). Further, Schwartz and Eicher (1991) as well as Moyo, Mutuma, and Magonya (1987) asserted that, in the case of Black farmers, extension was more about maintaining law and order, but for White farmers it was geared toward adoption of new technologies and improvements in marketing. Moyo et al. (1987) stated that for the Black farmers the "extension services provided [a form of c]ommunity development, which was essentially directed at social engineering communities under traditional chiefs with a view of maintaining 'law and order' and [to] develop subservient 'development skills' promoting colonial rule" (p. 21). In addition, Whiteside (1998) asserted that, during the colonial period, "[a] carrot and stick approach was used to 'improve' agricultural practices by Black Farmers" (p. 16), and those who did what was approved were awarded with “a Master Farmer[’]s Certificate and the opportunity to obtain land in a small-scale commercial farming area” (p. 16).

By the time Zimbabwe achieved independence from Great Britain in 1980, two separate systems of extension were operational for two forms of agriculture, i.e.,

> [a] high-yielding commercial sector with the capacity to produce a national surplus operated, on the one hand, and was managed by White farmers; alongside this affluent production power, a large [and almost entirely Black] African population of subsistence peasants struggled for small yields on poor land. (Närman, 1991, p. 26)

Following independence, the two extension departments, CONEX and DEVAG, were merged to form “the Department of Agricultural, Technical and Extension Services (AGRITEX)” (Hanyani-Mlambo, 2002, p. 3). The main objectives of this merger were to integrate the various extension personnel and harmonize them into one system as well as to reduce the racial segregation which existed under the former governmental system (Cobbett, 1985; Närman, 1991). Further, more resources were allocated toward the purchase of commercial farms to resettle people and ex-combatants who had participated in the liberation struggle for Zimbabwe’s independence (Whiteside, 1998).

In 1988, AGRITEX with support from the German Organization for Technical Cooperation (GTZ) started a project called Conservation Tillage (ConTill) to help farmers with soil conservation efforts (Hagmann, Chuma, Connolly, & Murwira, 1997). In a bid to help farmers adopt new farming practices, it required interaction between farmers and the extension staff, as well as sharing information with others in the community (Hagmann et al., 1997). However, as a result of this interaction and community involvement, it further led to a transformation in the delivery of extension services, i.e., “from the rigid, linear, top-down extension model, to a more process-oriented approach, where farmers’ needs provided the framework for the extension service” (Hagmann et al., 1997, p. 3).

AGRITEX initially employed a top-down extension approach to train and disseminate new technologies to ensure increased food production (Hanyani-Mlambo, 2000). According to de Jong (as cited in Närman, 1991), this was espoused in its main objective to implement ‘“the agricultural policy of government through the provision of agricultural, technical and extension services, which stimulate the adoption of proven agricultural practices, leading to increased, sustained and profitable production”’ (p. 77). However, in 1994, AGRITEX embarked on the Participatory Extension Approach (PEA) (Hagmann et al., 1997). And according to Närman (1991), in the 1990s, Zimbabwe was credited as having some of the best extension services in Sub-Saharan Africa. But later,

> [i]n 2002, AGRITEX and the Department of Research and Specialist Services (DR&SS) were merged to form the Department of Agricultural Research and Rural Extension (AREX). In 2007, the research arm of AREX was separated to form the Department of Agricultural Research for Development (DAR4D). [And i]n 2009, the extension arm was separated from AREX to once again form AGRITEX. Similarly, the DAR4D was renamed as before, that is, [the] Department of Agricultural Research and Specialist Services (DR&SS). (Qamar, 2013, para. 5)

Of note, in 2000, Zimbabwe embarked on the process of fast-tracking land reform "to address the racially skewed land distribution pattern inherited at independence in 1980" (Zikhali, 2008, para. 1, abstract). In the process of land redistribution, agricultural extension workers played a role in demarcating land to the smallholder farmers (Manby, 2002). The land was not only distributed to the landless farmers and "war veterans (for whom government policy officially reserves 20 percent), but also to the police, army, CIO [Central Intelligence Organization], civil servants such as agricultural extension workers (who are involved in demarcating plots), and traditional leaders" (Manby, 2002, p. 29). Roodt (2012) concluded the redistribution of land was done haphazardly and this led to the collapse of most commercial farms that were replaced by a large number of small-scale farms, producing food mainly for consumption, i.e., subsistence farming, which adversely affected the country's economy. The high influx of small-scale farmers also increased the ratio of farmers-to-extension workers, leading to a decline in the availability of extension services (Scoones et al., 2011). A ten-year long study by Scoones et al. (2011) about effects of the land reform initiative reported "that the story is not simply one of collapse and catastrophe; it is much more nuanced and complex, with successes as well as failures" (p. 967) in Zimbabwe.

Uganda

In Uganda, during the colonial era (1920 to 1956), extension was mainly conducted by *chiefs* with the help of a few trained agricultural personnel (Bukenya, 2010; Kidd, 2001; Semana, 2008). The chiefs were often clan heads or elders in their communities and appointed by the colonial government to govern a specific area and to collect taxes on behalf of the central government (Ojambo, 2012; Tumushabe, Mushemeza, Tamale, Lukwago, & Ssemakela, 2010). These chiefs together with their aides were entrusted with the responsibility of distributing planting materials for cash crops, such as cotton and coffee, as well as giving instructions to their farmers on how to grow crops (Bukenya, 2010; Kidd, 2001; Semana, 2008). In addition, during the colonial period, extension was often coercive and aimed at producing cash crops to raise revenue for the colonial government (Bukenya, 2010; Kidd, 2001; Semana, 2008). However, from 1956 to 1963, the role of chiefs became less pronounced and extension was transformed to a support model for progressive farmers in their respective communities. It included the provision of inputs as well as credit to expand and finance producers' farms with the hope that those farmers' operations would be viewed as demonstration farms or *models* from which the local populace would learn and thereby seek to emulate (Kidd, 2001; Semana, 2008; Tibezinda, 1996).

In the post-independence era, especially during the 1960s and early 1970s, most of the extension services were provided by the national governments of developing countries with support from the United States Agency for International Development (USAID), and was aimed at farmer empowerment (Semana, 2008; Swanson & Claar, 1984). However, the political turmoil and upheavals experienced during the 1970s and early 1980s in Uganda rendered its extension services ineffective (Bukenya, 2010; Kidd, 2001; Semana, 2008). But a demand for market-driven extension systems became more pronounced in the late 1980s and through the 1990s (Alonge, 2003; Kibwika, Wals, Nassuna-Musoke, 2009; Swanson, 2011) in many countries. However, in spite of the increased emphasis on market-driven extension services through the 1990s, extension in Uganda continued to be associated with the diffusion and adoption of new technologies (Bukenya, 2010) with little farmer-driven input.

The extension services provided by the Ugandan government's agents in the 1960s were top-down. Innovations from research stations were delivered to farmers for adoption without their input (Anderson, 2007; Bashaasha, Mangheni, & Nkonya, 2011). However, according to Rivera and Sulaiman (as cited in Bashaasha et al., 2011), in the 1990s, that approach "was replaced by the agriculture knowledge and information system perspective and, more recently, by the innovation systems concept" (p. 13). The flow of information and innovations became a two-way process involving both farmers and government researchers; extension agents became the go-betweens or served more as facilitators (Bashaasha et al., 2011). To this end, Swanson and Rajalahti (2010) outlined four different models used to deliver extension services in many developing countries during the 1970s, 80s, and 90s, including the decentralized and demand-driven market models that emerged in the 1990s. The extension system used in most areas of Uganda, beginning in the 1990s, was intended to be comprehensive to address a wide range of areas such as animal production, crops, and aquaculture (Venkatesan & Kampen, 1998).

Moreover, in 2001, Uganda formally changed its extension services system from the traditional top-down approach to a farmer-driven/demand-driven model, as provided by the National Agricultural Advisory Services (NAADS), in which farmers received public funds to contract private firms to provide extension services, thus replacing the traditional system (Benin et al., 2011; Lumu & Kiwuuwa, 2014; Swanson & Rajalahti, 2010). However,

> NAADS in Uganda, which started in 2001, has struggled with serious management and resource problems; therefore, it is in the process of being reestablished as a public agricultural extension system, but with representative farmers continuing to shape extension programs and in setting priorities. (Swanson & Rajalahti, 2010, p. 97)

In 2014, the president of Uganda ordered the restructuring of NAADS and firing of all its district coordinators, who were in charge of supervision and implementation of NAADS' programs, and replaced them with personnel from the Uganda Peoples Defense Forces [UPDF] (Lumu & Kiwuuwa, 2014; Rwakakamba & Lukwago, 2014; The State House of Uganda, 2014; Uganda Media Centre, 2014a). The personnel from UPDF underwent two weeks of intensive training at Makerere University on the basic concepts underlying agriculture production (Anyango, 2014) so they would be able to effectively monitor and implement the NAADS programming at the district level to ensure prosperity of the local populace (Uganda Media Centre, 2014b). The NAADS coordinators were accused of a number of issues, including corruption, inefficient use of allocated resources, lack of proper accountability, failure to follow stipulated procurement guidelines, and poor monitoring (Lumu & Kiwuuwa, 2014; Uganda Media Centre, 2014b). The full impact and consequences of this action on the delivery of extension services in Uganda are only beginning to unfold and warrants close monitoring in the future.

Kenya

In the case of Kenya, although the provision of extension services began in the early 1900s, it did not yield much in terms of tangible results until the late 1960s and early 1970s when hybrid maize was diffused (Gautam, 1999). According to its National Agricultural Sector

Extension Policy [NASEP] (2012), during the colonial era, as was the case of Zimbabwe, Kenya also had two separate extension delivery arms, i.e., one for White settlers which was "well-packed" and "combined extension services with credit and subsidized inputs" (p. 6) and one for the indigenous Africans that was "coercive in nature" (p. 6). Similar to the cases of Uganda and Zimbabwe, after achieving independence, the provision of extension services in Kenya was mainly a responsibility of the national government through its Ministry of Agriculture (Davis & Place, 2003; Nambiro, Chianu, & Murage, 2010; Nambiro, Omiti, & Mugunier, 2006). Kenya, however, had and has a bifurcated extension system, i.e., one focused on food production (or a whole farm approach) provided primarily by the government, and a commodity-based model provided by the private sector, including parastatals and corporations focused on commercial crops (Muyanga & Jayne, 2006, 2008). Davis and Place (2003) posited that "[r]esearch and extension [in Kenya] were focused mainly on [serving] large-scale farms or smallholders in high and medium-potential areas. Trials and demonstrations were [held] mostly on research stations" (p. 747).

After having gained independence in 1963, and through the 1970s, Kenya, with support from donors, adopted "the whole farm approach, and use of [the] integrated agricultural development approach" (NASEP, 2012, p. 6). Further, the government of Kenya, between 1965 and 1980, established extension services targeting small-scale farmers and this gave rise to what was called the "Farming Systems Research and Extension (FSR/E) model" (Nambiro et al., 2010, p. 5). The FSR/E model was decentralized in approach with on-farm trials and farmers' involvement, and it provided a "three-way linkage between farmers, researchers, and extension providers" (Nambiro et al., 2010, p. 5). In the beginning, however, Kenya used a number of extension approaches to deliver services, and most of them were top-down in their modes of operation (NASEP, 2012). For example, the "whole farm extension approach, integrated agricultural development approach, and training and visit approach" were more prevalent in the 1980s and 1990s (NASEP, 2012, p. iv). According to Mcmillan, Hussein, and Sanders (as cited in Davis & Place, 2003 and in Nambiro et al., 2010) extension agents in Kenya used a '''cookbook'" model (p. 746 and p. 4, respectively) to deliver services through a top-down approach. In the early 1980s, the World Bank helped fund reforms to extensions systems in Sub-Saharan Africa and Kenya was the first beneficiary (Venkatesan & Kampen, 1998).

In the 1990s, a shift from the top-down approach to a more horizontal or farmer-driven, participatory approach began in Kenya, and it led to a decentralization of its extension services (Nambiro et al., 2006). The decentralization included "structural reforms with the objective of shifting extension to other institutions and improving accountability and responsiveness" (Nambiro et al., 2006, p. 2), as well as increasing the participation of farmers in decision making with "the end-users assuming greater responsibility for designing appropriate curricula, and dissemination [of] information" (p. 2). In addition, the decentralization of extension services facilitated the entry of other organizations, especially from the private sector, to deliver extension services, including, community-based organizations, cooperatives, faith-based organizations, non-governmental organizations (NGOs), parastatals, and private companies (Muyanga & Jayne, 2006, 2008; Nambiro et al., 2006; NASEP, 2012). According to Rivera (1996), decentralization of extension services empowers farmers to make independent decisions that best suit their needs, promotes sustainability, and increases the likelihood of commitment and collective responsibility among farmers regarding the decisions they make.

Unlike the government, which may offer a wide range of extension services, the extension services provided by the private sector tend to be commodity-specific depending on the needs and aims of the organization (Muyanga & Jayne, 2006, 2008). For example, corporations and cooperatives dealing in commercial crops, such as tea, coffee, and pyrethrum, may provide customized advisory services to their outgrowers to increase production and improve quality (Muyanga & Jayne, 2008). In more recent times, Kenya's government has embraced a more demand-driven and participatory approach in the delivery of extension services (NASEP, 2012). For example, "[a] focal areas approach and farmer field schools (FFS)" (NASEP, 2012, p. 6) have become more of the norm. Although the Kenyan government still provides financial support for its extension system, the "long term goal is to have private sector-led and fully commercialized extension services" (NASEP, 2012, p. 28) in the future.

Conclusions

In these countries, during the 1980s and 1990s, the respective governments and parastatals together with the private sector, especially NGOs, were involved in the provision of extension services through community participation, which led to further decentralization of their extension services (Bashaasha et al., 2011; Friis-Hansen & Kisauzi, 2002; Gautam, 1999; Hanyani-Mlambo, 2002; NASEP, 2012; Rivera, Qamar, & Crowder, 2001; Semana, 2008; Venkatesan & Kampen, 1998). According to Venkatesan and Kampen (1998), Rivera et al., (2001), and Swanson (2011), if several organizations are involved in the provision of extension services a *pluralistic extension system* is operating. Rivera (1996) asserted that in a pluralistic extension system, the private sector, such as corporations, provided extension to the commercial farmers, as well as smallholder farmers (outgrowers) who are contracted to grow crops for the companies, and the public sector continued to provide extension to the smallholder, subsistence farmers. For example, sugar corporations in Uganda, such as Sugar Corporation of Uganda Limited (SCOUL) and Kakira Sugar Works, sign contracts with farmers to whom they provide inputs and extension services and, in turn, the farmers are obliged to honor these contracts by selling their sugarcane to the corporations with whom they contracted (Smith, 1970). In addition, Kenya and Zimbabwe also have a number of agricultural corporations that contract with farmer outgrowers to whom they provide inputs and extension services to ensure high quality and efficient agricultural output (Coulter, Goodland, Tallontire, & Stringfellow, 1999).

It is evident these former British colonies more or less have adopted demand-driven, pluralistic approaches to provide extension services (Bashaasha et al., 2011; Friis-Hansen & Kisauzi, 2002; Gautam, 1999; Hanyani-Mlambo, 2002; NASEP, 2012; Rivera et al., 2001; Semana, 2008; Venkatesan & Kampen, 1998). This kind of approach to extension, however, makes it difficult to harmonize the activities of the various agencies involved in extension and it may sometimes foment conflicts, especially if advice rendered to clientele by technocrats differs from the official government position (NASEP, 2012; Qamar, 2005). This calls for the respective governments to take a supervisory position and monitor the activities of organizations that provide extension services (Qamar, 2005). Further, other than only providing agricultural extension services, most of the organizations, both private and public, have incorporated other activities or deliverables ranging from HIV/AIDS awareness and prevention to mechanisms supporting economic empowerment through microfinance services (Davis, 2008; Muyanga & Jayne, 2008; NASEP, 2012; Rivera et al., 2001).

Challenges and Recommendations for the Delivery of Agricultural Extension in Zimbabwe, Uganda, and Kenya in the Future

It should be noted that, historically, extension in the three countries studied was associated frequently with cruelty, exploitation, and oppression toward, as well as the enforcement of law and order among, the Black population, i.e., the would be *intended beneficiaries* (Moyo et al., 1987; Schwartz & Eicher, 1991; Whiteside, 1998). These acts of social injustice likely created a negative perception among the people affected, such that feelings of bitterness and distrust have not been lost on their descendants. Further, the militarization of extension, a path taken recently by the Government of Uganda (Anyango, 2014; Lumu & Kiwuuwa, 2014; Nassaka, 2014; Rwakakamba & Lukwago, 2014; The State House of Uganda, 2014; Uganda Media Centre, 2014a), may create dissidence among the population because some Ugandans endured human rights abuses under past regimes, e.g., during Idi Amin's presidency. However, encouraging a more participatory model for extension (Navarro, 2008) may help counter some of the negative views created during the colonial era as well as the aftermath of approaches implemented post-independence that were unsuccessful.

Reconsidering what Cohen et al. (2007) and McDowell (2002) professed, historical research enables us to understand how past events have shaped the present phenomenon as well as learn about events that may continue to have influence in the future. Davis (2008) posited that through awareness of each country's past extension experiences, more effective systems can be put in place to achieve desirable results in the future. The governments of Zimbabwe, Uganda, and Kenya, therefore, should not underestimate what impact the use of extension agents to enforce unpopular government policies may have had on the successes or failures of extension services and programs in the past. Therefore, a pluralistic approach to extension in these countries would appear to be the most appropriate model to pursue (Davis, 2008), but in accordance with guidelines set by the responsible government agencies and complementary to the national development agendas of the respective countries. In addition, the national governments of these three countries should guide and monitor activities of their various extension organizations to ensure harmony and avoid gratuitous use or waste of scarce resources (Lumu & Kiwuuwa, 2014; Oladele, 2011). The approaches adopted should not be only about agricultural production but rather aim at empowering the respective beneficiaries to embrace and apply sustainable practices to better ensure a prosperous future. This would include working with stakeholders to find solutions to address cross-cutting issues, such as HIV/AIDS, malaria, malnutrition, climate change, gender equity, and the promotion of good leadership (Davis, 2008; Oladele, 2011; Qamar, 2005).

Although the need exists for countries to move toward more demand-driven approaches to extension, especially with farmer participation and empowerment, guidelines should be clearly stipulated and followed by the authorities, and mixing approaches or models with politics should be avoided. By not following this stipulation, corruption, politicking, and perceived lack of accountability has already presented a substantial challenge to the future of NAADS in Uganda (Benin et al., 2011; Bukenya, 2010; Lumu & Kiwuuwa, 2014; Mafaranga, 2010; Musheshe, 2013; Nassaka, 2014). Further, even though decentralization and privatization of extension services stands to increase the accountability, efficiency, and effectiveness of providers (Bashaasha et al., 2011; Nambiro et al., 2006; Rivera, 1996), not many of the smallholder and subsistence farmers in these countries can afford to pay for extension/advisory services. The Governments of Zimbabwe, Uganda, and Kenya, therefore, should continue to provide public extension to their low income, resource-poor producers in addition to opening the provision of extension to the private sector and other sources of services. Moreover, governments of the three countries should honor the *Maputo Protocol* (to which all three are signatories) and commit at least 10% of their national budgets toward the agriculture sector (Food and Agriculture Organization, 2004) to increase production and improve food security. Corporations are urged to continue providing extension services for outgrowers and to also consider other aspects of their well-being, such as ensuring food security, providing HIV/AIDS prevention and treatment, improving general healthcare, and supporting education for them and their families.

Additional studies should be conducted to understand the longstanding impact of using chiefs and other law enforcers as extension agents on individuals' present-day perceptions about extension. This may warrant a historical narrative study (Cohen et al., 2007; McDowell, 2002) or could involve a phenomenological inquiry, i.e., personal interviews (Lincoln & Guba, 1985; Moustakas, 1994), to determine the *essence* of their lived experiences about extension during that era, including remembrances of elders' views and stories. This may provide extension service providers and policy makers a way forward on how best to offer extension services to this population in the future. McDowell (2002) posited that being aware of the past helps to avoid repeating earlier mistakes and guides us in making proper decisions for the future with some degree of certainty. Reliable data to that end could be helpful to policy makers and practitioners of extension in Zimbabwe, Uganda, Kenya, and elsewhere in the world.

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The Relationship of Graduate Program Satisfaction with Student Learning Ability, Department Collegiality, and Adequacy of Student Support

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Abstract

The quality of graduate education and student support are important determinants of student satisfaction with their graduate program of enrollment. The College of Agricultural Sciences at the Pennsylvania State University conducted a survey to determine graduate students' learning ability as a result of learning experience, collegiality in departments, adequacy of student support, and student satisfaction within their graduate programs. The survey was designed to measure student learning ability using 14 variables, collegiality in department, eight variables and student support, by five variables. Surveys collected from 220 respondents with a response rate of (45.8%) were analyzed for the study. This study tested the validity of representation of factors by different set of variables using factor analysis and examined the significance of factors predicting student satisfaction using logistic regression. Results from factor analysis suggest the questions designed to measure student support identified two distinct factors: 1) support related to courses and curriculum and 2) support related to faculty-student relationship. Logistic regression analysis using factor scores identified all factors as significant in predicting student satisfaction. Students in a more collegial environment with adequate support related courses, high learning ability, and good faculty-student relationship tend to be highly satisfied with their graduate programs.

Introduction

The College of Agricultural Sciences at the Pennsylvania State University, with enrollment of around 500 graduate students, is one of the leading institutions in the nation that offers graduate degrees in 18 major areas. Quality education, better facilities, and adequate student support can be assumed as the key factors for student satisfaction. Quality education in graduate schools not only helps to attract new students, but also helps to retain enrolled students. Colleges and universities in the United States are functioning in an increasingly competitive environment to offer quality educational experience to students. Assessment of quality of graduate programs and student experiences are becoming crucial for graduate schools to maintain and improve educational standards. These assessments of graduate education quality have implications for both higher educational institutions and students. Rowley (2003) suggests that student feedback can be served as indicators to maintain institution's reputation and improve courses and curriculum (as cited in Douglas, Douglas, & Barnes, 2006). At the same time, asking students for their feedback encourages them to reflect back on their learning experiences and provide them the opportunity to express their level of satisfaction with the graduate programs. Student evaluation of courses has been a general practice in higher educational institutions (Grebennikov & Shah, 2013) to evaluate quality of offered courses taking students' prospects into account (Douglas et al., 2006).

Students' satisfaction with educational programs can arguably be considered as a sign of educational excellence and performance of a university (Petruzzellis, D'Uggento, & Romaanazzi, 2006). Furthermore, assessment of quality of education and student satisfaction allows stakeholders to make decision on key aspects of graduate programs in order to offer students better educational experiences. Feild, Holley, and Armenakis (1974) investigated intrinsic and extrinsic factors that could affect student satisfaction in Auburn University. Their study revealed that intrinsic factors such as freedom to choose courses and academic progress toward degree as two important factors to predict satisfaction with graduate education. Dissatisfaction related to graduate education is presumed to result in dropping out of students from graduate programs. Highlighting the issue of student dropping out of graduate programs, Gregg (1972) stated that the degree of satisfaction that the graduate student experience while in the program, may be vital not only for his or her level of performance, but also for his or her objectives to attain the degree.

Ilias, Hasan, Rahman, and Yasoa (2008) emphasized students' perceptions on learning and teaching, support facilities, and learning environment, and external aspects as factors that could influence student's level of satisfaction (as cited in Hanaysha, Abdullah, &Warokka, 2011). Similar to their findings, a study conducted by Garcial-Aracil (2009) in different countries of Europe identified course content, student contact, learning and teaching facilities, and quality of teaching as highly influencing factors to determine student satisfaction (as cited in Wilkins & Melodena, 2013). Majority of studies on assessing satisfaction with graduate programs have cited faculty-student relationship as an important influencing factor (Barrick, Easterly & Rieger, 2011). Powers and Rossman (1985) elucidates factors such as satisfaction with intellectual stimulation of instruction, freedom to influence school policies and procedures, professor–student interaction, intellectual stimulation of peers, and university facilities to influence students' overall satisfaction with graduate education.

Limited studies to offer empirical evidence on linking student learning ability, student support, and collegiality in academic cohort to students' satisfaction with graduate programs prompted to carry out this research. This research addresses the national research priority areas 5 of the National Research Agenda (NRC, 2011), which concentrates on the quality of educational programs to meet the academic, career and developmental need of diverse learners. Moreover, this study is an attempt to identify factors that could explain variability in graduate students' levels satisfaction with their current graduate programs.

Conceptual Framework

The conceptual framework, employed for this study primarily focuses on three constructs such as students' ability to perform academic activities, collegiality and student support. Conceptual frameworks that are proposed to explain student satisfaction highly emphasize program quality as an essential determining factor. Students' academic performance and collegiality in institutions where students are encouraged to thrive and perform are determinants of quality of graduate programs. Acknowledging the relationship between quality and satisfaction, the proposed conceptual model attempts to explain student satisfaction based on concepts from literature on service marketing (Duque & Weeks, 2010). Majority of theoretical models adopted in service marketing literature symbolize students as customers (Anthiyaman, 1997; Petruzzellis et al., 2006) and higher education as service. Within the customer- satisfaction framework, service is vital for student or customer's satisfaction. Hartman and Schmidt (1996) studied student satisfaction using a consumer satisfaction framework, which supports the assumption that customers with higher perceived quality of service are more likely to be satisfied with the service.

Supporting the assumption of students as customers, Wilkins and Melodena (2013) argued that "student satisfaction is not determined solely by the students' teaching and learning experiences, but rather by their overall experiences as a customer of a particular institution" (p. 145). One of the key assumptions in this customer-satisfaction model is that universities are in the business of offering educational experience as service commodity and satisfaction is the determinant of superiority or inferiority of quality of service. Duque and Weeks (2010) found that the major components that define the quality of service such as perceived educational quality and quality of support positively influence students' satisfaction. Sojkin, Bartkowiak, and Skuza (2012) identified social condition as another important determinant of student satisfaction in higher education (as cited in Wilkins & Melodena, 2013). Influence of social conditions on student satisfaction may be studied equating it with collegiality in educational institutions. Attributes of collegiality considered for this study were care, value, respect, acceptance, assistance, and trust (Balsmeyer, Haubrich, & Quinn, 1996). Educational quality covers students' educational experiences determined by their ability to perform and engage in various educational activities and collegiality in the environment, where students engage to gain optimum educational experience. Quality of support covers items related to courses and curriculum and support from faculty members. Figure 1 reflects all three constructs and series of attributes representing each construct.

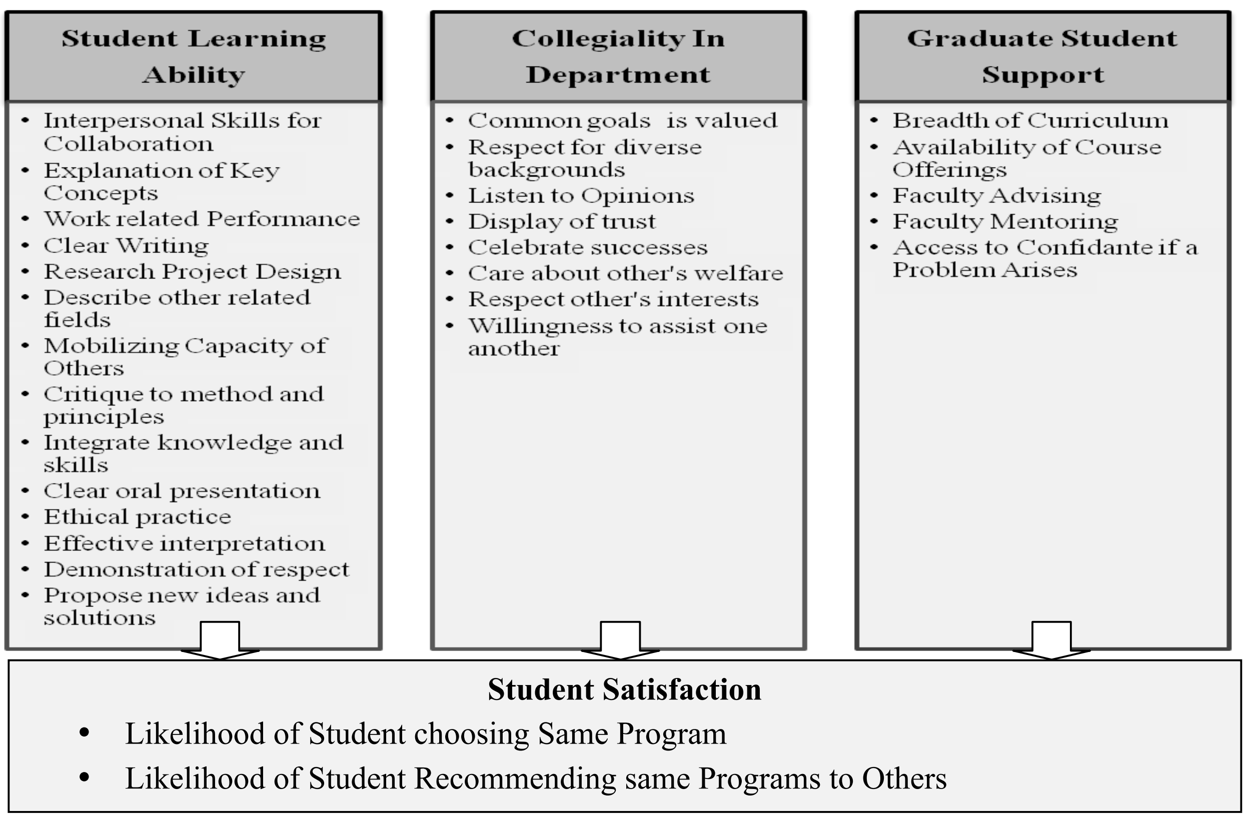

Figure 3. Factors with Corresponding Variables.

Mavondo, Tsarenko, and Gabbott (2004) studied the influence of resource facilities and capabilities on the likelihood of students recommending the university they are currently enrolled in to other candidates. Acknowledging students as clientele of university services, their study supports the view point that satisfied students are more likely to recommend their university to other potential students and return to the same university for their higher studies. Literature that focuses on various aspects of customer satisfaction apart from quality of service, have emphasized costumers' personal/physiological attributes (Anthiyaman, 1997). For example, Kotler and Clark described satisfaction as "a state felt by a person who has experienced performance or an outcome that fulfill his or her expectation" (as cited in Hanaysha, et al., 2011, p. 3). This definition attempts to establish relationship between the levels of satisfaction with personal expectations. Furthermore, Elliot and Healy (2001) defined student satisfaction as a short-term attitude developed as a result of evaluation of their educational experiences. Students' expectation from the graduate program and their attitude are the psychological factors that are related to students' overall satisfaction with graduate education. However, this study confines its focus on academic aspects of educational quality and support to assess the relationship between quality of service and student satisfaction.

The conceptual framework, adopted in this study, is based on the assumption that the graduate program satisfied students will recommend the same graduate program to other potential graduate students and re-choose the same program if allowed to start over again. As shown in Figure 1, we hypothesized that constructs representing quality of education influence graduate students' satisfaction with graduate programs. This relationship can symbolically be stated as:

Student satisfaction = ***f*** (learning ability, collegiality, and student support).

Purpose and Objectives

The purpose of the study was to determine the relationship between graduate student satisfaction with their enrolled graduate programs and their learning ability, collegiality in departments, and adequacy of student support. The following objectives guided this study:

1. To determine graduate students' learning ability, collegiality in departments, and adequacy of student support using descriptive analysis.
2. To validate the variables representing the constructs, learning ability, collegiality, and student support using factor analysis.
3. To examine the relationship of graduate student program satisfaction with students' learning ability, collegiality in departments, and adequacy of support using (logistic) regression analysis.

Methodology

Population and Sample

In spring 2013, the College of Agricultural Sciences at the Pennsylvania State University conducted an online survey to determine graduate students' satisfaction within their enrolled graduate programs. The target population of the study was all enrolled graduate students (N=480) including both full and part-time students registered for spring 2013 semester. In total, 274 students responded to the survey for a response rate of 57.1% after several points of contact to elicit responses. Of the 274 surveys received, only 220 (45.8%) were usable where respondents answered to questions corresponding to student learning ability, collegiality in departments, graduate program support, and student satisfaction. The study sample was comprised of both part-time (20%) and full-time graduate students (80%) representing all nine departments of the college. The study sample included of graduate students who had started their graduate programs anytime between 2013 and 2003 academic years. The demographics of the sample indicated that majority of respondents (60%) were enrolled in Ph.D. programs while 26.4% were enrolled in M.S. programs. The remaining 13.6% were enrolled in M.P.S. and M.Ed. programs. Majority of the respondents (60%) were female and were mostly between the ages of 18 to 34 years. Only a few respondents (5%) were over 49 years old.

Instrumentation

The survey instrument was designed by a group of experts and academicians in the College of Agricultural Sciences at the Pennsylvania State University. The Institutional Review Board (IRB) at the Pennsylvania State University reviewed and approved this research. The survey comprised of separate sections to collect data relative to student learning ability, collegiality in departments, student support, and satisfaction. Graduate students' learning ability was measured using 14 items on a five-point Likert scale ranging from 1 "very low" to 5 "very high." To measure collegiality in departments, graduate students were asked to indicate their agreements to eight statements on a five-point Likert scales ranging from 1 "strongly disagree" to 5 "strongly agree." Similarly, adequacy of graduate student support was measured using five items, measured on a five-point Likert scale ranging from 1 "very inadequate" to 5 "very adequate." Graduate students were asked to indicate 1) how likely they would chose the same program of study if they could start their education again and 2) recommend the same program to their friends and colleagues. Both the items were measured on a ten-point scale ranging from 1 "very unlikely" to 10 "very likely."

Data Analysis

Scales measuring student learning ability, collegiality, and graduate support were tested for reliability using Cronbach's alpha (α). Cronbach's alpha values for student learning ability was .91, .94 for collegiality, and.79 for student support, which were acceptable with the criteria of acceptance level of $\alpha > .70$. The statistical software SPSS 21 and R (cran.r-project.org/ version 3.1.2) were used to analyze survey responses. Descriptive statistical analyses were carried out to specifically to determine the central tendencies and dispersions of graduate students' responses to items measuring student learning ability, collegiality, and graduate program support. One-way Analysis of Variance (ANOVA) with post-hoc tests were performed to compare students' satisfaction with respect to the year they enrolled in their graduate programs.

Factor analysis was performed to validate whether or not the items statistically presented respective constructs. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity were performed to test suitability of responses for factor analysis. Inter-item correlation coefficients (Pearson's r) were also calculated to identify variables with high correlations. Factor scores were calculated to create a binomial logistic regression model to explain graduate students' level of satisfaction. In order to create a predictive model, graduate students were categorized into two groups: "unsatisfied to moderately-satisfied" and "satisfied", based on their response to two questions measuring student satisfaction. Students, who rated their likelihood to join the same graduate program given another chance and the likelihood that they would recommend the graduate program they are currently enrolled to their friends and colleagues with a value from 1 to 7, categorized as “unsatisfied to moderately-satisfied” group. Similarly, students who rated their likelihood between 8 and 10, were grouped as “highly satisfied.” Variance Inflation Factor (VIF) was obtained to examine for possible multicolinearity among factor scores in the models. Akaike Information Criterion (AIC) values were considered to select best the model and accuracies of prediction of models were also estimated.

Results

Objective1. Descriptive Analyses

Descriptive analyses were carried out to determine graduate students’ overall responses to items measuring their learning ability, collegiality, and adequacy of graduate support they received in their respective departments. Table 1 presents the list of 14 items measuring students’ learning ability. The mean responses ranged from minimum of 3.64 to maximum of 4.42 indicating majority of the respondents rated their learning ability as “moderate” to “very high.”

Table 1

Variables Measuring Students’ Learning Ability (N=220)*

Student Ability to	Mean	SD
Perform work-related tasks in the laboratory or community to carry out your research	3.94	1.01
Explain key concepts in your discipline	4.10	.80
Design research projects	3.79	.94
Describe other fields or disciplines as they may relate to your work	3.68	.82
Use interpersonal skills to work collaboratively	4.00	.85
Engage and mobilize the capacities of others	3.64	.84
Make your meaning clear to others in writing	3.86	.88
Explain ideas, solutions, products or reports to an audience during and oral presentation	3.92	.89
Effectively interpret and analyze new knowledge	3.92	.77
Critique your own and others' ideas using scientific method principles	3.85	.84
Propose new ideas and solutions in your field or discipline	3.78	.85
Demonstrate respect for those with diverse backgrounds	4.32	.75
Practice ethical principles in the pursuit of truth, accuracy, and fairness	4.42	.75
Integrate your knowledge and skills to serve and engage the public for the common good	4.03	.81

Note. Learning ability measuring Likert scale ranged from 1= “Very low” to 5= “Very high.”

Graduate students responded to a series of eight statements measuring collegiality in their respective departments, see Table 2. Results indicated that in general, graduate students were mostly in agreement with the collegiality statements.

Table 2
Variables Measuring Collegiality in Department(N= 220)*

People in your Department	Mean	SD
Promote an environment where the achievement of common goals is valued	3.96	.88
Communicate respect towards those with diverse backgrounds	4.16	.85
Display trust in one another	3.92	.84
Listen to differing opinions	4.01	.87
Celebrate successes	4.05	.87
Care about each other's welfare	3.99	.90
Respect each other's interests	4.05	.86
Demonstrate a willingness to assist one another	4.04	.85

Note. Collegiality measuring Likert scale ranged from 1 = “Strongly Disagree” to 5= “Strongly Agree.”

Graduate students’ responses to five items measuring the adequacy of student support in their respective departments were analyzed and means and standard deviations were reported, see Table 3. Results indicated that graduate students received adequate student support in their respective departments. Descriptive analysis also indicated that the variations (standard deviations) in responses to items measuring student support were relatively higher than the items that measured student learning ability and collegiality.

Table 3
Adequacy of Graduate Student Support(N=220)*

Adequacy of	Mean	SD
Breadth of curriculum	3.61	.93
Availability of course offerings	3.45	1.00
Faculty advising	4.04	1.00
Faculty mentoring	3.94	1.12
Access to confidante if a problem arises	3.84	1.02

Note. Adequacy of support measuring Likert scale ranged from 1= “Very Inadequate” to 5= “Very Adequate.”

Objective2. Questionnaire Validation

The dimension reduction technique of factor analysis was used to validate whether questions under each construct statistically represent them based on factor loading values. The relatively high value of KMO test (.88) and the significant chi-square value (*p* <.001) of Bartlett's test indicated that the data was suitable for factor analysis. The identification of correlation coefficients greater than .30 (r > .30) for a number of items, further supported the decision on factor analysis. The number of factor extraction was based on Eigen values greater than 1 (λ >1) using Principal Component Analysis (PCA) method. The Scree plot indicated 4 factors with Eigen values greater than 1, see Figure 2. Principal Factor Axis (PFA) method was used to extract factor loadings for four factors using covariance matrix, since unit of measurements were similar for all the items. Varimax of factor rotation (orthogonal) with Kaiser Normalization was used to calculate factor loading values. Factor scores were calculated using regression method.

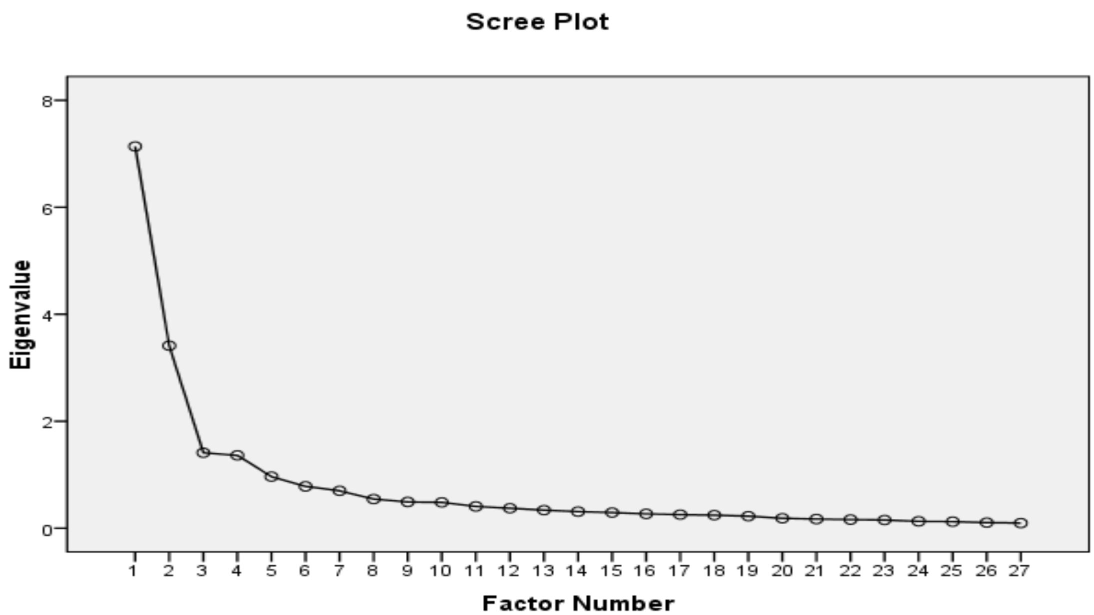

*Figure 2***.** Scree plot indicating Eigen values of all factors.

The four extracted factors explained 57.68% of the variance in the 27 items representing all three constructs. Table 4 shows factor loading values for all 4 factors and corresponding explained variances. Results indicated relatively high factor 1 loading values for the 14 items that represented students learning ability. Similarly, relatively higher factor 2 loading values were observed for 8 items representing collegiality in departments.

Results also indicated that the five items designed to measure the construct, student support, however, statistically represented two distinct factors that were named as factor 3 and factor 4. Factor loadings for items related to adequacy of breadth of curriculum and availability of courses were grouped together to represent factor 3. On the other hand, factor loadings for items related to adequacy of faculty advising, faculty mentoring, and access to confidante grouped together representing factor 4. Relatively fewer numbers of items (2 and 3 respectively) represented factors 3 and 4. However, high reliability for scales measuring factor 3 (Cronbach's α=.86) and factor 4 (Cronbach's α =.83) indicated few items can appropriately represent those factors.

Table 4
Factor Loading Values for Items Presenting all Four Factors

Factors	Items	Factor Loadings
Factor 1 (14) *V=22.20% **α=.91	Perform work-related tasks in the laboratory or community to carry out your research	.560
	Explain key concepts in your discipline	.617
	Design research projects	.702
	Describe other fields or disciplines as they may relate to your work	.646
	Use interpersonal skills to work collaboratively	.693
	Engage and mobilize the capacities of others	.625
	Make your meaning clear to others in writing	.690
	Explain ideas, solutions, products or reports to an audience during and oral presentation	.656
	Effectively interpret and analyze new knowledge	.737
	Critique your own and others' ideas using scientific method principles	.691
	Propose new ideas and solutions in your field or discipline	.668
	Demonstrate respect for those with diverse backgrounds	.405
	Practice ethical principles in the pursuit of truth, accuracy, and fairness	.522
	Integrate your knowledge and skills to serve and engage the public for the common good	.579
Factor 2 (8) *V= 20.98% **α=.94	Promote an environment where the achievement of common goals is valued	.747
	Communicate respect towards those with diverse backgrounds	.809
	Display trust in one another	.814
	Listen to differing opinions	.782
	Celebrate successes	.745
	Care about each other's welfare	.796
	Respect each other's interests	.862
	Demonstrate a willingness to assist one another	.840
Factor 3 (2) *V=7.05% **α=.86	Breadth of curriculum	.684
	Availability of course offerings	.901
Factor 4 (3) *V=5.83% **α=.83	Faculty advising	.809
	Faculty mentoring	.819
	Access to confidante if a problem arises	.477

Note. *Variance explained by factor, **Cronbach's alpha for reliability testing.
Factor 1= Student Learning Ability, Factor 2= Collegiality in Department; Factor 3= Support with Courses and Curriculum, and Factor 4= Support from Faculty.

Objective 4: Prediction of Graduate Student Satisfaction

Factor scores for all four factors from factor analysis were used as independent variables to create a linear model to predict graduate students' satisfaction. Step wise binary logistic regression analyses were performed to test the ability of factor scores to predict: 1) the likelihood that student would select the same graduate program, if given a chance and 2) the likelihood that they would prefer the same graduate program to their friends and colleagues. These two questions measuring satisfaction were found to be highly correlated ($r = .82$, $p < .001$). Response variables, level of satisfaction could only take one value either "unsatisfied to moderately-satisfied" or "very satisfied", thus responses to satisfaction questions were treated as binary response from a binary distribution: $Y_i \sim Bin(N, \pi)$, where π is the probability that student is highly satisfied.

Assessment of model 1: Likelihood student choosing the same graduate program. Results from regression analysis suggest that all factors, student learning ability, collegiality, course support and faculty advising support significantly contributed ($p < .05$) to predict the likelihood that student will chose the same graduate program if given another chance, see Table 5. The regression coefficients values associated with each factor and corresponding odd ratios indicated positive relationships between factors and the likelihood of students returning to the same graduate program.

Table 5
Model 1: Predicting Student Choosing the Same Graduate Program

Variables	*B*	*SE B*	Odds Ratio
Intercept	.810**	.165	2.249
Student learning	.529*	.183	1.698
Collegiality in department	.372*	.174	1.451
Support with courses	.888**	.180	2.430
Support from faculty	.473*	.182	1.604
Model Prediction Accuracy = 74.1% (95% CI :0.678, 0.797)			

Note. B= Regression Coefficients
* $p < .05$, ** $p < .001$

The regression model with all 4 factors had a prediction accuracy of 74.1% with 95% confidence interval of 67.8% to 79.7%. Nagelkerke R Square was .287, which suggests that 28.7% of variability in the likelihood of students choosing the graduate program again is explained by the set of 4 factors in the model.

Assessment of model 2: Likelihood student recommending graduate program to friends and colleagues. The regression model with student learning, collegiality, course support, and faculty advising support factors significantly ($p < .05$) contributed to predict the likelihood that students would recommend the same graduate program they are enrolled in to their friends and relatives, see Table 6. Furthermore, the positive values of regression coefficients associated with each factor and corresponding odd ratios show positive link between factors and the likelihood of students recommending graduate programs to others. The estimated accuracy of regression model with all 4 factors was 77.3% with 95% confidence interval of 71.3% to 82.6%. Nagelkerke R Square value of .371 indicates that the regression model with all 4 factors explains

37.1% of variability in the likelihood of students recommending the same graduate program to their friends or colleagues.

Table 6
Model 2: Predicting Student Recommending Others the Same Graduate Program

Variables	*B*	*SE B*	Odds ratio
Intercept	.907**	.177	2.477
Student learning	.553*	.191	1.738
Collegiality in department	.588*	.184	1.801
Support with courses	.901**	.188	2.463
Support from faculty	.884**	.199	2.420
Model Prediction Accuracy = 77.3% (95% CI :0.713, 0.826)			

Note. B= Regression Coefficients
*$p < .05$, **$p < .001$.

Additionally, results from multiple mean comparisons using ANOVA and post-hoc tests indicated that graduate student satisfaction differed significantly based on the number of years student have been enrolled to the graduate programs. In detail, graduate students significantly differed with their likelihood to return to the same graduate program, $F\ (4,\ 218)$ =3.219, p =.014, and also with the likelihood that they would recommend the same graduate program to others, $F\ (4,221)$ =2.584, p <.038, when grouped based on the year they started their programs. Further examination of results from post-hoc tests indicated that, recently enrolled graduate students, who started their graduate programs in spring 2013, were more likely to differ with their level of satisfaction when compared to graduate students, who started their program before spring 2013.

Discussion and Conclusions

Based on the study findings, students in the College of Agricultural Sciences at the Pennsylvania State University rated their overall learning ability as high as a result of their educational experiences. Students' learning experience enabled them to demonstrate respect to people from diverse backgrounds and practice ethical principles in academic activities. Students, who respect other persons' interests, are more likely to show willingness to assist others. Graduate students in the college received adequate support for availability of courses and breadth of curriculum. Students reportedly received adequate student support from faculty members both in terms of advising and mentoring. Overall, students are satisfied with the quality of education and adequacy of support in the College of Agricultural Sciences. This study finds a strong relationship between the two questions that were used to measure student satisfaction. This strong relationship implies that students who are highly likely to choose the same graduate program if given another chance to start over the program again are more likely to recommend the same graduate programs to other potential students. Findings of this study are aligned with literature that supports educational quality (student performance and collegiality) and student support (Ibrahim et al, 2014; Duque & Weeks, 2010) as determinants of student satisfaction. Students in a collegial environment with high learning ability and adequate student support both in terms of courses and curriculum and faculty support are more likely to be satisfied with the graduate program.

Assessing students' satisfaction with graduate programs has been an essential practice for graduate schools to ensure quality education. National Research Agenda for 2011-15 calls for accurate presentation of data to describe educational quality. In this regard, a valid instrument is always desired to accurately measure educational quality (both performance and experiences) and corresponding student satisfaction. Variables selected in this study to measure constructs such as students learning ability and collegiality appropriately measured respective constructs, which ensures validity of the instrument. Variables that were selected to measure a single factor, graduate student support, however, measured two distinct factors: 1) factor related to course and curriculum and 2) factor related to faculty-student relationship. Therefore, surveys that are designed to measure graduate student support should consider support associated with courses and faculty as separate factors.

Student support both in terms of adequacy in availability of courses and breadth of curriculum and student-faculty relationship are major factors that influenced the likelihood that students would recommend the graduate programs they are in to other potential graduate students. Interestingly, it is the student support in terms of availability of courses and breadth of curriculum found out to be relatively more important factor than other factors in influencing the likelihood that students will choose the same graduate program. Based on the findings, we may conclude that the overall student support is important to attract new students into graduate programs, however, support related to courses and curriculum are more vital to maintain enrollments in graduate degree programs.

Recommendations

This study established relationship between student satisfaction and academic quality factors such as student learning ability, collegiality in departments, and student support. Based on the findings from this study, we recommend:

1. Higher education institutions should prioritize student support with respect to courses and curriculum to improve educational quality.
2. Graduate programs within the College of Agricultural Sciences should constantly examine the breadth of curriculum they offer and also enhance support for faculty advising and mentoring as these predict reputation of graduate programs among prospective students.
3. Future studies should examine conceptual frameworks that emphasize student participation in quality learning experiences.
4. Similar studies should be replicated in other agricultural colleges to identify factors influencing student satisfaction.
5. Future studies are recommended to identify other aspects of student satisfaction such as personal expectations and attitude towards graduate programs and also to examine the association between psychological factors and satisfaction. Additionally, years in graduate school should be considered as a variable to explain satisfaction.

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Agricultural Extension in Mexico and the Mitigation of Rural Poverty: Reconsidering Decentralization, Privatization, and the Way Forward

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Abstract

A tendency to decentralize national agricultural extension systems around the world caught many countries unprepared to respond effectively to the needs of its rural population under privatized approaches to extension delivery, especially in regard to poverty alleviation. Myriad internal and external factors led Mexico to dismantle its national agricultural extension system in the 1990s, and adopt a more privatized or contractor-driven approach. As a result, significant changes occurred in the way extension services were offered to the public after the system's decentralization by Mexico's federal government, although some similarities remained. After almost two decades of decentralization, the effectiveness of the current system has been questioned regarding its provision of services to marginalized groups who represent the most impoverished of Mexico's citizens. This historical narrative aimed to understand the phenomenon by exploring the causes of decentralization, comparing extension service delivery before and after decentralization, including its concomitant outcome, privatization, and suggest directions for improvement in the future.

Introduction and Background

Countries need to consider that "poverty is a multidimensional phenomenon" (Van Praag & Ferrer-i-Carbonell, 2007, p. 6). In a national approach to reducing poverty, an agricultural extension system can be an important force (Farrington, Christoplos, Kidd, & Beckman, 2002). If a nation's agricultural extension system is to play a significant role in reducing poverty, its rural and agricultural contexts must be considered. We examined the decentralization of Mexico's national agricultural extension system (NAES), its replacement by a private contractor system, and consequences associated with that change. We also suggest the proper role of Mexico's government regarding agricultural extension and reducing rural poverty in the future.

Rural Poverty Remains a Major Challenge in Mexico

The population of Mexico was about 120 million in 2013 and almost 22% of its citizens were living in rural areas (Consejo Nacional de Población, 2013). Impoverished Mexicans accounted for 46.1% of the country's total population in 2012. For the Government of Mexico, the population living in poverty includes those "whose income is below the wellbeing line and that endures at least one social deprivation" (National Council for the Evaluation of Social Development Policy [NCESDP], 2012, p. 9), and *extreme poverty* comprises the "[p]opulation that endures three or more social deprivations and whose income is below the minimum wellbeing line" (NCESDP, 2012, p. 9). As of 2012, six social deprivations were considered in the poverty definition, i.e., educational gap, access to health services, access to social security, quality and spaces of the dwelling, access to basic services in the dwelling, and access to food (NCESDP, 2012). The wellbeing line is defined as the "[m]onetary value of a food, goods, and basic services basket" (NCESDP, 2012, p. 9). Even though the poverty rate had decreased 0.6% compared to 2010 (Consejo Nacional de Evaluación de la Política de Desarrollo Social [CONEVAL], 2010), this decline did not necessarily mean fewer people were living in poverty; population growth also must be considered. Despite a small decrease in the overall percentage of the population that was impoverished, more than one-half million additional people were trapped in poverty from 2010 to 2012, i.e., 52.8 million increased to 53.3 million, respectively. In the rural areas, 61.6% of the population is impoverished, and one-third of that, about five million people, are Mexicans living in extreme poverty; their meager incomes are not enough to meet daily nutritional needs (CONEVAL, 2013; NCESDP, 2012).

Most of the mainly rural states in Mexico have the highest poverty levels; Mexico's southern states reported the highest extreme poverty rates for 2012, i.e., Chiapas 32.2%, Guerrero 31.7%, Puebla 17.6%, and Veracruz 14.3% (CONEVAL, 2013). Not coincidentally, these states have some of the highest proportions of the more than nine million indigenous people in Mexico, with almost one million not speaking the Spanish language (*Diario Oficial de la Federación*, 2010). For example, in the state of Chiapas, 27% of the population speaks an indigenous language or related dialect and about one-third of them do not speak Spanish (*Instituto Nacional de Estadística y Geografía* [INEGI], 2011a).

A Snapshot of Agricultural Production in Mexico and Its Economic Importance

Agriculture represents 4% of Mexico's Gross Domestic Product (GDP) (INEGI, 2011b). The agriculture sector in Mexico employs about 6.5 million people or 14% of the country's labor force (INEGI, 2011c). Of Mexico's approximately six million farms (Muñoz & Universidad Autónoma de Chapingo, 2007), at least 50% are considered subsistence, 35% are small-scale, and 15% are commercial farms (McMahon & Valdes, 2011). However, subsistence farms may comprise up to 60% of total farms (Muñoz & Universidad Autónoma de Chapingo, 2007).

On commercial farms, production is tied mainly to exports focused primarily on a few types of fruits and vegetables. For 2010, of more than 70 fresh products, nine represented about 20% of the total value of agricultural exports: tomato was 7% and avocados 3%; other products were onions, cucumbers, coffee, mangoes, papayas, guavas, lettuce, cabbage, broccoli, and watermelons (INEGI, 2011d). The small-scale farm production is linked mainly to the internal market with some participation in exports. Exports from Mexico's agricultural sector are highly vulnerable to market fluctuations in the United States; in 2010, about 80% of its agricultural exports went to the United States (INEGI, 2011d).

For the subsistence farming sector, production is primarily for household consumption. According to McMahon and Valdes (2011), more than 60% of Mexican farms average 20 acres or less. In 2007, 67% of agricultural labor was employed in production units of fewer than 12 acres (Fox & Haight, 2010). However, income for the rural population in Mexico depends mainly on nonagricultural activities. In 2002, only 29% of rural per-capita income depended on family farm production, while 16% relied on migrant remittances, and the largest share was income from wages with a value of 50% of which four-fifths was from nonagricultural employment (Taylor, Mora, Adams, & Lopez-Feldman, 2005).

The Beginning of Agricultural Extension Services in Mexico

Before 1950, the agriculture sector in Latin America was only slightly developed, and very limited technology was used. National governments were investing very little in the sector and educational programs in agriculture were offered rarely. The establishment of national extension systems occurred mostly after the World War II period between 1950 and 1975; as a result, the region significantly enhanced its agricultural sector (Kaimowitz, 1993).

In 1949, U. S. President, Harry S. Truman, launched the *Point Four Program* with the aim of helping to develop poor countries. A significant emphasis was put on agriculture. As a consequence, many reforms were passed to boost agriculture, including those that established and augmented agricultural extension systems (Simon, 1950). By 1958, extension personnel from the United States were providing technical assistance in every country of Latin America except for Argentina, Mexico, Uruguay, and Venezuela (Rice, 1971). Mexico did not receive official advice and funding from the United States, as had most of the other Latin American countries; instead, the country only had to *look over the border* to see an approach to extension on a national scale (Rice, 1971); such was the *conventional wisdom* of some observers.

Agricultural extension in Mexico has its origins in a group of agronomists who started providing services in 1911 (Yates, 1981; Venezian & Gamble, 1969). After being interrupted by the Mexican Revolution, the extension service was reinitiated by 1922; however, it experienced a series of reorganizations and operated with limited support and staff during most of the next three decades (Venezian & Gamble, 1969). In 1948, it acquired the name of *Servicio de Extensión Agricola* (Yates, 1981; Venezian & Gamble, 1969). According to Rice (1971), a NAES in Mexico was established officially in 1953; some services existed before 1953 but not as a national policy.

The NAES in Mexico boomed beginning in the 1970s and growth continued until the middle of the 1980s (Yates, 1981). After that period, the country experienced a series of reforms, internal crises, and an openness to trade resulting in decentralization of its NAES beginning in the 1990s (McMahon & Valdes, 2011). From that time forward, the delivery of agricultural extension services in Mexico has become increasingly privatized as a result of decentralization (McMahon & Valdes, 2011). However, poverty, and especially rural poverty, persists in Mexico and has increased as a proportion of the overall population (CONEVAL, 2013). Because privatization of agricultural extension has not brought increased prosperity to many of Mexico's rural citizens, a reconsideration of its origin, current status, and future direction was warranted.

Purpose and Research Questions

The purpose of this historical inquiry was to describe the impact of decentralization on Mexico's NAES, especially regarding the provision of services to small-scale and subsistence farmers who comprise much of the rural poor. This study, therefore, examined the history of the NAES in Mexico *before* and *after* decentralization. In addition, we suggest implications and recommendations for the federal government's role in the future delivery and evaluation of agricultural extension services in Mexico. Four research questions guided this study: (a) What were the major reasons for decentralizing the NAES in Mexico? (b) How was agricultural extension offered *before* decentralization? (c) How has agricultural extension been offered *after* decentralization? (d) What should be the role of Mexico's federal government in the delivery of agricultural extension in the future?

Methods and Procedures

Historical research methods were used to answer the questions that guided this study (McDowell, 2002). McDowell (2002) stated that historical evidence should serve as the basis for understanding our past. He asserted: "[C]hange occurs on a constant basis and so we are unable to freeze reality, except perhaps when we look at historical evidence, such as written or photographic material" (p. 3). Further, Hale and Astolfi (2007) proposed five steps to follow when conducting historical research: (1) identification of the research problem; (2) collection and evaluation of source materials; (3) examination of collected evidence; (4) synthesis of information; and (5) analysis, interpretation, and formulation of conclusions. These steps guided this inquiry. Primary and secondary sources, including peer-refereed journal articles, books, newspapers, photographs, and government reports, were sourced and reviewed by the researchers during 2013 and 2014. Internet search engines as well as library search engines at Oklahoma State University were used to identify the study's sources of data. Sources in the Spanish language were translated by the lead author who is a native speaker of Spanish. All of the sources were subjected to internal criticism for accuracy and external criticism for authenticity (Johnson & Christensen, 2010).

Findings

Major Reasons for the Decentralization of Mexico's NAES

Public extension services, including those involving agriculture, have been critiqued as "inefficient, irrelevant, ineffective, and poorly targeted" (The World Bank, 2000, p. 6). Attempts have been made worldwide to decentralize many public or *national extension systems* (Rivera, 1996, 2000; Swanson, 2011). According to Swanson (2011), pluralistic extension systems are becoming more common in most of the world's regions. In Sub-Saharan African, the systems are mainly public but with the growing participation of non-governmental organizations (NGOs). In most of Asia, strong public extension still exists but a large number of private firms and NGOs have emerged; in most of the Middle Eastern and North African countries the systems are mainly public; and, in Latin America a variety of systems are operating (Swanson, 2011).

A series of reforms in the 1990s dismantled national extension systems in many countries, which decentralized the delivery of their services, including provisions to the agriculture sector. In Mexico, some of the reasons for decentralizing the NAES were because of its low efficacy and sub-par efficiency, significant financial crises, and a burgeoning openness to free trade (McMahon & Valdes, 2011).

As of 2012, Mexico had free trade agreements with more than 40 countries which started in the 1990s with its opening to trade liberalization and integration policies (Villareal, 2009). Trade openness in Mexico exposed its agricultural producers to global competition; therefore, a government strategy to face the external competition was to decentralize services from the public to the private sector with the aim of making the agriculture sector more efficient (Muñoz & Universidad Autónoma de Chapingo, 2007). According to McMahon and Valdes (2011), trade openness has led to a *model of export-driven agriculture* in Latin America, including Mexico.

Mexico's financial crisis, which also contributed to decentralizing its NAES, can be traced to the aftermath of World War II, when most developing countries, including Mexico, adopted an imports-substitution-industrialization economic policy to replace foreign imports with domestic production (Felix, 1989). From 1940 to 1975, Mexico had an average economic growth rate of 6% per year (Aspra, 1977). By the 1970s, Mexico experienced an economic crisis derived from a deterioration of the imports-substitution economic policy (Jimenez-Alatorre, 2006); for example, Mexico increased significantly its corn imports beginning in the 1970s (Hibon, Triomphe, López-Pereira, & Saad, 1992). The country, however, was unable to continue to afford its domestic expenditures, recurring to borrow money from the United States and the International Monetary Fund [IMF] (Barkbu, Eichengreen, & Mody, 2012; Lusting, 1997). The IMF assistance continued for almost the entire decade of the 1980s and during some of the 1990s to face the economic crisis of 1994 (Barkbu, Eichengreen, & Mody, 2012).

As a consequence of the IMF's lending conditions and also as a national commitment, Mexico's government was obligated to reduce its size to pay debt and begin operating on a sounder financial footing (Barkbu, Eichengreen, & Mody, 2012). Important state-owned, agricultural-related institutions were restructured to make them more efficient, e.g., the *Banco de Credito Rural* (BANRURAL) [Rural Credit Bank], the *Aseguradora Nacional Agricola y Ganadera* (ANAGSA) [National Agricultural and Livestock Insurance], and the *Compañía Nacional de Subsistencias Populares* (CONASUPO) [National Company of Popular Subsistence] were reformed. Some other entities were sold to the private sector, such as the *Productora Nacional de Semillas* (PRONASE) [National Seed Producer] and the *Fertilizantes Mexicanos* (FERTIMEX) [Mexican Fertilizers] (Díaz-Tapia, 2006).

Other than a financial crisis during the same period, officials determined that because many of the state-owned institutions had become so inefficient and corrupt, their operation would be highly problematic in the long-term (Díaz-Tapia, 2006). A representative example is the case of ANAGSA, the state-owned crop insurance service, which was created in 1961. According to Díaz-Tapia (2006), by 1964, insurance crop losses were about 30%, increased to 57% by1976, and were 75% before its closure in 1990; the losses represented government subsides of about 62% of the total operating budget of BANRURAL, the main rural credit bank. As Díaz-Tapia (2006) reported, *negotiations* between the insurance agents and farmers were common at the community level. The operation of direct and individual crop insurance through a state-owned company implied considerable subsidies, not only because of the farmer premium costs but also because of the company's administrative expenses. Although the premium subsidies implied public and private funds, the operating expenses were only part of the state funding. This kind of contact between farmers and extension agents led to corrupt practices (Díaz-Tapia, 2006, p. 9).

Moreover, Díaz-Tapia (2006) described a recurring practice called the *sinister industry* among ANAGSA insurance inspectors, BANRURAL extension agents, and farmers. It was a scheme to authorize or magnify fraudulent losses. The public employees received money as a farmer's bribe in exchange for their *verifying* a total loss. The farmer picked and commercialized the harvest anyway but BANRURAL applied the insurance coverage liquidating the debt, so the farmer, non-incurring on late payments, was suitable for more credit the next year. Both financial institutions, BANRURAL and ANAGSA, cleared their debts, closing the circle (Díaz-Tapia, 2006, p. 16). As a consequence of these factors, decentralization of the NAES occurred in Mexico by 1994. The provision of extension services would be different after that event. The planning and funding would continue to be mainly a government matter, but the delivery of extension/advisory services would be open to any individual or group interested in providing such, whether private, public, or other governmental entities, e.g., States. This would be a much different way of reaching farmers compared to the system and methods used before.

Agricultural Extension *Before* Decentralization

According to Rice (1971), Gustavo Diaz-Ordaz, President of Mexico, from 1964 to 1970, was very interested in poverty reduction and rural development. In 1969, the national budget for agricultural extension services was five times larger than the allocation in 1966. Rice (1971) stated funding was received on time and "jeeps were in good supply" (p. 69) under Diaz-Ordaz. The NAES had enough money to operate; however, it was obsolete and focused on traditional lines of service delivery rather than striving for innovation and diversification (Rice, 1971).

Forty extension agents were working in Mexico in 1953; the number rose to about 230 by 1956 after a budget increase in 1954 (Venezian & Gamble, 1969). In 1961, Mexico had 220 extension agents (Cole & Sanders, 1970). The number of agents increased to 700 by 1969, and they were distributed in 430 agencies; all of the agents held an agricultural engineering degree (Rice, 1971). For many years, especially during the 1970s, graduates from agriculture programs in Mexico's universities, such as the *Universidad Autónoma de Chapingo* and the *Universidad Autónoma Agraria Antonio Narro*, had *guaranteed positions* in one of the many government agencies related to the agricultural sector (Venezian & Gamble, 1969). Of the 15 countries in Latin America, in 1961, Mexico had the highest number of extension agents, excluding Chile with 460; the other 13 countries together had only 997 agents (Cole & Sanders, 1970).

Extension agents in Mexico were assigned to serve a specific population. According to Cole and Sanders (1970), by 1969, one Mexican agent was mobilized to provide services for an average of 35,000 farmers, also referred as to *production units* or *family farms*. In comparison, one extension agent in Venezuela, Panama, Costa Rica and Argentina was serving 17,000, 18,000, 28,000 and 31,000 farmers, respectively (Rice, 1971). However, Venezian and Gamble (1969) concluded that, in 1967, "the number of extension agents relative to farm families were about 1 to 10,000" (p. 165) in Mexico; the ratio of agents to beneficiaries in the United States and Japan was 1:540 and 1:650, respectively, for the same year (Venezian & Gamble, 1969). Norton (2004) concluded that, considering the number of agents in 1972, "the average Mexican farmer saw an extension agent once every forty years" (p. 381). In 1976, the fusion of the three main agricultural banks in Mexico created BANRURAL, which buoyed the NAES by employing a large number of agents (Yates, 1981). In the early 1990s, before decentralization, about 25,000 extension agents were employed by the Mexican Government (McMahon & Valdes, 2011), and a majority of the services provided by the agents was related to agriculture.

The usual way of reaching farmers to deliver agricultural extension services after the creation of

BANRURAL was through the *ejido* (Yates, 1981). According to Johnson (2001), before 1992, *"[e]jidos* [were] communities that own[ed] land communally and work[ed] it under a system of permanent but nontransferable use[r] rights" (p. 292). The *ejido* was the main achievement of the Mexican Revolution; it provided land to the people by redistributing properties belonging to the big *haciendas*. According to the 1991 *ejidal* census, almost 30,000 *ejidos* existed in Mexico, including upwards of three million members or *ejidatarios,* thus almost one-half of Mexico's land was stewarded under this form of social (or communal) tenure (INEGI, 1994). A similar number was reported about a decade earlier by Venezian and Gamble (1969). More recent, Escalante (2001) posited that more than 50% of Mexico's land was held under this social tenure system. In 2008, *ejidos* were reported to have increased from 30,305 in 2001 to 31,518 in 2007 and comprised 54.4 % of Mexico's land (INEGI, 2008). A single *ejido* communal area is divided into approximately 100 units of land, or *parcelas,* averaging about 20 acres with an independent governance system following the principles of Mexico's agrarian law (Escalante, 2001). Before the reforms of 1992, the land could not be sold, rented, leased, or subjected to any private contracts (Johnson, 2001). The *parcela* only could be transferred to a family member or another person under the approval of a majority of e*jido* members or *asamblea ejidal,* a body that meets regularly to advise, decide, and follow up on communal interests and issues (Escalante, 2001).

In most cases, the delivery of agricultural extension services was differentiated by the types of farmers served (Venezian & Gamble, 1969). Commercial farmers were, in the main, able to pay for extension services. Therefore, small-scale and subsistence farmers were BANRURAL's usual clients (Venezian & Gamble, 1969; Yates, 1981), and many were *ejidatarios.* BANRURAL designed production packages for the *ejidos* that included all costs of production; however, no money was given directly to the farmers. This package provided their credit and extension services. BANRURAL and/or CONASUPO were often also in charge of selling the harvest. The credit provided to the farmers would cover their costs of production inputs and advisory services, as supplied by the state-owned companies (Meza-Castillo, 2011), i.e., credit, extension, and project administration was provided by BANRURAL, seeds were supplied by PRONASE, fertilizers by FERTIMEX, and crop insurance by ANAGSA. CONASUPO would deliver the goods through its local stores and also serve as the reception point for farmers' harvests (Escalante, 2001; Yunez-Naude, 2003).

More urban settlements in the *ejidos,* usually centered in the communal area, provided basic services such as one elementary school and a grocery store. CONASUPO managed the grocery stores which were "retail shops to sell basic foods to the rural and urban poor, and it was also involved in the trade of fertilizer and improved seeds and in peasant training programs" (Yunez-Naude, 2003, p. 5). In every *ejido,* one *parcela,* the *parcela escolar*, was allocated for field practicals and the financial benefit of the local school. It was where demonstrations by NAES personnel took place; and, in most cases, profits from production activities in the *parcela escolar* were given to the local school (García-Solorzano, 2010).

Agricultural Extension *After* Decentralization

In most countries in Latin America, few complementary reforms followed the decentralization of public institutions, including their agricultural extension systems. As a result, many of the programs faltered or failed to reach expectations due to inadequate monitoring practices and adherence to transparent accountability mechanisms (The World Bank, 2000). In the case of Mexico, two events marked the way extension was delivered after the NAES was decentralized: (1) BANRURAL was replaced, and (2) the *ejido,* as a legal entity, was reformed. In 1989, the government eliminated BANRURAL and another similar agency was created to offer government-sponsored rural credit, *Financiera Rural*, but due to the failure of the previous institution, the rules to access credit were tightened with much stricter lending and repayment requirements (Meza-Castillo, 2011). Moreover, in 1992, the agrarian law of Mexico was reformed so the land of the *ejidos* could become private property (Escalante, 2001). Thereafter, the *ejido* lost its somewhat paternalistic ability to reach farmers through the NAES agents. As for commercial farmers, they continued to pay for extension services, which was not the case of most small-scale and subsistence farmers who could seldom afford to pay for assistance.

Extension services were now delivered primarily by private sector contractors either working alone or in groups (McMahon & Valdes, 2011). They serve as a *bridge* between the government and farmers and competed for government resources, typically, charging a percentage of the project's budget, as provided by the *Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación* (SAGARPA) [Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food] (Muñoz & Universidad Autónoma de Chapingo, 2007), in exchange for services. Or they are paid directly by SAGARPA (McMahon & Valdes, 2011). The extension agents, therefore, have become *rent-seekers* in the competition for government resources rather than *resource-linkers* and *advocates* for farmers; moreover, little follow up of projects occurs after receiving the government funding (Swanson, 2011). Further, the agents often face low salaries, short-term contracts, job insecurity, and late payments for the services they deliver to SAGARPA; they numbered about 6,000 in 2011 (McMahon & Valdes, 2011).

> A dedicated agricultural extension service does not exist in Mexico [today]. Instead, technical assistance is available to farmers accessing the different support programs of SAGARPA as an integral part of these programs. The technical assistance is implemented through private sector contractors [PSP], *prestadores de servicios profesionales*, whose function is to implement the programs at the farm level. This program was a government strategy to create a market for these services as a response to the abandonment in the early 1990s of the National Directorate for Agricultural Extension. *Servicios Profesionales* as defined for these purposes includes strategic planning, project formulation, accessing public resources, technical advice, commercial strategies, training etc. with the goal of supporting farmers to increase efficiency and facilitate their incorporation into value chains. (McMahon & Valdes, 2011, p. 17)

The agricultural extension system in Mexico, historically, had focused mainly on the production process; few efforts were made to develop a value-addition chain. If evaluation does occur in any part of the value stream, it concentrates mainly on the production process. McMahon and Valdes (2011) found a systemic deficiency of *impact evaluation* throughout the current provision of Mexico's extension services, from the generation of technology to its diffusion and across the entire process. Evaluation is based mainly on the government's indicator of percentage farms receiving support (*Diario Oficial de la Federación,* 2013).

According to Ramos (2013), despite an increase in the government's budget for the agricultural sector, due to the exclusive operational rules on which the allocations are based, only a small percentage of farmers are benefitting. For 2008, only 6.3% of farmers had access to credit and 17,000 farmers received 60% of the national government's resources (Ramos, 2013).

> The present system of technical assistance as implemented through the support programs is highly fragmented and is based on individual projects. Since most of the demand for these services comes through the support programs of SAGARPA there is a dispersion of effort and resources into small projects and there is a lack of integration in terms of territorial development and productivity goals. Because of this dispersion, it is difficult to evaluate the overall impact of the program since the projects are spread over differing agro-ecological regions and a wide range of commodities. The driving force behind demand is access to government programs (*'la inercia de la ventanilla'*). *The means becomes the end* [emphasis added]. Because of this, the PSPs [Professional Services Providers] are seen as merely brokers (*'captadores de demanda'*) for the Federal support programs. Because the PSP is very often the agent who initiates the application for the support programs he has the incentive to get paid. In other words, the incentives are for *rent-seeking* [emphasis added] and there is no incentive for the PSP to follow the project to completion or to assess its impact. (McMahon & Valdes, 2011, p. 17)

A counterfactual example of progress during the era of decentralization may be the Capacities Development and Extension Program, which focuses on different production scales. According to the Organisation for Economic Co-operation and Development (OECD, 2012), one important component of this program is the Strategic Project for Food Security or *PESA,* operating since 2004 in collaboration with the Food and Agriculture Organization (FAO). It provides support to small farms and farm households in highly marginalized rural areas. Other programs follow the same three-component approach: investment-extension-conservation, i.e., deploying resources from earlier programs and focusing on large-scale production activities (OECD, 2012). The program is part of a new approach aiming to better impact its farmer clients (SAGARPA, 2014).

Discussion and Conclusions

The role of national governments in the provision of extension services has been minimized in many countries; instead, diverse systems have emerged with varying levels of involvement from the private sector (Swanson, 2011). However, decentralization of agricultural extension services leading to their privatization may produce problems that undermine progress (Rivera, 1996). Decentralization stands to foment expected and desirable consequences as well as unexpected outcomes (Bruno & Pleskovic, 1996) that may be undesirable (Rogers, 2003).

According to the Rivera and Qamar (2003), a country's agricultural extension system should be seen as a vehicle of national development and the empowerment of local human capital for the management of natural resources. Further, it should contribute to the national innovation process and be based on a holistic approach that considers economic development, social integration, academic collaborations, private sector participation, public policy, and so forth.

Muñoz and *Universidad Autónoma de Chapingo* (2007) concluded that, generally, income from the agricultural sector, as contribution to a nation's GDP, is at least two times more effective in reducing poverty than the income derived from other sectors. Moreover, innovation is a key factor for generating more income from the agricultural sector. The government, therefore, should provide conditions for this to occur, such as laws and infrastructure, including the harmonization of relationships with and among service providers of agricultural extension (Muñoz & Universidad Autónoma de Chapingo, 2007). In addition, transparent monitoring and evaluation schemes must be designed properly and implemented professionally (Ansell & Mitchell, 2011; McMahon & Valdes, 2011; Swanson, 2011).

According to the analysis of McMahon and Valdes (2011), Mexico no longer has a NAES due to its decentralization policies of the 1990s. Instead of the 25,000 public extension agents who existed before the system changed, now 6,000 private contractors seek funding from government programs with the promise of delivering extension services in return. McMahon and Valdes (2011), however, found systematic deficiencies throughout the process, especially in regard to sector prioritization and impact evaluation. Although counterintuitive, agricultural extension services in Mexico still may be considered *centralized*. This is because most services are delivered to farmers as a result of decisions made at the federal level rather than as initiatives emanated by the *bottom up approach* as argued for by Swanson (2011). After the government approves funding for a specific program, the *act of extension* is now between a private contractor and his *client,* the farmer, instead of a federal extension agent serving as a *beneficiary's* advisor.

Poverty remains a major problem (CONEVAL, 2013), especially in the rural areas of southern Mexico, even though the agricultural sector of this region represents an important source of employment and wealth generation. Moreover, this is where many of the more than six million farmers of Mexico are located, also where more than six million indigenous people live, and where extreme poverty affects people the most (CONEVAL, 2013; Consejo Nacional de Población, 2013; INEGI, 2011a, 2011b, 2011c).The main strategy of Mexico's Government to alleviate poverty has been conditional cash transfer programs which provide some relief but this model of *clientelism* perpetuates poverty rather than reducing it (Ansell & Mitchell, 2011).

Mexico's NAES started after the end of World War II, following a worldwide pattern, when the United States helped a number of other developing countries establish their extension systems (Kaimowitz, 1993; Rice, 1971; Simon, 1950; Venezian & Gamble, 1969; Yates, 1981). Mexico, however, did not receive formal assistance from the United States in regard to its NAES (Rice, 1971). Mexico's extension system boomed considerably during a period of good economic performance from the 1940s to the 1970s due to a high demand for products that began with the post-World War II era (Yates, 1981). And Mexico's President, Diaz-Ordaz, from 1964 to 1970, dedicated considerable resources to establish a robust NAES (Venezian & Gamble, 1969; Yates, 1981). Further, fusion of the three main agricultural banks in Mexico created BANRURAL in 1976, which buoyed extension services by employing more agents (Yates, 1981).

Agricultural extension services before decentralization were planned and executed by Mexico's national government. The most common way to reach farmers was through the *ejidos* (Venezian & Gamble, 1969), a highly organized communal land tenure system controlled by the government that included more than three million small-scale and subsistence farmers (Johnson, 2001). Under the *ejido* system, farmers were reached by government institutions mainly through BANRURAL and its affiliates. However, the participation of these farmers was very limited or non-existent in planning the government programs; the farmers themselves were simply another production input, i.e., labor, rather than participants who took a managerial, decision-making position in the production process (Escalante, 2001). Commercial farmers usually have paid private contractors for their extension services (Venezian & Gamble, 1969; Yates, 1981).

Mexico's NAES before decentralization evolved from a few extension agents in the 1960s to about 25,000 agents at the beginning of the 1990s (McMahon & Valdes, 2011). Considering that number, just before the NAES's dismantling, the agents could potentially serve most of the country with a ratio of one agent to about 200 farmers or roughly similar to many developed countries (Venezian & Gamble, 1969). The collapse of Mexico's financial system in the late 1980s resulted in a trend to decentralize public institutions beginning in the 1990s (McMahon & Valdes, 2011). The elimination of a web of state-owned institutions led to Mexico's NAES being essentially dismantled and replaced by a pluralistic extension system where government provides the funding and the private sector executes services (McMahon & Valdes, 2011), at least, in concept. Another main factor that precipitated the decentralization of Mexico's NAES was the high incidence of corruption it tolerated (Díaz-Tapia, 2006) along with the escalating pressure of global competition caused by trade agreements such as the North American Free Trade Agreement signed by Canada, Mexico, and the United States (McMahon & Valdes, 2011).

Few complementary reforms followed the decentralization of NAESs in Latin America, and most of the decentralized systems failed due to poor monitoring and evaluation practices (The World Bank, 2000). A deficiency of impact evaluation is endemic throughout Mexico's current approach to agricultural extension (McMahon & Valdes, 2011). Although Mexico's Government has increased the budget for the agricultural sector, its operational rules are benefiting only a small percentage of farmers (Ramos, 2013).

Implications and Recommendations

Higher poverty among the rural population is not only a norm in Mexico; in Latin America broadly the poverty rate is 44% for the entire population and 64% in the rural areas (International Fund for Agricultural Development [IFAD], 2002). Moreover, the youth, who make up about 30% of the population, are affected even more; children under the age of 15 in the region are 1.7 times more likely to suffer from poverty than adults (IFAD, 2010).

According to Swanson (2011), in a pluralistic extension system, many actors collaborate to plan, deliver, and evaluate the system's services. In the case of Mexico, commercial producers comprise about only 15% of the six million Mexican farmers and, historically, they have paid for their extension services (McMahon & Valdes, 2011; Rivera, 1996; Venezian & Gamble, 1969; Yates, 1981). It is the more than five million small-scale and subsistence farmers who are in most need of government-provided extension services. Before decentralization in the 1990s, a total of about 25,000 extension agents meant the ratio of agents-to-farmers was roughly 1:200. The number of extension agents in Mexico is currently about 6,000 who are expected to serve approximately five million small-scale and subsistence farmers (McMahon & Valdes, 2011); a ratio of one extension agent to more than 800 farmers is the reality. Moreover, Ramos (2013) reported only about 6% of Mexico's farmers received government credits in 2008, and that the rules to access government resources are benefiting more commercial farmers than small-scale or subsistence farmers. Considering this condition, the current system for delivering agricultural extension services to Mexico's farmers is untenable if those most in need are to receive advisory services commensurate with their challenges.

Multidimensional poverty must be addressed with a multifaceted approach. Mexico's Government needs to redefine its national approach to extension to better serve farmers of all socio-economic strata but especially the small-scale and subsistence producers. Elsewhere in Latin America, Guatemala's government has reengaged to reestablish its national extension system where the *PESA* program plays an important role in serving the rural poor (Gobierno de Guatemala, 2012; Swanson, 2011). A new strategy should include increasing the number of extension agents as Guatemala is doing (Gobierno de Guatemala, 2012), as well as expanding the partnership with FAO through the *PESA* program, which operates currently in Mexico with encouraging results but in only a few highly marginalized rural areas (OECD, 2012). Other alternative ways to reach Mexico's farmers may involve more extensive use of mass media channels, such as radio and television, of the formal education system, as well as increasing their access to and use of the Internet and social media (Schoemaker & Stremlau, 2014). Government rules of operation, especially the guidelines for accessing funding, should be changed according to the needs of farmers and extension providers. Rules of operation should provide equal access to all farmers and not only to the approximately 17,000 farmers who currently receive 60% of the resources (Ramos, 2013). The low salaries, short-term contracts, job insecurity, and late payments experienced by private contractors providing agricultural extension must be addressed, as well (McMahon & Valdes, 2011). Doing that stands to reduce the prevalence of agents participating in corruption and improve their performance overall.

Ten points follow for Mexico's Government to consider to reform and revitalize its approach to providing extension services, especially in regard to reducing rural poverty: (1) strategies should focus mainly on rural areas due to their higher poverty levels (IFAD, 2002); (2) focus strategies according to farmers' scale of production, i.e., commercial, small-scale, and subsistence (Maass Wolfenson, 2013); (3) commercial farmers need to diversify their production for the export market to be less susceptible to price fluctuations or market dependency (United Nations Development Programme, 2011); (4) small-scale farmers need incentives to increase production designed to satisfy the domestic market (IFAD, 2013); (5) subsistence farmers need a comprehensive strategy that should include not only agriculture but all of the economic activities supporting their income generation (Fritzsch, 2012); (6) equal opportunities for women and other marginalized groups should be cross-cutting components of all strategies (International Food Policy Research Institute, 2012); (7) youth also should be targeted across all strategies (Proctor & Lucchesi, 2012); (8) local contexts and the many socio-economic-cultural variables should be considered in the development and execution of all strategies, i.e., indigenous peoples should be served according to their customs and languages considering a high number of the rural poor do not speak Spanish (Tripathi & Bhattarya, 2004); (9) an *impact evaluation* strategy should be established at all levels and for all programs according to the major objectives and realities of the processes and stakeholders involved (Farley, Lucas, Molyneaux, & Penn, 2012; Muller-Praefcke, 2010); and (10) education and training in effective leadership and ethics should be compulsory for all stakeholders, including extension providers, farmers, and other key participants (Brown, 2006; Lasley, Baumel, Deiter, & Hipple, 1997; Schminke, Wells, Peyrefitte, & Sebora, 2002).

The current pluralistic extension system can be improved to help reduce rural poverty in Mexico. Rivera (2000) suggested that, rather than the typical decentralization of the extension services toward local governments, a federalization of the strategy may contribute more to the alleviation of poverty. “Federalization is the involvement of all levels of government in the funding and direction of extension services” (Rivera, 2000, p. 2). To this end, Rivera (2000) predicted:

> decentralization reforms, when limited to shifting authority to lower levels of government or to the private sector alternatives, will fail to address major issues of public concern and will, within the next decades, result in a reconsideration of the value and utility of national extension services. (p. 3)

Mexico’s government officials, who are charged with ensuring that its agricultural extension services perform as intended, are encouraged to consider Rivera’s admonition and begin strategizing on how best to recalibrate the current system. No less than improving the lives of millions of their citizens could result from good policies, properly implemented, with a bias toward measurable and sustainable impacts.

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Adult Volunteer Perceptions: Providing Service to Local, School-based Agricultural Education Programs

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Volunteers provide valuable service to organizations such as FFA, Boy Scouts of America, and 4-H. These organizations often rely on volunteers to be successful. The purpose of this study was to describe the assimilation of adult volunteers with school-based agricultural education programs in Oklahoma. Specifically, this study sought to determine volunteer perceptions of efforts to recruit, train, and reward volunteers. Volunteers are motivated to serve school-based agricultural education programs because of their desire to interact with youth and give back to the FFA. While some volunteers did not recognize any obstacles to volunteering, many cited work and family obligations as a barrier. They frequently served in direct, point-of-service, activities such as general labor and transportation of livestock; however, volunteers reported they never served in roles related to the classroom. While some volunteers received formal training in volunteerism, many were provided with either informal training or none at all. Volunteers preferred to be rewarded with simple gestures of appreciation rather than large scale recognition programs. We recommend volunteers seek more active participation in the entire agricultural education program. Further, we encourage the National FFA Organization to develop training and specific rewards for those who serve the programs.

Introduction/Theoretical Framework

According to the National FFA Organization (2014a), agricultural education teachers are responsible for carrying out a variety of roles to establish and maintain a successful local agricultural education program. The execution of these roles has the potential to increase demand on teacher workload and place constraints on adequately meeting the needs of the students (Tillinghast, Ramsey, & Terry, 2013). The National FFA Organization (2013) reported another annual surge in active members with current membership just under 580,000 members. In Oklahoma, similar growth has been reported with membership reported at over 25,000 FFA members during the 2013-2014 school year (K. Short, personal interview, March 3, 2014).

One way to adequately meet the needs of students and agricultural education teachers is to utilize volunteers. Terry, Harder, and Pracht (2011) posited the ability for organizations to meet their mission, goals and objectives depends on the effectiveness of volunteer involvement. Hartenian (2007) stated volunteers possess important resources for organizations: time, talent, and information. While few studies have been conducted on volunteerism in school-based agricultural education, volunteers can benefit such programs by helping to better meet the needs of students (Seevers & Rosencrans, 2001).

Motivation has been emphasized in behavioral research throughout the past fifty years (Fritz, Barbuto, Marx, Etling, & Burrow, 2000). Effective utilization of volunteers depends on understanding what motivates these individuals to volunteer (Murk & Stephan, 1990). According to Balenger, Sedlacek, and Guenzler (1989), volunteers serve because they expect certain motivational needs to be met during the process or act of volunteering. Those most ready to volunteer traditionally have a history of volunteering (Culp, 1996). Zeutschel and Hansel (1989) found the primary motivator for initiating volunteer service was having children involved in that organization. Similarly, Culp (1997) posited parents first and foremost volunteer in capacities benefiting their children. Volunteer motives for continuation of volunteer service primarily stem from interaction with youth, loyalty to the organization, and feeling needed (Fritz et al., 2000). Ultimately, identifying and illuminating these motivators is only one means of trying to inspire volunteer involvement (Culp, 1997).

In addition to positive motivators to begin volunteer service, there are negative motivators, or barriers, to volunteering more. Additionally, volunteers may decide to even discontinue their volunteer service (Culp, 1997). According to Culp (1997), the majority of volunteers in youth organizations discontinue their volunteer service due to feelings of being unwanted or unneeded, time conflicts, or kids leaving the organization. While the literature does not specifically speak to volunteering less or more, the same motivators for discontinuing volunteer service certainly could be affecting the level of participation.

Volunteer roles in school-based agricultural education programs have been studied on a limited basis (Tillinghast et al., 2013). Elliot and Suvedi (1990) found that for agricultural education programs in Michigan, volunteers primarily served on advisory committees and assisted with field trips, supervised agricultural experience (SAE) programs, and FFA leadership activities. Seevers and Rosencrans (2001) identified chaperoning, coaching CDE events, and assisting with FFA activities to be the top three services provided by volunteers in New Mexico. Tillinghast et al. (2013) found livestock shows, fundraising, general labor, and chaperoning to be the primary roles of volunteers in Oklahoma agricultural education programs. While these assignments are helpful to teachers, a question remains: Are volunteers and their assortment of talents used effectively by agricultural education teachers and FFA advisors? (Tillinghast et al., 2013).

Elliot and Suvedi (1990) recommended volunteers get involved in classroom and laboratory instruction, guidance and counseling, and recruitment. Other youth organizations, such as 4-H and Boy Scouts of America (BSA) have found ways to utilize volunteers in all aspects of the organization, including leadership and mentoring roles. The Cooperative Extension program in the United States considers volunteers to be critical to the success of youth development and educational programs (Boyd, 2004). BSA has reported their adult volunteer population to be well over 1.2 million (Boy Scouts of America, 2014a). Since these two agencies rely on countless volunteers, many hours are spent recruiting, training, and rewarding people who serve (Boy Scouts of America, 2012a, 2012b; Boyd, 2004).

Seevers and Rosencrans (2001) said, “Despite the belief that volunteer involvement should increase, there is still a question of how fully the potential is being realized” (p. 73). Seevers and Rosencrans (2001) also posited the potential for volunteers to be more fully integrated into school-based agricultural education exists through proper training and retention methods. Volunteers need guidance during their service to make sure they focus their efforts in the right direction (Boyd, 2003). Training programs provide individuals with the tools they need to successfully serve in the context of volunteerism (Culp & Kohlhagen, 2004).

Fritz et al. (2000) said, “Attention to recognition of volunteers can be the difference between retaining or not retaining volunteers” (p. 42). Volunteers desire to be appreciated and recognized for their service (Culp & Schwartz, 1999). Recognition of these volunteers is essential to the success of the school-based agricultural education program (Tillinghast et al., 2013).

Henderson (1981) stated the primary reasons for volunteerism were affiliative, or linked to a relationship with another person. With this in mind, Penrod (1991) argued the recognition of volunteers is most meaningful when it is linked to their motivation patterns. Culp and Schwartz (1999) then concluded the most meaningful types of recognition in extension education to be thank you notes and letters from youth, which are linked to the relationship the volunteer formed with the youth. Not all types of recognition have been found to be affective (Fritz et al., 2000). Some types of recognition may not appeal to all volunteers (Culp & Schwartz, 1999). Furthermore, volunteers indicated any type of communication with the volunteer administrator, such as a phone call or visit, is the least appealing form of reward (Fritz et al., 2000).

In order to better understand what influences people to volunteer, Herzberg’s Motivator-Hygiene Theory served as a theoretical frame for this study. Herzberg separated factors affecting people into two categories: *hygiene* factors and *motivator* factors (Herzberg, Mausner, & Snyderman, 1959). Adler (1991) suggested the needs in each factor were related to those posited by Maslow (1954) in his famous *Hierarchy of Needs*. However, Herzberg challenged the notion that dissatisfaction is the opposite of satisfaction; instead, the two are independent phenomena (Foor & Cano, 2011; Ricketts & Ricketts, 2011). Herzberg et al. (1959) theorized motivator factors (higher-level needs such as achievement, recognition, responsibility, advancement, and work itself) and hygiene factors (conditions and practices that promote or preserve health or psychological well-being) affect a person’s self-efficacy. This self-efficacy and factors affecting one’s impetus to volunteer must be balanced at all times to keep volunteers motivated and involved (Kempton, 1980).

Herzberg et al. (1959) called the most basic level of needs hygiene factors. These basic levels of needs are associated with lower order necessities such as physiological and safety needs (Adler, 1991). Hygiene factors have been found to be essential for preventing dissatisfaction, but have little impact on generating non-monetary satisfaction (Pinder, 1984). Factors such as safe working conditions and job security can reduce dissatisfaction, but satisfaction will not necessarily increase (Herzberg et al., 1959).

The second set of needs is termed motivator factors, which are called growth needs (Herzberg et al., 1959). These factors are primarily associated with higher order needs, similar to Maslow’s need levels of social, esteem, and self-actualization (Adler, 1991). According to Pinder (1984), motivator factors cause feelings of growth and personal development in the context of the job or experience. Motivator factors tend to promote long-lasting experiences and satisfaction (Pinder, 1984). According to the theory, satisfaction and motivation are affected only by the motivators (Herzberg et al., 1959); therefore, individuals can be happy about aspects of their job, while simultaneously being unhappy about other aspects (Foor & Cano, 2011).

In addition to the Motivator-Hygiene Theory, the Expectancy-Value Theory was used as a conceptual prism to better understand the use of volunteers in school-based agricultural education programs. Schunk, Pintrich, and Meece (2008) concluded, “Expectancies are peoples’ beliefs and judgments about their capabilities to perform a task” (p.44). Values refer to the belief people have about the reasons they serve in a specific role (Schunk et al., 2008). According to Schunk et al. (2008), expectancies and values influence achievement choices. Wigfield and Eccles (2000) posited these two factors also influence effort, persistence, and performance. However, expectancy is not considered motivation alone (Schunk et al., 2008). Expectancy must be coupled with value to provide encouragement to engage in the task (Franken, 2007).

According to Eccles (2007), the value placed on a task is based on attainment value, intrinsic and interest value, utility value, and cost. Attainment value represented the desire to do well on a particular task, while intrinsic and interest value is possessed by those who seek direct enjoyment from task engagement (Wigfield & Eccles, 2000). Utility value is the importance level assigned to a task by an individual, which can be powerful enough to outweigh negative expectancy (Eccles, Adler, Futterman, Goff, Kaczala, Meece, & Midley, 1983). Cost described what one must give up to complete the task and the time and energy lost by participating (Eccles, 2007). For example, volunteers in agricultural education programs potentially could be gone overnight to livestock shows or chaperoning students at regional or national conferences.

Purpose/Objectives

The purpose of this study was to describe the assimilation of adult volunteers with school-based agricultural education programs in Oklahoma. This study specifically sought to determine volunteer perceptions of efforts to recruit, train, and reward volunteers. The specific objectives of this study were to:

1. Determine motivation factors of adult volunteers who serve in school-based agricultural education programs.
2. Determine barriers to volunteering in school-based agricultural education programs as perceived by adult volunteers.
3. Identify volunteer roles in school-based agricultural education programs as perceived by adult volunteers.
4. Identify how adult volunteers are prepared to serve school-based agricultural education programs.
5. Identify how adult volunteers are recognized for their service to school-based agricultural education programs.

Methods/Procedures

This study, as part of a larger investigation, was descriptive in design and employed a sample of convenience. Data were collected at the 2013 Oklahoma Youth Expo, a nonprofit program partnership with the Oklahoma Department of Agriculture Food and Forestry and a variety of other institutions, organizations, and sponsors (Oklahoma Youth Expo, 2014). Participants completed an electronic questionnaire using networked iPads to respond to items associated with the objectives of this study. Volunteer data collectors were trained to identify and engage subjects for the study, including rules and regulations for collecting data in accordance with the Institutional Review Board at Oklahoma State University.

The data collection instrument was developed by the researchers and contained six sections. Section One of the instrument included statements to assess adult volunteers' motivation factors for volunteering in agricultural education programs. A five-point Likert scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree) was used. Section Two sought to determine the barriers to volunteering for adult volunteers. Checkboxes were provided for respondents to indicate multiple barriers. Section Three sought to determine what volunteer roles are most commonly assumed in association with school-based agricultural education programs. Respondents were asked to indicate the frequency in which they served in each role using a four-point Likert scale (Never, Seldom, Occasionally, Frequently). Section Four of the instrument was designed to identify methods used to train volunteers serving agricultural education programs. Like the second section, checkboxes were provided for respondents to indicate multiple training methods. The fifth section addressed ways in which volunteers preferred to be rewarded for their service. Respondents were asked to rank eight forms of recognition in terms of most appealing. The final section of the instrument consisted of designed items to obtain demographic information about the respondents.

The instrument was created using Qualtrics, an online data collecting software. Face and content validity were assessed by a panel of experts consisting of seven faculty in the Oklahoma State University Department of Agricultural Education, Communications, and Leadership and three Ph.D. candidates in agricultural education. The pilot test, taken by 27 sophomore and junior level agricultural communications students, resulted in no adjustments being made to the instrument. A total of 69 adult volunteers served as subjects for the study. Because a sample of convenience was used and it represents a small portion of the volunteer population at the Oklahoma Youth Expo, results should not be generalized to the unknown number of adult volunteers in school-based agricultural education programs (Creswell, 2012).

Data associated with personal characteristics were nominal in nature and were analyzed using frequencies and percentages. Measures of central tendency were utilized to analyze data associated with volunteers' perceptions regarding their service to agricultural education and FFA. According to Jamieson (2004), ordinal response scales can be employed to categorize responses with a rank order, however, the "intervals between values cannot be presumed equal" (p. 1217). In addition, Gay, Mills, and Airasian (2006) stated that when choosing a measure of central tendency to analyze data, the mean is only "appropriate when the data represent either an interval or ratio scale" (p. 308). Similarly, Miller (1998) described use of mean scores to term nominal and ordinal data as "nonsensical" (p. 2). Data generated from this study are both nominal and ordinal; therefore, the measures reported are frequencies and modes.

Results/Findings

Selected Characteristics of Respondents

Respondents of this study were adult volunteers in Oklahoma agricultural education programs who were part of a convenience sample. Fifty-seven percent (39) of the respondents were female. Age ranged from 18 to 69 years with the average being 38 years. The number of children each respondent has ranged from 0 to 7 with the average being just under 2 children. Of those reported with children, the average number of children who are past, current, and future FFA members was 0.84, 1.91, and 2.14 respectively.

Objective One

The first objective was to determine motivation factors of adult volunteers who serve in school-based agricultural education programs. Table 1 displays 12 statements used to assess the motivation factors of adult volunteers.

Table 1
Motivation Factors of Adult Volunteers in Agricultural Education Programs (n = 69)

	SD		D		N		A		SA	
Motivators	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Want to make a positive difference in the lives of young people	0	0.00	0	0.00	3	4.35	24	34.78	**42**	**60.87**
Want to teach young people	2	2.90	3	4.35	5	7.25	22	31.88	**37**	**53.62**
Enjoy helping others	0	0.00	1	1.45	3	4.35	30	43.48	**35**	**50.72**
Want to give back to the FFA	0	0.00	1	1.45	6	8.70	27	39.13	**35**	**50.72**
Want the opportunity to interact with my own children	6	8.70	1	1.45	7	10.14	20	28.99	**35**	**50.72**
Express care for others	0	0.00	1	1.45	7	10.14	30	43.48	**31**	**44.93**
Express concern for others	0	0.00	0	0.00	12	17.39	**32**	**46.68**	25	36.23
Feel needed in the program	1	1.45	1	1.45	16	23.19	**32**	**46.38**	19	27.54
Enjoy interacting with other volunteers	0	0.00	2	2.90	13	18.84	**30**	**43.48**	24	34.78
Feel needed by the agricultural educator / FFA Advisor	1	1.45	4	5.80	15	21.74	**30**	**43.48**	19	27.54
Cannot say “no” when asked	5	7.25	9	13.04	18	26.09	**21**	**30.43**	16	23.19
Want to be involved in more leadership-type roles	2	2.90	2	2.90	**23**	**33.33**	22	31.88	20	28.99

Note. SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree
Mode in Bold

The modal response is displayed in boldface. Respondents strongly agreed with one-half of the motivation factors surveyed including “Want to make a positive difference in the lives of young people,” “Want to teach young people,” and “Want to give back to the FFA.” Just over 50% of respondents strongly agreed they desired to interact with their children. Volunteers also indicated they were positively motivated by feeling needed in the program and by the agricultural educator/FFA Advisor. The modal response of *neutral* resulted from the item asking if respondents were motivated by the opportunity to be more involved in leadership roles.

Objective Two

The second objective sought to determine barriers to volunteering in school-based agricultural education programs as perceived by adult volunteers. Respondents were provided 11 statements regarding barriers to volunteering (see Table 2). Nearly 90% of the volunteers indicated they were restricted from volunteering or volunteering more by either work or family obligations. Interestingly, just under one-fourth of the respondents did not see any barriers to volunteering in school-based agricultural education. Several barriers received a single response; these four barriers are rooted in lack of support and getting along with either the agricultural education teacher or other volunteers.

Table 2
Barriers to Volunteering in Agricultural Education Programs (n = 69)

Barriers	*f*	%
I have work obligations	41	59.42
I have family obligations	20	28.99
There are none	17	24.64
Lack of organizational commitment by the chapter / program	11	15.94
Lack of training for volunteers	5	7.25
Lack of volunteer management skills by the administrator	3	4.35
I have health or medical problems	2	2.90
Volunteer administrator (advisor) has too many other responsibilities than volunteer administration	1	1.45
Volunteer administrator does not support volunteerism	1	1.45
I do not get along with the volunteer administrator	1	1.45
I do not like the volunteers in the organization	1	1.45

Note. Volunteers were allowed to select all training methods that applied which caused the overall percentage to exceed 100%

Objective Three

The third objective looked to identify roles most often assumed by adult volunteers in school-based agricultural education programs. Adapted from Seevers and Rosencrans’ (2001) instrument, respondents were provided 18 roles volunteers could potentially assume with agricultural education programs. As shown in Table 3, only two roles were found to have the modal response of *frequently*: “General labor” and “Transport animals/tack to livestock shows.” More than half of the respondents indicated they occasionally participated as volunteers during fundraising activities. Additionally, more than 40% of volunteers said they occasionally participated in recruiting, transportation, and chaperoning-type activities. A modal response of *never* was found for nine of the roles.

Table 3
Roles of Volunteers in Agricultural Education Programs (n = 69)

	N		S		O		F	
Roles	*f*	%	*f*	%	*f*	%	*f*	%
General Labor	1	1.45	13	18.84	21	30.43	**34**	**49.28**
Transport animals/tack to livestock shows	4	5.80	7	10.14	27	39.13	**31**	**44.93**
Fundraising	4	5.80	7	10.14	**35**	**50.72**	23	47.83
Recruiting other volunteers	11	15.94	17	24.64	**33**	**47.83**	8	13.04
Provide transportation to FFA events	7	10.14	8	11.59	**32**	**46.38**	22	31.88
Chaperones	16	23.19	8	11.59	**28**	**40.58**	17	24.64
Provide/assist with meal functions	11	15.94	14	20.29	**27**	**39.13**	17	24.64
Recruit future FFA members	19	27.54	**24**	**34.78**	18	26.09	8	11.59
Provide technical assistance for student SAEs	15	21.74	**23**	**33.33**	22	31.88	9	13.04
Administrative/Office Support	**49**	**71.01**	17	24.64	8	11.59	2	2.90
Unpaid classroom instructor (substitute, teacher’s aide)	**49**	**71.01**	11	15.94	7	10.14	2	2.90
Coaching CDE teams	**45**	**65.22**	12	17.39	10	14.50	2	2.90
Unpaid classroom guest speaker/lecturer	**37**	**53.62**	17	24.64	13	18.84	2	2.90
Coordinate FFA events	**35**	**50.72**	14	20.29	12	17.39	8	11.59
Judge FFA events	**34**	**49.28**	14	20.29	14	20.29	7	10.14
Assist with FFA award applications	**33**	**47.83**	19	27.54	11	15.94	6	8.70
Program advisory committees	**30**	**43.48**	17	24.64	16	23.19	6	8.70
Supervision of student SAEs	**27**	**39.13**	18	26.09	18	26.09	6	8.70

Note. N = Never, S = Seldom, O = Occasionally, F = Frequently
Mode in Bold

Objective Four

The fourth objective inquired about how volunteers are prepared to serve school-based agricultural education programs. Respondents were asked to indicate the training method used to prepare them for their volunteer roles. Participants were also encouraged to select all training methods that applied to their individual situation. Ultimately, the nominal data collected for this objective indicated more than one-third of the volunteers received no training prior to serving as a volunteer. More than two-thirds of the respondents also indicated the training they did receive was primarily on an individual basis. Only seven of the adult volunteers identified their volunteer training as coming from someone with the FFA other than the agricultural educator. Additionally, only three took a formal class on volunteerism. Both of these types of training possess a formal structure and established process for preparing volunteers for their service to agricultural education programs.

Table 4
Training Provided to Volunteers in Agricultural Education Programs (n = 69)

Type of training	*f*	%
I received no training	26	37.68
The agricultural educator provided instruction to me, individually	25	36.23
Others associated with the FFA instructed me, individually	24	34.78
I participated in volunteer training conducted by an organization other than the FFA (4-H, school, church, Boy Scouts of America)	17	24.64
The agricultural educator conducted a program for a group of volunteers	9	13.04
Other individuals with the FFA conducted a program for a group of volunteers	7	10.14
I took a formal class on volunteerism from an educational institution	3	4.35

Note. Respondents were allowed to select all training methods that applied which caused the overall percentage to exceed 100%

Objectives Five

The fifth objective sought to identify how adult volunteers are rewarded for their service to school-based agricultural education programs. Respondents ranked eight forms of recognition based on their individual preferences from one to eight with one being the most appealing and eight being the least appealing. Table 5 shows the distribution of ranking choices based upon the frequency and percentage each form of recognition was chosen for a given ranking.

Nearly 50% of the respondents indicated a “Letter from FFA member” as the most appealing form of volunteer recognition. Additionally, respondents found a “Phone call” and “Visit from FFA Advisor” to be among the three most appealing methods of recognition. “Letter from FFA Advisor” and “Receiving plaques, certificates, pins” were identified as the fourth and fifth most appealing reward for their volunteer service. The remaining three forms of recognition, “Formal recognition,” “Nominated for awards/recognition through FFA,” and “Coverage in the newspaper,” considered more formal than the top forms of recognition, were found to be the least preferred methods of rewarding volunteers. Due to participant error, only 64 participants responded to this section of the questionnaire.

Table 5
Preferred Methods of Rewarding Volunteers in Agricultural Education Programs (n = 64)

	1		2		3		4		5		6		7		8	
Type of Recognition	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Letter from FFA member	**29**	**45.31**	8	12.50	12	18.75	6	9.38	2	3.13	2	3.13	1	1.56	4	6.25
Phone Call	**14**	**21.88**	12	18.75	11	17.19	7	10.94	2	3.13	2	3.13	9	14.06	6	9.38
Visit from FFA Advisor	4	6.25	**17**	**10.94**	11	17.19	9	14.06	7	10.94	9	14.06	2	3.13	5	7.81
Letter from FFA Advisor	1	1.56	9	14.06	**18**	**28.13**	14	21.88	10	15.63	6	9.38	5	7.81	1	1.56
Receiving plaques, certificates, and/or pins	6	9.38	6	9.38	4	6.25	9	14.06	13	20.31	**14**	**21.88**	7	10.94	5	7.81
Formal recognition (banquet, meeting, etc.)	7	10.94	8	12.50	3	4.69	7	10.94	11	17.19	5	7.81	**15**	**23.44**	8	12.50
Nominated for awards/recognition through FFA	1	1.56	1	1.56	3	4.69	9	14.06	13	20.31	9	14.06	11	17.19	**17**	**10.94**
Coverage in the newspaper	2	3.13	2	3.13	2	3.13	3	4.69	6	9.38	17	26.56	14	21.88	**18**	**28.13**

Note. Respondents were instructed to place the eight types of recognition in rank order from 1-8;
Mode in Bold

Conclusions, Recommendations and Discussion

Volunteers who participated in this study are motivated to serve school-based agricultural education for a variety of reasons. Volunteers are driven to help others and make a difference in their community. In agreement with the findings of Fritz et al. (2000), we conclude volunteers desire to give back to the FFA. In addition, they expressed agreement with being motivated in some aspects by a feeling of need. Volunteers sought chances to impact the agricultural education program through direct contact with youth; therefore, opportunities to serve in leadership roles in the context of the program were not a strong motivational factor.

Many volunteers suggested there were no significant barriers to volunteering in agricultural education programs. Conversely, the vast majority of volunteers cited higher-priority obligations as a restriction to volunteering in general or volunteering in a greater capacity. Very few volunteers see their health or lack of training as a barrier. Volunteers see a program's level of commitment as a potential barrier; however, their relationship with the agricultural education teacher or other volunteers does not deter them from seeking volunteer opportunities. Volunteers are encouraged to express their concerns regarding the direction of the program to the agricultural education teacher. If their concerns or perceived barriers to volunteering are shared, long-term volunteer dissatisfaction may be avoided.

The roles most frequently assumed by volunteers are direct service, or point-of-service, activities (Hartenian, 2007). One-half of the 18 provided roles, such as supervising SAEs and coordinating FFA events, were never assumed by the respondents. Elliot and Suvedi's (1990) recommendations for volunteer involvement in the classroom were found to not be a form of service in Oklahoma agricultural education programs. One reason for this finding may be that teachers see this task as easier to complete on their own or with students rather than adult volunteers. Some of the roles volunteers could potentially undertake may be tasks they are not comfortable assuming. Eccles (2009) recommended volunteers ask themselves, "Do I want to do the task" and "Can I do the task" (p. 1). Ultimately, the value of a volunteer experience must outweigh the perceived expectancy, or success, of serving as a volunteer in a specific area.

According to Eccles (2009), volunteers will be motivated to serve in roles they find interesting. Volunteers are encouraged to express their interests to agricultural education teachers and other volunteer administrators. Additionally, if a volunteer is not interested in a certain role, they should make it known. Herzberg et al. (1959) suggested that negative experiences will lead to dissatisfaction in the workplace. If interests of a volunteer are met, the volunteer is more likely to achieve higher levels of satisfaction, which leads to continued, long-term volunteering. This increased state of satisfaction ultimately increases one's self-efficacy in both the workplace and service sector (Herzberg et al., 1959).

Volunteers who participated in this study frequently assumed only one-ninth of the roles included in this investigation. Data indicate respondents either do not know about the roles they can accept or are simply choosing to not take full advantage of all opportunities within the agricultural education program. The researchers have observed this lack of volunteer involvement during their combined years of teacher and volunteer observation. Other youth organizations such as BSA and 4-H rely heavily on volunteer service (Boy Scouts of America, 2003; Fritz et al., 2000). Perhaps volunteers interested in serving school-based agricultural education programs should solicit the agricultural education teacher to make all service opportunities known to them and others interested in helping.

Data indicate little to no training of volunteers is occurring in Oklahoma agricultural education programs. Volunteers are primarily instructed on what needs to be done by either the teacher or fellow volunteer using informal training methods. The National FFA Organization (2014b) has a self-guided volunteer module and a website dedicated to volunteerism. Teacher educators and state staff should highlight this website and other agricultural education volunteer resources and model the training protocol used by BSA. According to BSA (2012b), adult volunteers are expected to complete training programs in order to work with youth. Similar programs could easily be developed in the context of agricultural education. In particular, the Youth Protection training program offered by BSA should be implemented for all adults interacting with FFA members (Boy Scouts of America, 2014b). This program focuses on appropriate ways adults are to interact with youth as well as how to recognize and report instances of abuse.

According to the expectancy-value theory, rewarded activities are more likely to attain sustained participation (Eccles, 2007). Results of this study indicate volunteers prefer simple, informal types of recognition (e.g. letters and phone calls). Even though some volunteer recognition programs exist in the FFA, we recommend more platforms for volunteer recognition be developed. The website, *Awards Central* (Boy Scouts of America, 2012a), lists more than 60 different awards BSA volunteers can earn. Therefore, we encourage agricultural education teachers to seek unique, potentially specialized, ways to honor volunteer contributions at the local level. Also, the National FFA Organization, due to its access to sponsors and stakeholders, could assist FFA advisors with developing a local volunteer recognition program.

We recognize the narrow application of the findings and conclusions of this study due to the sampling process used. We believe, however, functional information from the study provides valuable insight into the current needs in local, school-based agricultural education programs. We recommend a study with similar objectives be conducted using sampling techniques allowing conclusions and recommendations to be generalized to a broader profile of the volunteer population serving school-based agricultural education. Additionally, research should be conducted specifically related to volunteer training methods and recognition programs.

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The Influence of NELD/LEAD21 Leadership Development Experiences on the Leadership Skills and Careers of State Extension Directors and Administrators

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Abstract

The purpose of this exploratory, qualitative study was to develop an understanding of the influence and explain the phenomenon of leadership development program experiences on the leadership abilities and career paths of participants in leadership development programs over time. The study population included participants completing either the National Extension Leadership Development (NELD) Program or the LEAD21 Program serving in the role of Extension Directors or Administrators at the time of the study. The study examined the program participants' early preparation including leadership development experience, skills, and experience prior to participation in NELD/LEAD21, actual leadership development experience, perceptions and application of the leadership learning and leadership growth following the program, and their subsequent leadership practice and career-path in order to develop a holistic understanding of the lived experiences of the NELD/LEAD21 program on their careers and how these experiences shaped their leadership skills, growth and career path. The findings indicate that the Directors and Administrators believed the experiences in the NELD/LEAD21 program significantly influenced the evolution of their leadership goals and helped develop specific skills contributing to their success.

Introduction

Leadership development has been a source of interest and continued study in higher education since the early twentieth century (Bass, 1990). There has also been sustained interest in how leaders develop in the university land-grant system, specifically in the Cooperative Extension Service (Bisbee & Miller 2006; Cooper & Graham, 2001; Glenn, 2005; Holder, 1990; Jelinek, 2004; Jones, 2006; Mayer 2001; Moore, 2003; Moore & Rudd, 2004, 2005; Rohs, 2003; Winiewski, 2000). Many academic and Extension leaders begin their career in the faculty or staff ranks, rarely anticipating potential leadership positions. As a result, few participate in organizational leadership training (Gmelch, 2002). Training for higher education and Extension faculty tends to be discipline specific, so when faculty members enter administrative positions they learn leadership skills as they go (Gmelch, 2002; Green, 1990).

The career ladder for leaders in higher education tends to be evolutionary in nature, beginning with a faculty or agent appointment before moving to a position of more responsibility (Land, 2003). As a part of the land-grant university system, CES mirrors the promotion process of higher education. Many institutions do not have formal career paths, which may make the identification of specific leadership skills and competencies difficult, further complicating the preparation of leaders in higher education. Developing leaders should be a critical task for institutions to maximize the effectiveness of an individual while serving in a leadership position.

Green (1990) recommended providing leadership development to enrich careers, without making moving “up” or “out” the only career option. This approach allows institutions to move people laterally or shift responsibilities in order to keep leaders challenged through expanded roles. Additionally, the most effective leadership development programs occur within the context of the work environment based on competencies connected to organizational strategy (Fulmer &Wagner, 1999; Hernez-Broome & Hughes, 2004).

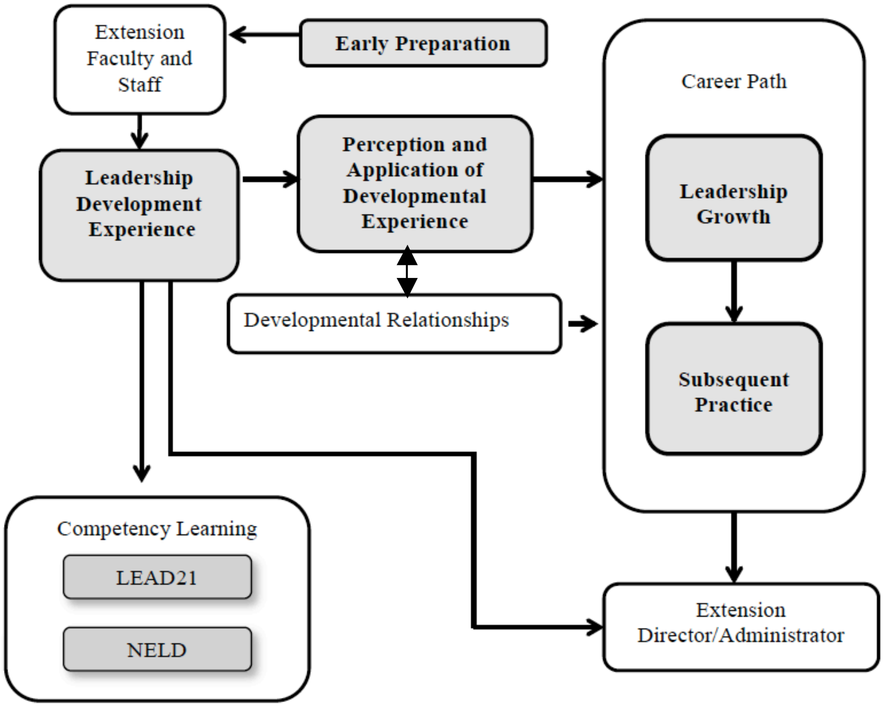
Although succession planning is not a commonly used leadership development practice in higher education, it is vital to develop leadership depth to ensure a skilled talent pool is prepared when it is time to fill leadership positions. According to Lewis, Fino, Hungar, Wallace and Welch (1994), if an institution creates a culture of leadership, individuals are more likely to be recognized for their demonstrated potential, than for their status or position. To increase the number of potential leaders within an institution, Land (2003) recommended providing a variety of leadership development opportunities including leadership training programs, external leadership training institutes, professional association activities and mentoring. Hernez-Broome and Hughes (2004) supported this concept by suggesting organizations grow their own leaders by providing leadership development experiences.

The Cooperative Extension System (CES) has supported an internal leadership development program at the national level for potential leaders since 1990. The National Extension Leadership Development Program (NELD) was a two-year leadership experience specifically for Extension personnel in mid-level management with potential for higher administrative leadership (LEAD21, 2011). In 2004, the Leadership Development for the 21st Century (LEAD21) replaced NELD (LEAD21, 2011). It was not clear in the extant research if leadership development stimulates leadership growth, abilities, and the career-path of faculty in the years following participation in a rigorous leadership program (Land, 2003). This explanatory study investigated the influence of NELD/LEAD21 learning experiences on the leadership growth, subsequent practice and career trajectory of program graduates. This study addressed research priority three of the American Association for Agricultural Education’s (AAAE) national research agenda (Doerfert, 2011). The outcome desired from research priority three is a “sufficient supply of well-prepared agricultural scientists and professionals” to “drive sustainable growth, scientific discovery, and innovation in public-private and academic settings” (Doerfert, 2011, p. 18).

Conceptual Framework

The framework of this research was based on five constructs, which supported the conceptual dimensions and the variables upon which the interview questions were based. The conceptual framework, developed by the researcher, served as a lens for exploring and understanding Extension directors’ and administrators’ insights and opinions of leadership development experiences on leadership growth, subsequent practice and career trajectory.

The five constructs comprising the conceptual framework are early preparation, leadership development experience, perception and behavioral application of developmental experience, leadership growth, and subsequent practice (see figure 1**).**



F*igure 1*. Conceptual Framework—Exploration of the Influence of NELD/LEAD21 on career path of administrators

1. Early Preparation. This construct includes the conceptual dimensions of Planning, Development, and Awareness. The Planning dimension included three variables, Education, Professional Goals, and Career Path. The variable Education is broad as it encompassed the formal education required to hold a professional position within the organization (Bass, 1990). The variable Professional Goals identified goals prior to participation in the program and understanding of specific roles and responsibilities related to specific positions (Gmelch, 2004). Career Path, the third variable, explored the participants starting position and progression of employment (Land 2003; Raines & Alberg, 2003; Strathe & Wilson, 2006) prior to participation in NELD/LEAD21. The second conceptual dimension, Development, encompassed three variables: (a) Leadership Skills and Strengths, the abilities developed through training (Bass, 1990; Katz, 1955; Kouzes & Posner, 2002; Mumford, Zaccaro, Connely & Marks, 2000; Mumford, Marks, Connelly, Zaccaro & Reiter-Palmon, 2000), (b) Leadership Training, the education and preparation regarding specific skill sets (Bass 1990; Betts, Urias, Chavez, & Betts, 2009; Green, 1990; Raines & Alberg, 2003) and (c) Mentoring, developmental relationships (Hernez-Broome & Hughes, 2004; Land, 2003; Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000; Strathe & Wilson, 2006). Two variables composed the Awareness conceptual dimension. These variables include, Introduction to the Program or how the participant learned about NELD/LEAD21 (LEAD21, 2011) and Preconceptions, the expectations the participant had of NELD/LEAD21 (Bass, 1990; Northouse, 2013).

2. Leadership Development Experience**.** This construct consists of three conceptual dimensions, Relationships, Competency Learning and Significant Learning. Relationships explored the influence of the relationships developed by the NELD/LEAD21 Intern with cohort members and

the facilitators or instructors for NELD/LEAD21. The Competency Learning conceptual dimension consisted of the skills and competencies addressed as a part of the NELD/LEAD21 curricula, supported by 10 variables or skill sets identified below.

- Understanding Self - self-knowledge or personal awareness (Bass, 1990; Cangemi, 2001; Gmelch, 2004, Hengrenes, 2005; Kouzes & Posner, 2002; Stogdill 1948, 1974; Zaccaro et al., 2000).
- Developing Self and Others - understanding personalities, attitudes and motivation (Northouse, 2013; Zaccaro et al., 2000).
- The Organization - the global inclusion of USDA, NIFA, the Land-Grant System, CES and individual institutions (LEAD21, 2011).
- Higher Education - the state universities and land-grant colleges (NIFA, 2010);
- Problem Solving - the creative ability to solve new and usual, ill-defined organizational problems (Northouse, 2013).
- Diversity - having multiple perspectives and people (Carr, 1999; Jelinek, 2004; Land, 2003; LEAD21, 2011).
- Communication - an exchange of information including speaking, listening, giving feedback and writing (Carroll & Wolverton, 2004; Cooper & Graham, 2001; Gmelch, 2002; Jelinek, 2004; Katz, 1955; Moore & Rudd, 2004; Northouse, 2013).
- Conflict Resolution - resolving disagreement, negotiation, and achieving agreement (Carroll & Wolverton, 2004; Cooper & Graham, 2001; Gmelch, 2004; LEAD21, 2011; Northouse, 2013).
- Managing Change - the ability to adapt behavior based on an understanding of others or organizational expectations (LEAD21, 2011; Northouse, 2013).
- Integrity and Values - the ability to be consistent and truthful in actions, beliefs, and principles (Crawford, 1982; Hogan & Kaiser, 2004; Jones, 2006; Kirkpatrick & Locke, 1991; Kouzes & Posner, 2002; LEAD21, 2011; Moore, 2003;Northouse, 2013; Zaccaro et al., 2000).

The final conceptual dimension in the Leadership Development Experience construct is Significant Learning. Significant learning is the meaningful integration of development experiences (Hernz-Broome & Hughes, 2004) as viewed by the NELD/LEAD21 Intern.

3. Perception and Behavioral Application of Development Experience. The construct, discovered how NELD/LEAD21 Interns practiced the new knowledge and skills learned as a result of their participation in the leadership program and how these practices may have influenced their leadership behavior in their current position. This construct included the conceptual dimensions Applied Learning and Behavioral Assessment. Applied Learning is the application of leadership learning and the practice of new skills. The 10 variables related to Applied Learning are the same variables related to Competency Learning, except the variables explore how each participant applied what they learned about the variables and how they practiced the new skills tied to new knowledge. The Behavioral Assessment dimension encompassed five variables. The first variable, Skills Related to Career Success, included skills or abilities or competencies needed to be effective in a specific role (Bass, 1990; Katz, 1955; Kouzes & Posner, 2002; Mumford, Marks, et al., 2000) as associated with career success indicators such as accomplishments, achievements and effectiveness (Bass, 1990; Mumford,

Zaccaro, Connelly, & Marks, 2000). The second variable, Evolution of Goals, corresponded to a change in aspirations or achievements (Bass, 1990; Chemers; 1984; Ebbers, Gallishath, Rockel & Coyan, 2000; Northouse, 2013; Valverde, 2003). The third variable, Continued Training, related to ongoing leadership education and development (Bass, 1990). The fourth variable, Continued Mentoring, pertained to ongoing or continued developmental relationships (Hernz-Broome and Hughes (2004); Land, 2003; Mumford, Zaccaro (a.) et al., 2000; Mumford, Zaccaro (b.) et al., 2000; Strathe & Wilson, 2006) and the fifth variable, Value, referred to the return on investment as related to the perceived worth of the program to the participant (Hernz-Broome & Hughes, 2004; Green, 1990: Gmelch; 2002; Rohs, 2003; Sugrue, 2005). How the participants perceived the leadership development experiences and choose to apply skills learned and the degree to which the participant developed competency related to those skills may influence a career path.

4. Leadership Growth**.** This construct explored the Performance dimension of the conceptual framework, which includes the variables related to Significant Experiences, Competency, Career Trajectory, and Career Satisfaction. Significant Experiences sought to understand the meaningful interaction of career experiences (Hernz-Broome & Hughes, 2004); and Competency tied to the knowledge, skills and abilities needed to be an effective leader in a specific role (Hernz-Broome & Hughes, 2004; Green, 1990: Gmelch; 2002; Rohs, 2003; Sugrue, 2000). Career Trajectory described the various positions, stages, benchmarks and ways of thinking over time (Bogdan & Biklen, 2003*)*. Career Satisfaction looked at contentment with aspirations and achievements over the course of a career (Bass, 1990; Chemers; 1984; Ebbers, Gallishath, Rockel & Coyan, 2000; Northouse, 2013; Valverde, 2003).

5. Subsequent Practice. The final construct has one conceptual dimension, Recommendations, which includes suggestions Extension Directors and Administrators have for potential leaders and explored the ways the participants as leaders encourage and support others to take part in leadership development opportunities. This dimension included five variables. The variable Leadership Training looked at suggestions for the skills and competencies needed by future Extension leaders that may have been beneficial if included as a part of the NELD/LEAD21 (Barner, 2000; Cooper & Graham, 2001; Crawford, 1982; Katz, 1955; Mumford, Marks et al., 2000; Moore, 2003); Decision Factors explored reasons an individual may choose to pursue a formal leadership position (Thomas & Schuh, 2004); Role of Leadership Development investigated the influence effective leadership development training may have on the success of a leader (Bass 1990; Betts, Urias, Chavez & Betts, 2009; Green, 1990; Raines & Alberg, 2003); Role of Mentoring considered the influence developmental relationships may have on the success of a leader (Hernz-Broome & Hughes 2004; Land, 2003; Mumford, Zaccaro (a.) et al., 2000; Mumford, Zaccaro (b.) et al., 2000; Strathe & Wilson, 2006); and Strategies are the methods used to recruit potential leaders LEAD21, 2011; Merriam, 1998; Adrian, 1993).

Leadership Growth and Subsequent Practice comprised the participant's career path. At some point following the study participant's graduation from NELD/LEAD21, their career path led them to the role of Extension director or administrator as defined by NIFA (2011). As part of their subsequent practice, the Extension directors provide support and input and refer faculty to LEAD21.

Purpose and Objectives

This study investigated the experiences of current directors and administrators in the Cooperative Extension System who were interns in either the National Extension Leadership Development (NELD) Program or LEAD21. The overarching purpose of the study was to determine if NELD or LEAD21 participation influenced the leadership growth, abilities, subsequent practice, and career-path of Extension directors and administrators in the years following their participation in the intensive leadership program. Five specific questions guided the study:

1. Is there is a clear process that potential Extension leaders follow to prepare for leadership roles?
2. Does the NELD/LEAD21 leadership development program change the knowledge, skills, and behaviors of participants?
3. How do knowledge, skills, and behaviors learned from the NELD/LEAD21 leadership development experiences contribute to the subsequent practices and leadership success?
4. Has participation in the NELD/LEAD21 intensive leadership development experiences made a difference in career performance?
5. What recommendations do experienced leaders have for future leaders?

Methods

The study followed a qualitative research design to investigate and explain the phenomenon of leadership development program experiences on the leadership skills and career paths of Extension directors and administrators. The qualitative method used was an explanatory case study. The study was modeled, in part, after the research design of Defrantz-Dufor (2007), which was based on the experiences of women who participated in the American Council on Education (ACE) Fellows Program.

The population for the study was purposively selected from the 81 senior leaders, state directors, and administrators in the Cooperative Extension System, identified in the National Institute of Food and Agriculture (NIFA) directory (NIFA, 2011) and compared with the NELD/LEAD21 rosters to determine who had attained a state director or administrator position since completing the NELD/LEAD21 program. Eleven Extension directors met the criteria (n = 11), eight individuals who completed NELD and three graduates of LEAD21. The potential study participants were asked to select their own pseudonym and a pseudonym for their institution in order to provide confidentiality. At the time of the interviews, three of the participants had served as an Extension directors for 11 to 20 years, eight of participants had served between three and seven years. The directors with 10 or more years of experience were all NELD graduates.

The interview protocol questions were designed around the conceptual framework and based on the five constructs, beginning with Reaction questions based on the Early Preparation construct focused on training and prior experiences, which inspired the participant to become a NELD/LEAD21 participant. The second sequence focused on the learning and reflection that occurred during their Leadership Experiences in the NELD/LEAD21 Program. The Behavioral Assessment questions within the Perception and Application of Development Experience construct, centered on how their goals, professional development experiences and networking in Extension changed. The Performance Results questions explored factors that influenced the Leadership Growth and development of their career paths including within their current position. The last sequence of Advice for Future Leaders questions centered on the Subsequent Practice construct to solicit their thoughts regarding the identification, preparation and recruitment of potential leaders for senior level leadership and explored their strategies for doing so.

In-depth interviews were conducted with the study participants using a semi-structured format (Merriam, 1998; Rubin & Rubin, 2005) in which the researcher introduced the topic and guided the interview with specific questions. The open-ended questions (Bogdan & Biklen, 2003; Creswell, 1998; Merriam, 1998) were designed to elicit information from participant's point of view (Bogdan & Biklen, 2003) about their experiences during and since their participation in the NELD/LEAD21 Program. The open-ended questions provided flexibility for the researcher to tailor the interview to best fit each participant's interests and experiences and to make sense of the significant events in their career and leadership development (McMillan & Schumacher, 2001). The interviews were conducted via Blackboard Collaborate, video-conferencing software and were approximately two hours in length. Following the interview, the researcher made notes of the interview, noting impressions and themes from the interview to aid in analyzing the data. Data collection also included a document review including the study participant's vita, biographical sketch to verify the individual's professional growth and career path and related online documents and researcher observations.

The interviews were transcribed verbatim from the Blackboard Collaborate recordings and sent to each participant with a request to review the transcript for accuracy (Bogdan & Biklen, 2003b; Creswell, 1998; Merriam, 1998). Each transcript was coded for analysis with codes assigned to the study constructs, conceptual dimensions and variables in the conceptual framework. While the five constructs served as the organizing structure for the data, the conceptual dimensions within each construct were tied to the variables to which the data were coded and served as a sense-making mechanism for exploring and understanding the data. The data was organized around common themes and linked to the five constructs. A final document analysis was used to develop a holistic understanding of the lived experiences of state Extension directors and administrators on their leadership skills and career paths after completing the NELD/LEAD21 program. The research findings were verified by using multiple sources of data. The researcher admits personal bias may have influenced the interpretation of the data and the findings since she served as a director of an Extension Leadership Program (Creswell, 1998; Merriam, 1998). Threats to reliability were addressed by creating rich, thick descriptions of the data thereby including enough detail in the findings and reports to create an auditable trail that would allow others to replicate the study (Merriam, 1998; Yin, 2003).

Findings

The respondents were all state Extension directors at the time of the interview10 were men and one was a woman. Ten of the potential study participants had agriculture-related degrees; one had a degree in Adult and Extension Education. All had a terminal degree. The state directors and administrators represented nine land-grant universities founded as1862 land grant schools and two land-grant universities founded as 1890 land-grant schools.

The first objective was to determine if there was a clear process to follow to prepare the potential Extension leaders for leadership roles. The ability to share an identifiable route had positive implications for individuals interested in Extension leadership. The stages of the study participant's early career, steps in their professional development and their selection for the program were examined for this objective. The analysis of the interview results showed a doctorate degree was required to advance, with the preference being at least one degree in agriculture and natural resources. All study participants had degrees in agriculture and natural resources, while none held a degree in family consumer sciences or in youth development, even though these are major program areas within Extension. Only three of the 11 study participants indicated their early career goal, prior to NELD/LEAD21, was to become an upper-level Extension administrator or leader. The other study participants implied their goal was to be "the best" in their current role as agent, specialist, or researcher. Mr. Berry said, "I, quite frankly, did not have a very well scripted career-goal path. I truly enjoyed every position I held and always felt that if I did the best I could in that position, that other opportunities would come along." Similarly, Dr. Derby expressed his goal was to become, "the best Extension specialist in the county." Dr. Rimp said, "At that point, my main emphasis was being the best researcher that I could be. The desire to be the "best" may have been the fuel, which drove the study participant's careers forward, or it may have been a valued characteristic by others who recognized their capabilities and motivation. Each director participated in some early leadership training and was supported either formally or informally by mentors internal to their Extension system. The study participants described their mentors as role models, especially the mentors identified as Extension directors.

Based on their career advancement, exposure to leadership training, and informal and formal mentoring, it appears all the study participants were identified by administration as potential leaders and were provided opportunities and encouragement to advance toward leadership. As an example, Dr. Derby indicated his Extension Dean encouraged him to think about leadership opportunities when they arose, and Dr. Bright felt his Extension Dean gave him "every opportunity" to develop as a leader. Dr. McCoy also felt like she was being "groomed" for a leadership position prior to her NELD experience. All study participants were open to the opportunity to participate in NELD/LEAD21 and viewed it as an opportunity or an expectation for advancement. The interview data suggested developing new relationships with other NELD/LEAD21 Interns allowed study participants to grow strong professional networks across the Extension System. The study participants used words like thriving, strong, positive, professional network to describe their current relationship with some members of their class. Dr. Arnold described a mutually beneficial relationship with some of his peers who provide letters of recommendation and reference for each other, on occasion. Dr. Bill indicated the members of his cohort were the people in Extension whom he called upon for help when he needed a new perspective on a problem. The relationships the study participants developed with their cohort and instructors may have contributed or detracted from the quality of learning and focus during the program. As an example, Dr. Derby shared a personally profound experience, which occurred at the beginning of his program. A member of the facilitation team suggested some members of the class had leadership potential, but others were there to be "fixed." This, he said created doubt about his own potential and negatively influenced his experience and his relationship with peers and program facilitators. The second objective was to determine if participation in a leadership development program changed the knowledge, skills, and behaviors of participants. Comparing each of the 10 competency-based learning and applied learning variables allowed for insight and perspective into which variables most likely influenced the study participant's knowledge, skills, and behaviors. The degree of influence or change may, however, depend on each individual's pre-existing knowledge and life experience related to the variable. Some of the participants, such as Drs. Bill and Bright, had more leadership development training and experience prior to their participation in NELD/LEAD21, compared to other study participants who had more limited exposure.

When comparing the competency learning and applied learning variables, the study participants' comments suggested changes in their knowledge, skills, and behaviors following NELD/LEAD21 were most influenced by Understanding Self, Problem Solving, Diversity, and Communication. The study participants indicated they practiced stress management, reflection, listening, communication, and engaging others, which they linked to a better understanding of self. Their learned behaviors included listening, gathering input, analyzing, isolating core issues, and prioritizing to solve problems. The NELD/LEAD21 cultural and diversity experiences changed their practice related to identifying underserved audiences, understanding differences in clientele, hiring practices, and their ability to reach out to diverse groups and audiences. The study participants also pointed to specific changes in their communication practices, including two participants who created communication departments once they became Extension directors. The interview results indicated the most significant learning, skill, development, and behavior changes, due to NELD/LEAD21, were related to Understanding Self and Diversity. The study participants discussed specific learning and application related to Developing Self and Others, the Organization, Conflict Resolution Managing Change, Integrity and Values variables as a result of NELD/LEAD2. However, these variables seemed to have had less overall influence on the study participant's knowledge, skills, and behaviors and to be less closely associated with NELD/LEAD21, perhaps due to the study participant's previous knowledge and skills prior to participation in the program. The variable with the least connection to NELD/LEAD21 was Higher Education. Even though the variable is indirectly addressed through NELD/LEAD21, this particular variable was addressed more specifically in other related leadership development programs. The study participants were asked about their most significant NELD/LEAD21 learning experience in an attempt to isolate the most important and valuable aspect of the leadership development program experience. Nine of the study participants explained their most significant learning experiences as a profound, personal, emotional event, which changed their life and their behavior. Two of study participants described experiences with the homeless, five described international experiences, and two described how the self-assessments influenced their self-perception. When reflecting on the international trips, Dr. Bill said it was a "life-changing experience," Dr. Bright called it the "most meaningful" leadership experience, and Dr. Ruminique hailed it as the "perfect experience." Dr. Arnold claimed the experience he had in a homeless shelter changed his views about diversity and was "the eye-opening experience!"

The third objective investigated the ways knowledge, skills, and behaviors learned from leadership development experiences contribute to subsequent practice and leadership success. This objective was related to the construct Perception and Application of Development Experience and the Behavioral Assessment conceptual dimension. Since participating in NELD/LEAD21, the study participants have engaged in additional leadership development training and sought out mentoring relationships, both formally and informally. The study participants voiced the leadership development experience significantly influenced the evolution of their leadership goals, and that they have developed very specific skills as a result of NELD/LEAD21, which they believe augment their leadership success. Eight of the 11 study participants used the word "significant" to describe how NELD/LEAD21 influenced their career goals. Dr. McCoy noted she never thought she would be an Extension director, and she credited NELD for the career path that led her to the position. Dr. Fred said the program "planted seeds about potential career goals." The study participants specifically noted they learned to use communication, decision-making, interpersonal, mentoring, teamwork, and change management skills as result of NELD/LEAD21 and felt these skills contributed to their success as a leader. However, Dr. Rimp, pointed out all the skills comprised a "total package," which has contributed to his career trajectory.

The fourth objective was to determine whether participation in NELD/LEAD21 intensive leadership development experience made a difference in career performance. The study participants were able to describe the knowledge, skills and behaviors they learned and applied from NELD/LEAD21, which they had integrated into daily practice to become successful leaders. They indicated the application of knowledge and skills learned contributed to their upward career steps and led them to Extension director positions. The comparison of the Competency Learning and Applied Learning Variables highlighted that study participants did strengthen their leadership abilities as a result of NELD/LEAD21, which they believed afforded them career opportunities as leaders. In reviewing their careers and evaluating their career satisfaction, study participants unequivocally considered NELD/LEAD21 a major factor to their upward career trajectory and satisfaction. Of importance, the study participants had leadership learning experiences outside of NELD/LEAD21, which may have contributed to overall career performance. Ten of the study participants considered their career to be satisfying. Dr. Ocho rated his a nine on a 10-point satisfaction scale. Dr. Fred called his career exciting, challenging, frustrating, and great, and Dr. Corn Bore referred to his career as a great experience and opportunity. Only one study participant indicated he found his career to be more satisfying when he was in a lower-level leadership position. The study participants were asked to put a value on the perceived worth of their participation in the program to their career. The dollar value the study participants placed on the experience ranged from $5,000 to $20,000. However, three of the participants said "priceless."

The fifth objective was to determine the recommendations these organizational leaders had for future leaders. Study participants proposed additional topics for LEAD21 training related to working and communicating with elected officials and dealing effectively with crisis, conflict, and difficult people. Extension directors noted managing personal time and stress was difficult and may keep prospective leaders from high-level leadership positions. However, study participants contended mentoring, coaching, support, and encouragement from other key leaders were crucial for keeping individuals with potential in the leadership pool and moving toward leadership jobs. Participants also identified internal motivators that may contribute to an individual's desire to serve as a leader: internal drive initiative, confidence, desire to serve, and aspirations to excel. As a final note, the study participants indicated simply receiving the invitation to participate in leadership opportunities was of key importance. Seven of the study participants identified additional leadership responsibilities for individuals with leadership potential; and five of the participants encouraged Extension professionals to attend leadership training programs, including LEAD21, as a means of an invitation to become organizational leaders. Extension directors indicated NELD/LEAD21 was important to their development as a successful leader and was also important for future leaders. However, they also pointed to the importance of other training programs and informal leadership training. Study participants considered formal and informal mentoring as vital to their success as a leader and to their ability to ascend to the position of Extension Director. As a result, they aspired to serve as mentors for the individuals they perceive to be potential leaders.

Finally, the Extension directors shared the approaches they used to encourage individuals to consider and apply for leadership positions. They strongly advocated for offering individuals challenging responsibilities to develop experience. This approach was a development-in-place strategy (McCauley, Moxley, & Van Velsor, 1998). Study participants also pointed to the importance of providing state, regional, and national professional development and leadership training opportunities for potential leaders.

Conclusions, Discussion, and Recommendations

Prior to this study, little research had been conducted on the results of leadership development, specific for Extension leaders (Pernick, 2002). Additionally, an explanatory study of the influence of the NELD/LEAD21 learning experiences on the leadership growth, subsequent practice and career trajectory of program graduates had not been conducted. Therefore, this study was important to determine if NELD/LEAD21 truly had an influence on the leadership development of organizational leaders and to establish whether the leadership skills and competencies addressed/developed during these programs aligned and supported the organizational goals of CES.

The results of this study supported research suggesting leadership development expands the capacity of a person to be effective in a leadership role (Bass, 1990; Kegan & Lahey, 1984; Van Velsor, McCauley & Ruderman, 2010). Based on the evidence of this study the first three constructs in the conceptual framework had a positive influence on the leadership growth, abilities, subsequent practice, and the career-path of the participants following participation in NELD/LEAD21. Early career preparation does effect selection for participation in NELD/LEAD21. The results strongly suggested there is a process or specific decisions, which are more likely to make NELD/LEAD21 program graduates a suitable candidate for Extension director or administrator. The results inferred there is a consistent sequence of choices made prior to NELD/LEAD21, which positioned the study participants as contenders for future leadership opportunities. Supporting previous research (Hegrenes, 2005; Jelinek, 2004), NELD/LEAD21 helped study participants build social capital and develop a professional network, which enrich their leadership practice following NELD/LEAD21. The leadership competencies introduced as a part of the NELD/LEAD21 curriculum had favorable consequences on the study participant's knowledge and skill development bearing out the literature (Hernz-Broome & Hughes, 2004; Moore & Rudd, 2004; Mumford, Zaccaro (a.) et al., 2000; Mumford, Zaccaro (b.) et al., 2000; Stone & Bieber, 1997; Wisniewski, 1999). Leadership skills learned contributed to specific leadership practices, which, in turn, supported and encouraged subsequent practice and leadership success. Study results indicated the leadership development experience significantly influenced the evolution of the study participants' leadership goals. Additionally, the participants believed they developed leadership abilities, which led to career opportunities that may not have otherwise been available to them. As the study participants reviewed their careers and the role NELD/LEAD21 played in their career success and satisfaction, the leadership development program was a major factor to their upward career trajectory. The research confirmed the relationships developed within the confines of an intensive leadership development program added career benefit if structured properly (Hegrenes, 2005; Jelinek, 2004). The opportunity to learn with a cohort helped develop influential peer relationships over time. Pairing or grouping Extension participants for the purpose of peer mentoring may provide the most opportunity for on-target feedback, if not for learning about the larger system. Formal mentors for leadership development program participants are extremely valuable; however, study participants identified their informal mentors as the most influential mentors. It is recommended leadership development programs re-evaluate existing mentoring approaches and consider coaching instead of or in addition to mentoring.

Another significant finding of the study pointed to the value the NELD study participants perceived the international study trip had on their leadership growth and development. The current program, LEAD21, does not include an international study trip as part of the curriculum. The cost of such a study component may not be feasible, however the addition of an international component or a cultural experience is strongly recommended, as these types of experiences seem to assist with the integration of concepts.

Implications for future research may include conducting follow-up case studies with the study participants, especially the LEAD21 Interns since they completed LEAD21 more recently. Case studies with other NELD/LEAD21 graduates not currently serving in an Extension director or administrator role would provide additional data and a different lens about the influence of leadership development on leadership growth, subsequent practice and the career-path of NELD/LEAD21 Interns. This could be potentially valuable for LEAD21 since this program is still offered. A study using this model could also be conducted for graduates of the Food Systems Leadership Institute (FSLI) program, which would provide a broader perspective for leadership development within the land-grant system. Longitudinal studies with leadership program participants are also recommended.

A limitation of the study is the lapse of time for the study participants between their participation in the program and their interview for this study, especially for the NELD participants. Although the study participants were able to provide rich insight into their leadership experience, personal growth, and career path, it is possible the length of time may have limited the accuracy or completeness of recall. The challenge in this study was to isolate the specific variables, which directly influenced the knowledge, skills, and behaviors of the study participants and the exact degree to which NELD/LEAD21 may have contributed to subsequent practice and leadership success. As the Cooperative Extension System continues to see substantial retirements among the ranks of upper-level leadership, it is even more crucial for the organization to invest in the leadership development of emerging leaders. This study provides evidence leadership development programs such as NELD/LEAD21 contribute to the leadership growth, subsequent practice and career-trajectory of organizational leaders.

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A Thirst for Blue Waters: Exploring the Uniqueness of an Urban Extension Office

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Abstract

This instrumental case study sought to examine the structure of an urban Extension office in a Midwestern town. The study was guided by two questions: (a) What factors influence the structure of an urban Midwestern Cooperative Extension Service office? and (b) How does the current structure help accomplish the goals of a Midwestern Cooperative Extension Service? Data collected included semi-structured interviews, artifact retrieval, and observations. Analysis of the data led to two large frames and four total themes. The first frame included two themes associated with alignment to the external environment: (a) an urban uniqueness and (b) celebrated central power. The second frame included two themes that were related to the internal environmental alignment and were: (a) resistance to change and (b) thirst for change. It was recommended that staff in urban Extension offices work to specialize, challenge the traditional needs and processes of Extension education, and begin to capitalize on the fast growing need in urban areas. It was concluded that urban Extension Services are not going extinct, but rather transforming and meeting unique needs.

Description of the Case: A Fictional Vignette for Understanding

Bradley and Emily Schmitz, a couple new to Morgan County, were interested in growing some of their own foods. They had heard about the Extension Service in their previous hometown teaching people how to plant gardens, raise livestock, can fruits and vegetables, but had never fully explored this resource. After settling into their new home, they began to inquire about the Extension Service, in hopes that they could learn how to plant a small vegetable garden and raise a few chickens for fresh eggs. However, many of their neighbors had never heard of the Extension Service. At last, a Master Gardener volunteer down the street was able to point them in the right direction. As Bradley and Emily pulled into the Morgan County Extension office parking lot, they were baffled to find such a large building situated on the expansive Morgan State Fairgrounds. The manicured garden surrounding the entranceway soon caught their eyes. Upon entering the office, they were greeted by a receptionist and were directed down the right wing of the hallway to meet with the horticulture and agricultural educators. This was a new concept, as in their previous hometown, the Extension office was in the bottom of the courthouse in an area shared by several other offices. The staff consisted of an administrative assistant and two educators to cover all client needs. They were excited about speaking with specialized educators. Bradley and Emily left the Morgan County Extension office pleased with the information they received on starting a small vegetable garden and raising chickens. They were excited about beginning the transition to a lifestyle of sustainability.

Introduction

As Extension celebrates 100 years in 2014, it is time to reflect upon the changing times since the Smith-Lever Act was signed on May 8, 1914, signifying the birth of Extension (Seevers, Graham, Gamon, & Conklin, 1997). The early concept of Extension began with rural residents informally exchanging ideas about farming and other problems associated with rural life in order to find effective answers (King & Boehlje, 2000; Rolls, Jones, & Garforth, 1986). However, it was after agricultural research became established that the need arose of how to disseminate the new information and technological developments to farmers, thus leading to the creation of Extension through the land grant universities (Rolls et al., 1986). Extension serves as the link between the land grant universities and the counties as a way of bringing research based, unbiased knowledge to the local people (Patrico, 2011; Seevers et al., 1997). The mission of the Cooperative Extension Service is "to enable people to improve their lives and their communities….by offering practical education" (Seevers et al., 1997, p. 11).

In 1914, the population and agricultural life in the United States looked much different than it does today (USDA-NIFA, 2014b). One hundred years ago, 31 percent of the population was employed in agriculture, but currently, production agriculture jobs account for less than two percent of all employment (Frobose, 2011). Urban areas now account for 80.7 percent of the United States' population, an increase from 79.0 percent in 2000 (United States Census Bureau, 2012), and even a greater increase from 46.0 percent in 1910 (Seevers et al., 1997). Rural populations continue to decline as a percentage of the national population (United States Census Bureau, 2012). Today, there are fewer farmers, decreased farm income, and a reduced number of jobs in the production agricultural sector (Röling, 2000; Röling & Jiggins, 1998).

Today's increase in urbanization makes agriculture less politically pertinent, creating a struggle for securing government funding for research and Extension (Röling, 2000; Röling & Jiggins, 1998). Because of a decrease in resources, there are fewer county Extension offices and educators to serve an increasingly diverse clientele base (Patrico, 2011; USDA-NIFA, 2014b). In order to compensate for the decreased number of Extension offices and educators, many educators today are specialized, covering multiple counties and no longer serve a single county as a generalist educator (Morse, 2006; Rolls et al., 1986).

Interestingly, it is the farmers who played a role contributing to the dispensable role of Extension. Today many farmers seek their information directly from the source of research or innovation (Clarke, 2003), as Extension is no longer the only source for information and educational opportunities (King & Boehlje, 2000). Many times today the Extension educator plays the role of peer consultant, helping farmers access information as opposed to offering expertise (Dillman, 1986). Today's farmers are more educated (Jones & Garforth, 1997) and business savvy than their peers were when Extension began in 1914, making them less dependent on Extension than they were 100 years ago (Frobose, 2011).

Today the goals of Extension have shifted away from productivity to a focus now on sustainability (Blackburn & Flaherty, 1994). Even though sustainable farmers are still a minority, they are rapidly growing in number and in production value, as the organic food market continues to grow (Ikerd, 2008). In 2012, organic food sales were $28 billion, over four percent of total at-home food sales, and that number is expected to increase to $35 billion in 2014 (Greene, 2013; Greene, 2014). Working with these farmers offers a remarkable opportunity for Extension, if willing to adapt. In fact, what these new "farmer[s] need from Extension is a 'guide on the side'—a county agent" (Ikerd, 2008, para. 44).

Extension is facing the same problem that threatened and led to the eventual ending of the Pony Express, "survival in changing times" (West, Drake, & Londo, 2009, abstract). However, by shifting focus to new areas, Extension's public awareness and support will likely increase (Milburn, Mulley, & Kline, 2010). Extension educators "need to be highly agile in their approach to dealing with clientele" (Milburn et al., 2010, para. 29), and while it is tempting to return to structures, methods, and technologies that worked in the past, it is counter-productive. "Extension must embrace change to continue to be seen as relevant in a service industry that is vulnerable to decline" (Milburn et al., 2010, para. 29).

Urban Extension: A Review of the Literature

The first Extension educators were able to adapt to new information and methods with ease primarily because of their established relationships with families, familiarity with the communities, and an understanding of the cultures and values within the rural sector. However, communities have evolved and expanded over the last 100 years with a shift in population, forcing Extension programming to change as well (Borich, 2001; Schafer, Huegel, & Mazzotti, 1992). The shift to urbanization, coupled with a more knowledgeable farming population, requires a different type of Extension Service, one that focuses "on the quality of interaction between agent and client rather than on the movement of 'messages' through a hierarchical system" (Jones & Garforth, 1997, para. 45).

The idea of addressing the urban Extension clientele is not new. In fact, in the late 1950's and early 1960's, a Ford Foundation urban program conducted pilot urban Extension programs throughout the country resulting in "urban agents" (Ford Foundation, 1966, pp. 2-3). Inner cities have become more important with the population shift, requiring Extension educators to adjust the programs they deliver and the approaches they use (Borich, 2001). However, there is a lack of experience among Extension educators who have worked in urban communities (Webster & Ingram, 2007). Some researchers have noticed that Extension needs to do a better job at reaching urban clientele (Fritz, Karmazin, Barbuto, & Burrow, 2003), yet the question still remains as to whether or not Extension should even increase its presence in urban areas (Nelson-Smith, 2011). Nonetheless, there is an increased need for Extension educators to work in urban communities (Webster & Ingram, 2007). Since the role of the Extension educator is now broader than that of the rural farm life, educators need to develop their skills in negotiation, conflict resolution, and cultivating community to be successful in urban environments (Garforth, 1993; Smith, 1994).

Frustrations extend beyond urban Extension educators on the local level, as the USDA-NIFA Cooperative Extension System has its own set of obstacles to overcome when reaching urban America. These difficulties include: limited resources or budgets (Fehlis, 1992; National Extension Urban Task Force, 1995; Warner, Christenson, Dillman, & Salant, 1996); limited awareness (Jacob, Willits, & Crider 1991; Warner et al., 1996); limited networks or partnerships (Fehlis, 1992; National Extension Urban Task Force, 1995); and limited issues or program topics addressed (Krofta & Panshin, 1989; National Extension Urban Task Force, 1995; USDA-CSREES, 2000). The literature raises the issue, are urban Extension programs and their educators aligning with the changing population and needs of their clientele?

Focusing the Case

The purpose of this instrumental case study (Stake, 1995) was to understand the structure of an urban Extension office and to recommend further research needed involving urban Cooperative Extension offices. Two questions guided the study: (a) What factors influence the structure of an urban Midwestern Cooperative Extension Service office? and (b) How does the current structure help accomplish the goals of a Midwestern Cooperative Extension Service?

Methodology

We utilized a qualitative, instrumental case study to describe the structure of an urban Extension office and the factors influencing its structure. An instrumental case study focuses on exploring issues within a case in order to better understand something else (Stake, 1995). Studying the urban Extension office helped us to better understand the structure and the influential factors of this type of office. Stake's (1995) concept of a single, bounded case was employed, as the case was bounded by time, two on-site visits, and place, the county Extension office. A thick and rich examination of an urban Extension office situated in a predominately rural Midwestern state unraveled its structure, ultimately revealing how it operates differently to accomplish the mission of the Extension Service. The urban office was selected due to its atypical nature and to help us "maximize what we can learn" (Stake, 1995, p. 4). The Morgan County Extension office is an unusual case, as it is one of three urban counties in a Midwestern state monopolized by rural counties. Stake (1995) noted that "often an unusual case helps illustrate matters we overlook in typical cases" (p. 4). We chose to examine a single case because details are often diluted when examining multiple cases (Wolcott, 2008). The intention of an instrumental case study is to deeply understand the case at hand, while no attempt should be made to understand other cases (Creswell, 2013). Others should transfer the lessons learned from this case to other situations should they see similarity, while no attempts to generalize should be made (Creswell, 2013).

Participants (n = 6) for the case study were purposefully selected, as they were all staff in Morgan County representing the gamut of positions: Jessica, county Extension director; Cheyenne, head administrative support specialist; Donnie, horticulture educator; Natalie, traditional 4-H educator; Mallory, urban 4-H educator; and Elsa, Community Nutrition Education Program coordinator. Prior to any contact with the participants, Institutional Review Board (IRB) (AG-14-13) approval was sought and granted, confirming that the study adhered to the guidelines for ethical and responsible conduct of research involving human subjects. Initial contact was made with the county Extension director who agreed to participate in the study, and who subsequently provided us with a list of staff members in the office. We then selected from the list five additional staff members representing a variety of areas, and we telephoned them inviting them to participate in the case study. An approved telephone recruitment script was followed when speaking with the staff members to arrange dates and times for the interviews.

Semi-structured interviews were the primary data collection tool utilized for the case study (Creswell, 2013). Six one-hour interviews were conducted in the Extension office with the six staff members following an approved interview protocol. The semi-structured face-to-face nature of the interviews allowed for the emergence of issues, leading to additional questions. We recorded the interviews digitally on an iPhone®, as to allow for a more accurate representation of the data. Besides conducting interviews, we spent time in the Extension office observing the interaction of staff members and the daily routine activities. We used *memoing* to record our observations and ideas to help us later in data analysis (Creswell, 2013). Furthermore, two of the participants and one volunteer whom we encountered in the office gave us flyers, fact sheets, calendars, and booklets serving as further documentation. We also took photographs of the office and the surrounding fairgrounds to complete the holistic picture of the case. *Triangulation* of the data in this manner served to enhance its credibility (Tracy, 2010). After transcribing the six interviews verbatim, we then coded the data, documents, and photographs using QSR NVivo 10® computer software using the deductive, *constant comparative* method (Creswell, 2013). Following the coding of the data, codes were clustered into four themes (Creswell, 2013).

Quality is extremely important in qualitative research, as it serves to establish trustworthiness of the study (Tracy, 2010). One of the practices Tracy (2010) outlines, credibility, can be accomplished by thick, rich, concrete descriptions of the case. To achieve this, an extensive *audit trail* was maintained to document observations, data collection, coding, and reporting throughout the case study. Descriptions deepen the meaning, as it is essential to show, rather than to tell the details of a case. *Multivocality* was accomplished by providing “multiple and varied voices in the qualitative report and analysis” (Tracy, 2010, p. 844). We inserted numerous quotations from the participants in order to better interpret the case. “Qualitative researchers do not put words in members’ mouths, but rather attend to viewpoints that diverge with those of the majority or with the author” (Tracy, 2010, p. 844). Although we had our biases, we listened to the participants, making certain to report only their words in the appropriate contexts. Besides allowing the participants’ words to speak for themselves, *member reflection*, taking the form of *member checking*, was employed as a way to allow participants to examine the transcriptions and to report for accuracy (Tracy, 2010). Research quality was also enhanced as the researchers participated in weekly peer-debriefing meetings with other researchers who provided feedback.

As researchers, we brought different backgrounds to the interpretation of the case. We kept reflexive journals throughout the study, as to minimize researcher bias. According to Tracy (2010), *self-reflexivity* helps to establish sincerity, another practice enhancing the quality of qualitative research. “Self-reflexivity encourages writers to be frank about their strengths and shortcomings” (Tracy, 2010, p. 842). One of the researchers worked over eight years as an Extension agent in a rural county in a Southern state, never having been exposed to the pointed differences of an urban county. On the other hand, another researcher worked five years as an agricultural education teacher in a Midwestern suburban high school in the same state as the case. The third researcher was not involved in data collection, but rather served as an outside voice providing an external audit of the deductive process (Creswell, 2015). Our reflexive journaling involved *bracketing*, or setting aside of our experiences, of our biases. Bracketing allowed us to more accurately describe the case, achieving *epoche*, so we could deliver the case description from an *emic* perspective, or that of the participants (Creswell, 2013).

Tracy (2010) posited that ethics should be at the foundation of all qualitative research. We, as human instruments, were cautious that *procedural*, *situational*, *relational*, and *exiting ethics* were addressed. Prior to each interview, we explained to each participant our interest in exploring the structure of an urban Extension office with hopes of this knowledge enhancing future practices. Pseudonyms were given to each participant to ensure anonymity. “A situational ethic asks that we constantly reflect on our methods and the data worth exposing” (Tracy, 2010, p. 847). In other words, as researchers, we were sure to ask ourselves, “Do the means justify the ends?” (Tracy, 2010, p. 847). We carefully considered each quotation and piece of the data prior to including it in the report. *Reciprocity* is key in achieving relational ethics (Tracy, 2010). Our researcher team and the Extension staff benefitted from the study, as the staff members were willing to share their thoughts on the structure of their office, while we agreed to report the findings for an understanding of the structure of urban Extension offices. Lastly, exiting ethics were addressed, as we were careful to leave the on-site interviews with accuracy. We followed up with participants asking them to engage in member checking, so we would avoid unintentional misrepresentation of the data (Tracy, 2010).

Emergent Theoretical Lens

The findings and assertions of this case study are explained best through two theories, which help to focus the study (Anfara & Mertz, 2006). Henry Mintzberg’s (1992; 2009) theory of Five Organizational Structures explains the two external themes, while Kim and Mauborgne’s (2005a; 2005b; 2005c; 2009) Blue Ocean Strategy best elucidates the remaining two internal themes. Both theories emerged, creating the optimal theoretical lens in which to interpret the findings of this instrumental case study (Creswell, 2013).

Mintzberg (1992; 2009) theorized that organizations can be distinguished among three dimensions: (a) the key part of the organization (the part that plays a major role in determining the organization’s success or failure); (b) the prime conditioning mechanism (the major method used by the organization to coordinate activities); and (c) the type of decentralization used (how much the organization involves subordinates in making decisions) (Lunenburg, 2012, p. 2). Mintzberg (1992; 2009) further suggested that the strategy adopted by an organization and the degree to which it practices the strategy, in turn influences the organization’s structure. There are five structural configurations influenced by the three dimensions. They include: (a) *simple structure*; (b) *machine bureaucracy*; (c) *professional bureaucracy*; (d) *divisionalized form*; and (e) *adhocracy* (Lunenburg, 2012, p. 3).

Kim and Mauborgne (2009), like Mintzberg (1992; 2009), also suggested that an organization’s strategy could shape its structure. This reconstructionist approach, known as Blue Ocean Strategy, can best be described as, “making the competition irrelevant by creating ‘blue oceans’ of uncontested market space” (Kim & Mauborgne, 2005c, p. 22). Red oceans, on the other hand, represent existing industries, or “known market space” (Kim & Mauborgne, 2005c, p. 25). Blue oceans symbolize industries not in existence, or “the unknown market space” (Kim & Mauborgne, 2005c, p. 25). Blue Ocean Strategy is not about fighting competitors, as competition creates “nothing but a bloody red ocean” (Kim & Mauborgne, 2005c, p. 22). Creators of blue oceans do not consider competition as a benchmark (Kim & Mauborgne, 2005a), but rather use value innovation (Kim & Mauborgne, 2005c). Value innovation is about making a strategic move by jumping into a new market, or blue ocean, leaving the competition behind (Kim & Mauborgne, 2005c).

Assertions, Discussion, and Recommendations

Four themes best illustrate the structure of the Morgan County Extension office. The four themes can best be divided into two subsets. Themes one and two provide an elaborate, rich description of the case (Stake, 1995), while our assertions and recommendations are interwoven into themes three and four (Creswell, 2013).

External Environment Alignment

Themes one and two offer a rich description of the case and explain how the Morgan County Extension office is aligned with the external environment. *Urban Uniqueness* and *Celebrated Central Power* best elucidate the details of the case and set the stage for themes three and four.

***Theme 1: Urban Uniqueness*-**Upon pulling into the parking lot of the Morgan County Extension office it is clear that it is different from the offices in the 74 rural counties in the state. Even before entering the building, it is noticeably distinct, as the large building is situated on the massive fairgrounds, and the entryway is surrounded by a beautiful, elaborate, well-manicured garden. Upon entering the double doors, visitors are greeted by a receptionist who directs them to the educator who can best answer their question, as there is a "specialist in every major area" [Elsa: 54].

All six staff members mentioned the large, diverse population in Morgan County impacting how the office is structured and operated. When asked why Morgan County Extension is structured the way it is, Natalie replied, "So we can focus on all of the demographics...we obviously have different demographics than what you would in Randolph County that's just neighboring us" [Natalie: 43-46]. The staff handles significantly more daily phone calls and walk-in clients than rural offices. Elsa commented, "If I had to say anything, it would be volume. The number of phone calls or the number of people that we work with in a week's time or a month's time, I think is significantly more than what someone in a rural county would" [Elsa: 893-896]. Clients from surrounding counties also utilize the Morgan County Extension office's services. According to Elsa, "We extend out…there are a lot of people who live outside Morgan County but work here so their day time phone calls and soil samples would be here in Morgan County" [Elsa: 499-501]. For an urban office, "it's sheer numbers" [Donnie: 161], a finding consistent with the United States Census Bureau (2012) documenting the increase in urban populations.

Having a large population lends itself to many more opportunities, program resources, partnerships, and volunteers than found in a rural county. Program attendance is larger. "We can put [the program] out in our 8,000 member e-newsletter that we're having a class...and I have the population that I can get numbers" [Donnie: 862-865]. Also, "[the media] reaches beyond the urban Extension office actually. It reaches as many people outside the county as it does inside the county," bringing in even more people to meetings, classes, and trainings [Elsa: 488-489]. The educators partner with local businesses for programming needs. "If I need something, all I have to do is make a few phone calls…I may have 20 garden centers where [rural counties] may have one or two" [Donnie: 477-478; 490-491]. Another staff member pointed out the support of the schools. “I have lots of things at my disposal…I can pull from lots of people, lots of resources” [Mallory: 458-459]. The large volunteer base is yet another advantage over a small, rural office, with Morgan County having a “Master Gardener volunteer program [that] is 400 people active” [Elsa: 106-107]. These volunteers conduct programs all over the county and answer gardening phone calls and walk-in questions daily at the Extension office.

The extensive programming offered by Morgan County Extension is supported by a large staff of nine highly specialized educators and several administrative assistants and program assistants. Morgan County funds the staff positions exceeding the two educators and one administrative assistant funded by the state. With the large, metroplex area comes “people who are more highly specialized than they would be in a traditional two county-staff office” [Elsa: 485-486]. There has been movement away from being a generalist educator to one who is more highly specialized (Harriman & Daugherty, 1992; Rolls et al., 1986) and serving those in a growing urban population (Frobose, 2011). The movement toward highly specialized educators aligns with the second dimension of Mintzberg’s (1992; 2009) theory, prime coordinating mechanism. In this context it can be described as standardization of work processes, meaning staff members have specific job duties directing their work performance (Lunenburg, 2012). These highly specialized educators support Mintzberg’s (1992; 2009) idea of a machine bureaucracy because there is a high level of formalization and work specialization among all staff members (Lunenburg, 2012).

The large population seems to raise the level of expectation for the educators regarding their program area expertise. “They have to be a little more specialized and probably get that way pretty quickly because the level of expertise is expected to be pretty high in this community” [Elsa: 92-94]. This is consistent with the findings by Milburn et al. (2010) who said that Extension educators should be quick and responsive when dealing with clients and new, innovative approaches are expected. Having educators who “are really specialized” and “really an authority” [Elsa: 508; 510] adds to the credibility and richness of the programming.

While the Morgan County staff definitely recognized the perks of being an urban office, they also mentioned that with the large population, come challenges and competitors. As Elsa commented, “Here it’s more challenging to get things done because there may be other people working on a part of what you’re working on so you’re not the only game in town” [Elsa: 82-84]. Entities such as the large chain home improvement stores, garden centers, the botanical gardens, the health department, the Food Security Council, youth sports teams, FFA, and other university linked entities are all competitors for the Extension Service. Just as King and Boehlje (2000), mentioned, Extension is no longer the sole source for information and educational opportunities.

Theme 2: Celebrated Central Power-The Morgan County office is managed administratively through the state land grant university, but funded jointly by both Morgan County and the land grant university. The Morgan County office is overseen administratively by a county director who serves as a liaison between the district director and the other staff members. The county director is at the top of the chain of command within the office, with the administrative assistants, program assistants, and educators reporting to her. Morgan County’s structure is a result of “history and what has worked and what has not worked” [Donnie: 249]. Staff members do like the organizational structure currently in place, and remarked that it works well to meet the needs of the clientele. Two educators commented, “This works” [Donnie: 265], and “I really do like the structure here" [Natalie: 104]. Even though the district director communicates the directives to the Morgan County office staff through the county director, the county director is the one in charge and is "pretty tight on directing the office" [Natalie: 175]. Several commented, "[The county director] is in charge" [Cheyenne: 59], "Our first accountability is to our county director here in this office," [Cheyenne: 80-81], and "As far as what you think of as the classic 'the boss' kind of thing, she's that kind of a boss with the support staff, she's the end of the road there" [Cheyenne: 83-85]. With the county director being the most influential, "she definitely influences how the office operates" [Cheyenne: 178]. In fact, Jones and Garforth (1997) conjectured that the Extension Service has become more bureaucratic as times have changed. Many Extension Service organizations now have "distinct hierarchical structures," and some are being criticized for "being top heavy and top-down in their approach" (Jones & Garforth, 1997, p. 10). Though the literature articulates this viewpoint, the staff likes this structure in the county.

The county Board of Commissioners also influences the structure of the Morgan County office, as it budgets funds each year for facilities, personnel, and operating costs. The county director is the one who communicates with the Commissioners, keeping them up-to-date with Extension programming and how the needs of the county are being met. Elsa mentioned the importance of having a good working relationship with the Board because it can impact how much money is budgeted. She also emphasized the importance of having a county director willing to get out in the community and promote the Extension Service. "It's really key in this community to have somebody that is willing to be very visible that's an outgoing person…the current county director that we have is one of those people; she's very proactive " [Elsa: 479-480; 832-833].

The Morgan County structure aligns with Mintzberg's (1992; 2009) theory of Five Organizational Structures, machine bureaucracy structural configuration. A machine bureaucracy's key part is the technostructure, which can be compared to the administrative assistants, the program assistants, and the educators at the Morgan County Extension office. These individuals compose the majority of the staff and in turn play a major role in determining the organization's "success or failure" (Lunenburg, 2012, p. 2). Its prime coordinating mechanism is standardization of work processes, which corresponds with each staff member having specific job duties that direct his or her work performance. These job descriptions are the major method used to coordinate daily activities and duties (Lunenburg, 2012). Morgan County's type of decentralization used, limited horizontal, aligns with the power of the district director and county director making the decisions and communicating them to the staff members who are not involved in the decision-making power (Lunenburg, 2012). The Morgan County office further aligns with Mintzberg's (1992; 2009) theory in that there is a high level of formalization and work specialization among the staff members. The structure is tall, meaning there are many levels in the chain of command from the top down, and not much horizontal or lateral coordination is needed, resulting in narrow management. We concluded that Mintzberg's (1992; 2009) theory best explains the Morgan County Extension office's structure, as its technostructure and the support staff are both large with power centralized at the top (Lunenburg, 2012).

Internal Environment Alignment
Upon uncovering themes one and two, we now understand how they align with the second subset, the internal environment of the Morgan County Extension office. *Resistance to Change* and *Thirst for Change* shine light for our interpretations, assertions, and recommendations.

Theme 3: Resistance to Change-A common feeling of frustration due to an identity crisis surfaced during the interviews. When asked about possible improvements to the structure, each staff member spoke about the same challenge, “a lack of identity” [Jessica: 632]. “They really don’t quite get it like they do in what I have found in a smaller community” [Elsa: 121-122]. A staff member went on to say, “A lot of the people don’t understand that we’re here. They don’t know about us” [Donnie: 656-657]. This local level frustration aligns with the USDA-NIFA Cooperative Extension System as it too noted that limited awareness (Jacob et al., 1991; Warner et al., 1996) is an obstacle to overcome in urban America. However, many of the people who do know about the Extension Service do not associate all different programming areas together or “don’t know everything that they can do at the Extension office” [Natalie: 524-525]. One staff member said, “[The clients] see it as the Master Gardener office…those who are involved in 4-H see it as the 4-H office” [Mallory: 306-307]. The staff members say “it’s hard to get the overall package” [Cheyenne: 694]. All agreed that the “marketing piece” is missing [Natalie: 896]. “Probably the biggest thing as to why people don’t know what [Extension] is, is we’re just continuing to keep it the best kept secret, so you know, marketing is the way to help with that” [Natalie: 457-459].

Most of the staff members either lived or worked in a rural county prior to coming to Morgan County. This aligns with Webster and Ingram’s (2007) documentation of a lack of experience among Extension educators in urban settings. Additionally, most grew up knowing about the Extension Service and those who previously worked in rural offices were accustomed to clients knowing them by name. However, the staff members mentioned that many times now when they go to different events throughout the county, people “have no clue who [we are]” [Elsa: 209-210]. “You can just be very invisible when you’re in a city, urban, area” [Jessica: 780].

Many of the clients that staff members served in their rural counties had depended on the Extension Service for generations, and it had become a way of life. “When I talk to people that are in small counties that tend to have the same people and families and maybe have 4,000 people in the county and we have 600,000, it’s just a lot more movement and you have a lot more choices” [Jessica: 357-360]. However, staff members have found that clients in Morgan County are much different, as “people are in and out” [Elsa: 134]. There is a “much more transient population so they haven’t grown up with [the Extension Service]” [Elsa: 131-132]. Being an urban county, “there’s a lot of mobility, there’s people moving in, they move out, they join this group, and they decide they don’t really have time to do that” [Jessica: 268-270].

Unlike rural counties that have limited options for clubs and other activities, there are countless activities in Morgan County that people can join, which leads to a lack of commitment to Extension groups. As a result, “[4-H club leaders] get so frustrated because people won’t stay committed to the club and they can’t get anyone to help” [Jessica: 282-283]. In small, rural counties, there are many lifelong volunteers, but in Morgan County, most “transition out” [Jessica: 594]. There is “a large turnover of volunteers in the county. We have a large turnover of club membership…our county is that way” [Jessica: 264-268].

The staff members seemed to be more comfortable with what could be described as a traditional Extension program than an urban Extension program. One educator commented, “We don’t get to do a lot of different programming like a smaller county would” [Donnie: 193-194]. Another said in reference to volunteers, “I’m more of a volunteer manager…my role is to train them” [Donnie: 186; 189]. Instead of working directly with clients as he might do in a rural county, the sheer volume of clientele forces him to divide up the responsibilities among volunteers. From their comments, it seemed as though staff members wished they could function and structure their programs more in line with a traditional Extension program found in a rural county.

Perhaps the identity crisis described is more of a result of a misconception of the staff members thinking that the Extension Service is completely unique. While we do agree that the Extension Service is the only entity providing nonbiased research based information at no cost (USDA-NIFA, 2014a), there are multiple agencies that do provide similar services, programs, and information that compete with the Extension Service (King & Boehlje, 2000). However, it appears that staff members are focusing on these red oceans of competition, rather than utilizing value innovation and creating blue oceans of identity (Kim & Mauborgne, 2005c). Another source of the identity crisis could be misalignment with the actual needs of the people, as opposed to the result of poor marketing. Some of the needs of urban clientele are different from those of rural clientele, so by aligning more with the needs of the clientele, the identity gap would be bridged and Extension would no longer be invisible.

The perception that staff members have of invisibility could possibly best be described as an internal resistance to change. If the staff members continue with the mindset of a traditional rural county Extension program, they will continue to remain invisible to the people of the county. Acting in congruence with the needs of the clientele will hopefully eliminate the identity crisis they now face. We also suggest making sure that the staff members who are hired to work in an urban setting are a good fit and understand the urban clientele’s unique needs.

Theme 4: Thirst for Change-The needs of the Morgan County clientele are somewhat different from the typical needs and interests of clients who reside in the majority of the counties in the Midwestern state. Several staff members stated that the majority of clients they serve are young professionals with families. The typical client is not the farmer as it might be in a rural county. The urban clientele “want to be more self-sufficient” [Cheyenne: 391]. There is a trend toward self-reliance and a desire for natural food products, just as found in the literature with the focus now on sustainability (Blackburn & Flaherty, 1994). “It’s just this self-preservation thing and they just want to be self-sufficient” [Cheyenne: 400-401]. There is a “big fad now…everyone wants backyard chickens” [Mallory: 160]. Many urbanites also have an interest in “teaching their little kids some of the older ways of doing things” [Cheyenne: 401-402]. The staff mentioned that “people don’t like where their food is coming from or they don’t like what’s in their food anymore, so they want to grow their own food. They want to have chickens in their backyard that they can process and eat” [Mallory: 959-963]. This supports Ikerd’s (2008) finding that the organic food market continues to grow. Many people who live in urban areas want to move out to the rural areas but cannot afford to do so. To compensate, they “make their backyard this little piece of rural area where they have their own animals and their own garden” [Mallory: 967-969].

Urban residents are not interested in what one would think of as traditional Extension programs such as large livestock production, row crops, or forestry. Instead, they want to learn how to start their first garden, learn how to can, or raise small livestock in their backyards. Urban clients exhibit a thirst for change from the traditional programming offered in rural counties. The research clearly maintains that Extension as a whole needs to do a better job at reaching urban clientele (Fritz et al., 2003). Urban Extension educators should be aware of these needs and adjust the programs they deliver and the methods they use when working with urban clientele (Borich, 2001). The Morgan County Extension staff may be acting as though they are serving traditional clientele who have strong ties to the Extension Service, having been served for many generations. In actuality, the staff should realize they are serving a transient clientele who does not necessarily desire a strong relationship with the Extension Service. Urban clientele perhaps have a different perception of the Extension Service than do rural clients, as they may not view the Extension educators as lifelong friends who they interact with on a regular basis. These urban clients may strictly view the Extension Service as a business that provides them with free, unbiased researched based information and nothing more. This could be because they know they will not stay in the area long and do not see a purpose in forming close relationships.

When the Morgan County Extension staff members adjust their actions and approach to be in line with the thirst of their constituents, realizing that sustainability is at the top of their lists, the Extension Service will no longer be invisible. Further inquiry is needed to determine the best professional development opportunities that could aid staff members in transitioning from what they learned while growing up in or working in a traditional Extension program. Staff members' passion for traditional Extension programming and methods can no longer guide them. Rather, this case study suggests they should consider adjusting and meeting the needs of this new urban phenomenon. While 74 of the 77 counties in this Midwestern state may indeed need a generalist educator, the three remaining urban counties need a specialized educator (Harriman & Daugherty, 1992; Rolls et al., 1986). Urban Extension staff can either become content with the small number of clientele they currently serve who need traditional Extension programs, or they can adjust to the different needs of their clientele by moving out of the red oceans of competition and create new blue oceans of opportunity (Kim & Mauborgne, 2005b).

Even though some do believe that the Extension Service is dangerously approaching irrelevance, this predicament can be rectified with "bold and visionary leadership that addresses Extension's niche and mission, funding challenges, marketing strategies, and rigor" (West et al., 2009, abstract). Extension can survive, but needs to redefine itself to do so. Many educators are wary about "abandoning traditional clients," but will need to do so in order to survive (West et al., 2009, para. 9). "Once Extension better defines its modern-day niche," by creating blue uncharted ocean waters, program visibility will increase as more clientele are reached (West et al., 2009, para. 12). As a result, there will be increased support on all three levels, local, state, and national (Kim & Mauborgne, 2005b; West et al., 2009). However, even after creating a blue ocean, Extension must remember this is a dynamic process, as competition will immediately start to jump into the newly created blue waters, turning them red. To prolong its growth and profit, Extension should "[swim] as far as possible in the blue ocean, making itself a moving target, distancing itself from potential imitators" (Kim & Mauborgne, 2005c, p. 28). Finally, a constant thirst for blue waters will help Extension find its distinction rather than risk extinction in the red waters of competition (Kim & Mauborgne, 2005b; King & Boehlje, 2000).

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An Assessment of Equine Assisted Growth Learning Association and Professional Association of Therapeutic Horsemanship Programs in Montana

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Abstract

Equine assisted activities are gaining popularity as a modern, alternative form of human therapy and learning. Services may include equine assisted or facilitated psychotherapy, equine assisted or facilitated learning, and therapeutic riding. Professional associations such as PATH Intl. and EAGALA have become the industry standards and paved the way for program development and growth in this area. In Montana, there are a limited number of programs offering equine assisted learning and no previous research has been conducted on the existence of these programs. This study examined the structure of Equine Assisted Growth and Learning Association (EAGALA) and the Professional Association of Therapeutic Riding International (Path Intl.) programs in Montana. The study also described factors and experiences that influence these programs and a professional logic model was developed based on results. Six individual case studies were conducted to describe and assess the structure of EAGALA and PATH Intl. programs in Montana. Findings revealed there is an increasing demand for quality, professional equine assisted programs. Several common needs were identified across cases including assistance in marketing and promotion, training on business planning and management practices, improved access to funding and capital resources, and building communication between programs and within communities.

Introduction/Theoretical Framework

Horses and humans have changed the face of our existence and developed a relationship documented throughout history (Fine, 2010; Netting, New, & Wilson, 1987; Turner, 2007). Ralph Waldo Emerson wrote, "The outside of a horse is good for the inside of a man" (as cited in Meagher, 2007). Mandrell's (2006) research supported the horse and human bond:

> Those who are familiar with horses recognize and understand the power to influence people in incredibly powerful ways. Developing relationships, training, horsemanship instruction, and caring for horses naturally affect the people involved in a positive manner. Working with horses improves work ethic, responsibility, assertiveness, communication, and healthy relationships. Horses naturally provide the benefits (p. 28).

Although the horse-human relationship is not new, the implementation of equine into the world of teaching and learning is a relatively new concept that has evolved over the last few decades. The use of equine assisted/facilitated psychotherapy (EAP/EFP) and equine assisted/ facilitated learning (EAL/EFL) are gaining momentum as alternative sources of therapy, learning, and educational programming (Equine Assisted Growth Learning Association, 2010). The Equine Assisted Growth Learning Association (EAGALA) and Professional Association of Therapeutic Riding International (PATH Intl.) are at the forefront of professional associations offering these alternative methods of therapy and learning. PATH Intl. and EAGALA have assisted in building professional standards and guidelines for programs offering these types of services. The EAGALA Model uses a solutions-oriented team approach for all of its therapy or learning sessions consisting of an Equine Specialist, a Mental Health professional, and horses to work with the client in EAGALA sessions. Effective and deliberate techniques are used where the horses are metaphors in specific ground-based experiences (EAGALA, 2010). The vision of PATH Intl. (2014) "is to be a global authority, resource and advocate for equine-assisted activities and therapies and the equines that inspire and enrich the human spirit" (para. 2). PATH Intl.'s mission is to promote safety and optimal outcomes in equine-assisted activities and therapies for individuals with special needs. Both EAGALA and PATH programs provide a similar framework of practices, but within these frameworks, there are infinite opportunities for creativity and adaptability to various therapeutic and facilitating styles (EAGALA, 2010). These types of programs are increasing in popularity as they are aiding a variety of clients suffering from various mental and physical ailments, seeking to further develop life skills, or achieving other educational goals, such as improving teamwork and communication skills. In the last few years, there have been an increasing number of EAGALA and PATH Intl. programs developed to serve populations ranging from youth to adults for a variety of emotional, physical, educational, and personal needs.

Animal assisted therapies began to emerge in the late seventeenth century as the preliminary therapies that paved the way for EAGALA and PATH Intl. programming (Freeman, Hooker & Stewart, 2002; Hallberg, 2008; Morrison, 2007). Animal-assisted therapies with both small and large animals have successfully been used to treat a variety of client disorders, issues and experiences (Allen, 2000; Altschuler, 1999). Medical professionals have reported unequivocal connections between the mind and body when pets are integrated into the therapeutic process (Fine, 2010). The care and responsibility of an animal has been utilized in assisting at-risk populations including prison inmates and veterans to develop positive relationships (MacLean, 2011; Walsh, 2009). EAGALA and PATH Intl. programs are unique in that they provide interactive learning and personal development sessions with equines, in a safe, protected, and non-judgmental environment in which clients can gain personal valuable experience (Mandrell, 2006). Clients are able to develop a close connection with the animal and translate those skills to other necessary relationships and life events. Animal therapies of this nature are different from all other therapy settings in that they involve not only the therapist, but another living being without bias toward the client or situation (Mandrell, 2006). There is substantial evidence of the therapeutic effects that occur in the day to day routines of horse ownership. Dorrance (2010) emphasized the importance of understanding the relationship of the horse and human bond, whether in the daily tasks around the horse, or the actual training and riding of the horse. The therapeutic benefits of horseback riding are many; from simply riding the horse to relieve daily stresses or utilizing the movement of the horse to assist in muscle movement and development during a hippotherapy session for a physically disabled rider (American Hippotherapy Association, 2010; Bueltmann, 2010; Hallberg, 2008). The American Hippotherapy Association (2012) defines hippotherapy as a "physical, occupational, or speech and language therapy treatment strategy that utilizes equine movement." The birth of equine assisted/facilitated psychotherapy has been a result of therapeutic riding and hippotherapy methods. These methods explore and facilitate the mental health and learning aspect of horses used as an alternative therapy or learning technique for humans.

EAGALA and PATH Intl. programs are based on several theories and epistemologies of psychology and learning processes, including behaviorism, social cognitive theory, constructivism, and experiential learning (Mandrell, 2006; Hallberg, 2008; Kolb, 1984). EAGALA and PATH Intl. apply many of these concepts in their program sessions which occur in non-traditional therapy and learning environments. These programs often utilize techniques aligned with behaviorism principles to address a variety of behavioral issues that a client may bring forth during sessions. Behavior modification therapies assist both adults and youth with various needs and backgrounds, such as traditional counseling settings, academic environments, prisons and mental health hospitals to remedy phobias, dysfunctional language, disruptive behaviors, unconstructive social interactions, inadequate child rearing practices, and low self-control (Skunk, 2012). Because sessions are held in non-traditional settings, EAGALA and PATH Intl. programs help move the client "out of his/her comfort zone and into new territories where words do not hold much power" (Mandrell, 2006, p. 69). Cognitive and social cognitive theories are established on the premise that there is a constant reciprocal relationship between a person's cognitions, behavior, and the environment (Fine, 2010). According to Fine (2010), the goal of social cognitive therapy is to "Bring about positive changes in a person's self-perceptions--and their behavior--via improvements in, for example, self-esteem, self-efficacy, internalized locus of control, and so on. Learning and change take place through observation, imitation, direct instruction, and/or association" (p.42). Enactive and vicarious learning theories are applied every day in classroom settings, non-formal instructional environments, and in EAGALA and PATH Intl. programming. This idea goes hand in hand with EAGALA and PATH Intl. practices where sessions allow clients to actively participate and engage in activities, as well as to observe and process what is occurring through these activities (Mandrell, 2006).

Constructivist learning environments are planned so participants can engage in rich experiences that foster learning (Barbara, 2004; Jonassen, 1999; Skunk, 2012). "The key is to structure the learning environment in such a way that students can effectively construct new knowledge and skills" (Skunk, 2012, p. 261). This concept is similar to the learning environments designed for clients in EAGALA and Path Intl. programming. Mandrell (2006) described the experience of EAGALA participants as follows: "Participants have fun as they learn new skills, new behaviors, new ways to interact with each other, new philosophies and values, and new cognition about themselves" (p.6). Cognitive and metacognitive factors consist of "the nature of the learning process, learning goals, construction of knowledge, strategic thinking, thinking about thinking, and the content of learning" (Skunk, 2012, p. 263). This concept is similar to the processing that occurs with a client during an EAP/EFP or EAL/EFL session which assists in personal development in the areas of increased personal awareness of issues, promoting change, reflection of an experience, and integration into life (Mandrell, 2006). Experiential learning and therapy approaches provide an operational framework used in equine assisted programming. "The mission of experiential therapy as used in EAP/EFP is to use horses, activity, and recreation to help people deal with problems that serve as barriers to health and to assist them in growing towards their highest level of health and wellness," (Mandrell, 2006, p. 5). Kolb's experiential learning model (1984) aligns well with EAGALA and PATH Intl. programs. EAGALA (2014) described "EAP as an experiential modality" (para. 2). This program allows the participants to learn about themselves and others through hands-on learning activities with horses followed by examination of their thoughts and behaviors. The Association for Experiential Education (AEE) also stated that "throughout the experiential learning process, the client is actively engaged in posing questions, investigating, experimenting, being curious, solving-problems, assuming responsibility, being creative and constructing meaning" (EAGALA, 2012, p.13). These AEE principles are referenced by EAGALA and PATH Intl. program practices and guidelines.

According to respondents of the 2014 EAGALA annual survey, 40,586 clients were served in 509 programs, 129 programs were from outside of the U. S., with the top populations defined as youth ages 10-18 years (65%), 56% with depression and anxiety, 41.3% with PTSD/trauma, 35.7% as families and couples, 29.7% with ADHD, 28.1% as self-improvement/wellness, and 27.1% ages 0-9 years. All of these populations were served by PATH Intl. programs as well. In 2014, there were just seven EAGALA modeled programs and five PATH Intl. program centers in Montana. Although Montana has a smaller population in comparison to other states, for its geographical size, there are a limited number of EAGALA and PATH Intl. programs currently available to the public. For these programs and other similarly designed programs to be implemented and accessed across the state, the structure, effectiveness, and impact of current programs warranted exploration. According to EAGALA (2014) and PATH (2014), there have been no studies conducted in the state regarding program structure, development and evaluation. Assessing the current and future state of these programs in Montana provided information about potential audiences, therapies, educational uses, and community benefits. Findings from this research also offered future programming recommendations and created a professional model that can be used by a variety of educational programs as a developmental framework.

Purpose and Objectives

The American Association of Agricultural Education National Research Agenda 2011-2015 Research Priority Area 4, Meaningful, Engaged Learning in All Environments, states that, "Research is needed to achieve the goal of having all learners in all agricultural education learning environments actively and emotionally engaged in learning, leading to high levels of achievement, life and career readiness, and professional success" (Doerfert, 2011, p. 9). This priority area also states the need to design, develop, and assess educational programs, learning environments, and delivery methods "for their impact on specific cognitive, affective, and psychomotor learning outcomes… for diverse learners in all settings and at all levels" (p. 9). The purpose of this study was to assess the structure and influences of EAGALA and PATH Intl. programs across Montana in order to develop future programming recommendations.
The specific objectives of the study were:

1. To describe the structure of EAGALA and PATH Intl. programs in Montana using programming models and theories.
2. To describe factors and experiences that influence Montana EAGALA and PATH Intl. programs.
3. To develop a professional model for EAGALA and PATH Intl. to utilize for program development and evaluation.

Methods and Procedure

For the purposes of this study, a multisite case study research approach was utilized. Several programs were selected to examine to show different perspectives of the issue being researched (Creswell, 2013). The population included a total of 12 programs in Montana listed as either as an EAGALA certified program or a PATH accredited center (EAGALA, 2014; PATH Intl., 2011). All programs were contacted for participation in the study. The final selection was based on willingness to participate and representativeness based on number of years in operation ranging from four to 30 years. Based on these parameters, this yielded a criterion sample of two Montana based EAGALA programs, two Montana-based PATH Intl. programs, and two national association directors, one from EAGALA and one from PATH Intl. association, for a total of six cases (Creswell, 2013). All cases participated in interviews lasting 30-60 minutes. The instrument was researcher-developed and reviewed by university subject matter specialists and mental health experts to reduce confirmation bias, and to increase objective rigor in the research process. The interview protocol was purposively semi-structured in design, which means that questions were more open-ended and allowed for further exploration when warranted (Merriam, 2009). The researcher took detailed field notes and audio recorded the interviews to ensure accuracy. This study also collected unobtrusive data from all cases. The unobtrusive data collected consisted of advertising, evaluation and assessment documentation, such as promotional fliers, educational handouts, session observation forms, or program evaluation forms.

All data were transcribed and compiled into a database for coding using a content analysis approach (Fraenkel & Wallen, 2009; Saldana, 2009). This approach was utilized to identify, organize, code, categorize, classify and label the main patterns found within the data (Patton, 2002). The researcher developed in-vivo categories, individual classification themes, and multi-level themes for each case (Carson, et al., 2001; Merriam, 2009). Data were analyzed in a series of two stages of analysis: within case analysis and cross-case analysis (Creswell, 2013; Merriam, 2009; Yin, 2009). The primary goal of a qualitative research, inductive, multi-case study is to build abstraction across the cases (Merriam, 2009; Stake, 1995). In this study, cross-case analysis referred to the findings that related to the structure, organizational frameworks and guidelines found within the specific cases to those unearthed in other cases.

The four measures of validity and reliability as described by Lincoln and Guba (1985) used to establish "trustworthiness" were credibility, transferability, dependability, and confirmability. To establish credibility, interview questions, transcriptions and coding were reviewed by the researcher and professional experts in education and psychology prior to implementation and throughout the research process. Unobtrusive data were also examined to verify and support details within the interviews. Transferability was established through transcription of interviews, detailed field notes, and rich descriptions of each case study. Creswell (2013) noted that "both dependability and confirmability are established through an auditing of the research process" (p. 24). For these measures, the researcher created an audit trail of data and field notes and provided thorough instructions of materials and methods used in data collection. In a multiple case study such as this, the researcher used a variety of sources, methods, investigators, and theories to provide supporting evidence of the research (Creswell, 2013). Methodological triangulation was achieved by collecting interview and unobtrusive data from each of the six cases. Investigator triangualtion was achieved through the use of three experts to interpret coding of the data (Denzin, 2006).

Results and Findings

Across-Case Analysis of Four Local Program Case Studies

Results from the across-case analysis of the four individual program cases revealed the following themes: program director background and education, program background and structure, program inputs, program outputs, populations served, program challenges, program needs, program opportunities and unobtrusive data. Each classification theme also consisted of multi-level categories. Three of the four program directors had a Master's degree, all had horse experience, and three were certified as a mental health professional or equine specialist. Directors achieved continuing education hours primarily by attending regional and annual conferences. The structure of programs was similar with each having a clear mission statement aligning with national association models and guidelines, and had been in existence from 4- 30 years. Two programs offered therapeutic riding and two offered EAP/EFP and EAL/EFL services. Two programs operated as a non-profit and one was identified as a corporation. Populations served were common across all cases including youth, adolescents, adults, and veterans suffering from either physical or emotional disabilities or a combination of the two, depending on the type of program. All cases mentioned that they not only serve client populations, but also build community partnerships integral to program success. As one director said,

> I still think it's an important thing to do to maintain connections with other agencies; have good relationships. I try to support other agencies even if our clients don't overlap. I see the benefit in the work we do. I want to leave things open like that because, who knows? I want to be available to them".

Program inputs were identified as volunteers and staff, funding and capital, continuing education, communication and networking and the implementation of life skill development into sessions. One director stated the importance of funding, "Keeping a program funded is a major challenge, so fundraising is pretty much what I do, and run the program." Implementing life skills into program sessions was a priority for all directors, "To help get some of these people back into the mainstream, getting jobs, have the goals that they attain here to be applicable to life, so that they can go out and be productive in the society that we live in". Client assessment emerged as a unique input as one participant explained, "We marry their input with what we do and with our knowledge of horses and physical and mental conditions. So it's just a blend of many things with a horse facilitating the actual therapy."

Outputs similarly identified across the cases were divided into two categories: activities and participation. All participants discussed the importance of understanding their primary audience's needs and designing specific sessions to best meet these needs. The activities conducted within programs were marketing and promotion; networking; facilitation of therapy and learning sessions; and continuing education, workshops, and trainings. Many of the programs facilitated workshops, trainings and continuing education hours for staff, program members or other volunteers. Assessment (client and equine training), media relations and technology were also described as fundamental activities that contributed to program success. Evaluation was a key component for all programs to assess structure, development, and outcomes. Most often, evaluation data was collected, analyzed, and interpreted to make a program conclusion or generate a client report. Evaluations assisted organizations in referencing back to guiding association principles and priorities such as mission statements, values, frameworks, and models. This process was a crucial factor to ensure the program remains aligned with its professional goals.

Short, medium and long-term goals were classified under program outcomes. Short term goals were increasing consumer awareness of equine assisted programs, expanding recognition of program services and benefits, and improving motivation of clients to use services. In order to meet client needs, directors must format sessions appropriately such as implementing life skills development into sessions to assist clients in being productive members of society. One participant explained this further,

> They don't know how to generalize, so we start from that point. My job is to help, when they are ready to translate the general skills into the examples of things in real lives. And once they know that, I don't have to take them until they are way perfectly well, because I've given them the skills to go and finish it.

Medium-term outcomes were classified as actions such as making positive changes in client behaviors, skills, decision making, and development. The long-term outcomes were identified as building strategic community partnerships, creating a plan for program financial stability, and clients' adjustment and productivity in society.

Program challenges identified by the cases concentrated on funding issues, high operating costs, loss of staff, low pay for staff, reimbursement of services under insurance, and lack of public awareness of the program and services offered. One director expounded about the many misunderstandings surrounding the definition and function of equine assisted services,

> When we try to talk about our program, people…just don't get it. Something is not clicking about what we do like we are doing animal communication, helping animals with their mental health problems, which is completely absurd. Anyways, there is so much misunderstanding; we get really horrible referrals. And so what happens, it ends up sabotaging the whole thing.

Time, necessary equipment, technology, community partners, research base, and educational resources in marketing, promotion, and volunteer and business management were all described as additional needs. Opportunities shared by programs were increasing communications within the community, involving colleges and universities, building stronger business plans, and improved collaboration between local programs to improve success and recognition.

Unobtrusive data was collected and coded from the four individual programs. The themes found were marketing, publications, internet communication, social media and forms of assessment. Marketing materials included posters, brochures, resource guides, and business cards. Publications included newspaper and magazine articles. Websites provided an extensive amount of information for members as well as for the public. All programs utilized email as a primary source of communication and were involved in the social media. Programs can be found on Facebook, Twitter, Pinterest, LinkedIn and Google +. With respect to documents used for assessment, programs had differing documents with some examples of a packet of releases and medical history forms, client and equine assessment forms, class and equine observation forms, and a horse and rider combination observation form.

Across-Case Analysis of Two National Association Directors

The themes for the two national association director cases were (1) director background and education, (2) association background and structure, (3) association inputs, recommendations, challenges and needs, (4) association outputs, recommendations, challenges and needs, and (5) unobtrusive data. Each classification theme consisted of multi-level categories explained. Both directors held master's level degrees and one was a Licensed Clinical Social Worker (LCSW). Both associations have clear mission and vision statements, a specific model, guidelines, and code of ethics set as standards for each respective association. EAGALA has been in operation for 15 years while PATH Intl. has been operating for nearly 45 years. EAGALA serves approximately 4,000 members and PATH Intl. approximately 8,000 members. Both associations were non-profit and offered their services at national and international levels. Both directors believed that certification of association members, continuing education for staff and members, technology use, volunteers, global input, and business planning and management skills were all valuable program inputs. The challenge of running a program as a business was explained by one director, "I think that a huge challenge is training people in this industry to know how to start a business and how to have a successful business." Funding was mentioned not only as an association input, but also a challenge. "People have to definitely realize there is an investment, a sacrifice of time and money that you have got to get from somewhere." It was explained that the majority of funding for local programs comes from grants, small participation, or favor services which can be difficult to maintain.

Outputs were related to activities and participation in the following areas: assessment; conducting workshops, meetings, trainings, and certifications; member resources; public awareness of the association or program and services offered; and populations of clients served. A variety of resources were produced by the association for members including an informational website, annual surveys, business planning and marketing strategies, networking groups, business consulting, and a public relations staffer. Both agreed that programs should always evaluate work through some type of measurement tool and described it as "a part of the association, a program output, and an important piece of a well-managed organization…Part of that process is the feedback loop where you are analyzing the effectiveness against benchmarks and instrument practices." Conducting workshops, meetings, trainings and certifications that served as member resources was also a critical association function. One director considered developing public awareness about the association and services offered an output, challenge, and need, simultaneously. One director discussed community demonstrations as an effective way to develop public awareness, and encouraged multiple programs to conduct these types of events collaboratively brings more credibility to all of the programs.

> The majority of programs that I am aware of that have pretty full loads are doing it through strategic partnerships, meaning that they are establishing contracts with agencies in their communities or schools, or more than just an individual type work and having relationships and agreements with them. The funding even comes through those agencies. So anytime you can develop those relationships in your community, then that's a good thing for sure.

Unobtrusive data was collected from the two associations and the following themes emerged: marketing, publications, Internet communication, and social media. Promotional materials available for members to download from the website included fact sheets, posters, flyers, and resource guides. Both associations publish and send quarterly magazines to members and both were featured in magazine and newspaper articles. Association websites provide extensive information for members and the public, including an annual survey with fact sheets of association and program statistics. One association posted a tool on its website to assist with translation of information into 52 different languages. Email was the primary source of communication and networking. Both associations were also engaged with the social media platforms of Facebook, Twitter, Google + and LinkedIn. One was active on YouTube, Pinterest, and ENews.

Conclusions and Recommendations

This qualitative multisite case study described and assessed the structure of EAGALA and PATH Intl. programs in Montana using programming models and theories, factors, and experiences. Results demonstrated that there is a need for EAGALA and PATH Intl. services in Montana and around the world. In order to fulfill this need, it is vital that programs align and evaluate their programs with structural frameworks and guidelines to provide top quality, professional services. By strengthening program development, directors and associations will be able to create and expand impactful programs for all populations. Using evidence from all cases, a program logic model was developed for EAGALA, PATH Intl., and other similar programs to develop, align, and evaluate programs. The model was constructed from the study findings and principles suggested by the University of Wisconsin Extension Program's Logic Model guide (Henert & Taylor-Powell, 2008).

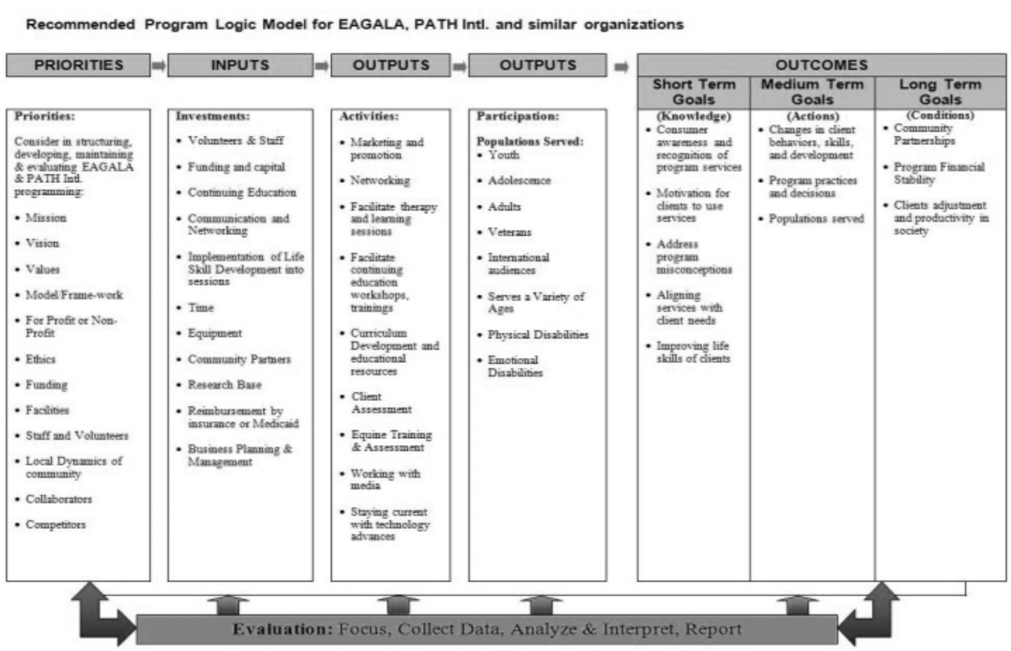

Figure 1. Recommended program logic model for EAGALA, PATH, Intl. and similar organizations.

In addition to national association frameworks, programs should be developing, formatting and implementing sessions in these ways to provide clients with the non-traditional form of therapy sought. During an EAGALA or PATH Intl. session, environmental features of behaviorism were emphasized across all cases within the program structure. Learning environments must allow the client to come into a session with no protocols. Each session should be designed for the client to work through a task and have the opportunity to explore issues or discrepancies without having to directly discuss it with the therapist. The director from case study one described this process saying that,

> When I bring somebody out here, they have no protocol, it's a novel environment. I assess here because in therapy a coping skill is to resist talking about things to defend ourselves. So I am going to look and I am not going to ask questions about discrepancies, I'm just going to take note of it. It's just to provide you with an opportunity to explore that discrepancy on your own and we don't have to talk about it.

The cases in this study described structuring sessions in such a manner to allow clients to observe, perform the task, and make changes accordingly based on their needs. This structure promoted the values of constructivist learning theory with emphasis on problem solving and the construction of knowledge in an authentic situation (Jonassen, 1999). Clients were able to work in a social setting, make observations of the situations and participate in hands-on activities resembling the cycle of experiential learning theory (Kolb, 1984; Skunk, 2012). Through these observations, activities, and group associations, learning and change were taking place (Allen, 2000; Fine, 2010). This framework provided clients with a unique, life changing experience that cannot occur in the traditional therapy setting. Additionally, EAGALA and PATH Intl. sessions aligned well with constructivist theory as the environment was naturally designed for clients to learn about themselves through the use of horses (Skunk, 2012). Cultivating sessions that supported this learning environment aligns with what many clients may be trying to find when seeking out alternative therapies, such as equine therapies. Integrating experiential learning can also be very beneficial in the design and development of client sessions. Kolb's (1984) model of experiential learning and the principles of experiential practice as developed by the Association for Experiential Education (AEE) were already used in programming. Many of the programs discussed the components of reflection, critical analysis and synthesis processes utilized within their therapy sessions. Directors specifically identified client decision-making processes, accountability and responsibility for personal actions, problem solving, and other transferable skills as important components. Implementing these theories and approaches into therapy sessions were vital to creating a beneficial, life experience for the client. Additionally, having a strong foundation and structure played a crucial role in building a professional program.

Across the six cases, all associations and programs had developed a clear mission statement modeled after EAGALA or PATH, Intl. frameworks. One important decision mentioned within the cases was the determination of whether or not the program will operate as a non-profit or for-profit business. Based on this decision, needs differed for resources, volunteers, expenses, funding, insurance, and clients. One association director emphasized the importance of maintaining professionalism as a key factor to program success. She commented, "I haven't met many programs that didn't stick to high standards that have been able to be successful." There was also an identified need for more educational resources to be developed for local programs. Funding and the need for qualified volunteers was described as both a challenge and a need by all of the cases. Many of the programs explained the high costs involved with running an equine program along with the challenges of managing people. To address these issues, a workshop, training, or guide provided by the associations should be developed in each of these areas for program staff. Participants mentioned that it would be valuable for associations to develop a business and volunteer management curriculum as the majority did not have educational backgrounds in these areas.

Employing a professional staff was imperative to the livelihood of a program. One way to support staff was to require participation in a set number of continuing education hours on an annual basis. The majority of cases described continuing education as an important input for staff and volunteers to continue to grow, keep up with industry changes, and to enhance the quality of the services offered. Upon certification in EAGALA or PATH, Intl., members receive a program manual with certification or renewal. To assist in upholding the highest standards of practice, each certified professional should refer back to manuals periodically to evaluate their practices. The manual provides a variety of developed teaching and learning activities that can be used in different settings to meet the individual goals of various clients and reinforce association guidelines. Implementing a mandatory mentoring program for all levels of certification is recommended and would enhance the professional development of staff. Parent associations could develop mentoring programs for directors at different stages of program development. New programs, continuing programs, and established programs all have different needs for staff involved. It might be beneficial to form mentoring networks for programs at different stages so that they can share advice and information. Associations could also include mentoring programs as an option for continuing education credit.

The implementation of life skill development into program sessions has been incorporated by the majority of the cases in a variety of ways that align with life skill models (World Health Organization Department of Mental Health, 1998) Both EAGALA and PATH Intl. emphasized the importance of incorporating life skills into sessions to further assist their clients in adapting into society, as well in their daily life skills. For some clients, this included finding jobs in the community; routine daily tasks, such as taking care of themselves and those around them; developing and maintaining healthy relationships; building confidence and other personal skills that may not have been possible before participation in the program. The majority of directors addressed these areas within program sessions. A future recommendation would be for programs to utilize this model for curriculum and session development, as well as a tool for evaluation of practices. Program directors could incorporate these life skills into each session by making a plan with specific activities for each area as part of every session.

Assessment processes and measurements were also considered vital components of programming. A necessary element of client assessment was communicating with the client‘s parents or guardians, spouse, caregivers, or educators. This type of assessment can be conducted in a variety of ways including through regularly scheduled meetings and questionnaires. Incorporating this input with the staff's knowledge of horses and human mental and physical health conditions plays a vital role in placement of client into an appropriate session, and is necessary to operate an effective program. Assessment should also occur to examine the client's strengths and weaknesses, both physically and mentally, to ensure safety. These assessments can be used to track and document client progress and to examine association and program outputs, outcomes and impacts. The assessment of equine should also be included as a key factor to program success. It is critical that the horses are well trained and qualified to work in various situations. A recommendation for the national association would be to develop a standarized list of mandatory qualifications that each horse must meet as well as a standardized form which must be completed on each horse after every session. This would provide valuable information to track each horse's behavior and to ensure the safety and well-being of that horse, and the client working with that horse.

Communication and networking within the community was described across all of the cases as a fundamental component of programming and plays a crucial role in developing strategic relationships and partnerships. Relationships with local community agencies, schools, universities, and justice systems are essential inputs to the growth, development, and in some cases, funding of an association or program. One association director made note that the vast majority of programs that had full workloads were ones that were constantly engaged in communication and networking practices. A recommendation for programs is to collaborate both within their local communities and with each other. Between program collaboration would result in reduced costs in the areas of advertising and marketing, establishing community awareness, and increasing credibility across the programs as a unified entity. Networking was also described as an effective way to increase consumer awareness about this type of work and to generate new ideas for program growth and development. A lack of consumer or public awareness was considered as both a challenge and need by all six cases. It was identified that are a common misconceptions about what exactly equine therapy is, to whom it is serving, and how it can be beneficial. A recommendation would be for the association or program to facilitate and host community demonstrations of the services offered, provide informational resources and guides, and to become more involved with the media. Developing an educational campaign about the services offered would be highly recommended to assist in this process. One of the case study programs created and implemented a local horse show and community event in which its clients and their families participate. Educating the youth, who are the future, is another essential element of creating public awareness. In the college and university systems, there are often students interested in this line of work, but do not have the resources available to them to become educated about equine therapies. This is partly because this is a new and upcoming industry with limited research available. A resource recommendation would be to develop courses in which these students could enroll to learn about this alternative form of therapy, and to eventually become certified. It was also identified that several programs had waiting lists for their services; therefore, there is an increasing demand for these services, which results in an increased demand for certified, qualified professionals available to implement them. All cases utilized various sources of marketing and promotional materials such as flyers, posters, resource guides and brochures; however, the majority of programs relied primarily on Internet communication and social media for marketing and promotion. In order to continue increasing consumer awareness, Internet communication and social media presence needs to take precedence as a priority. The development of a detailed, current and up to date website and Facebook page demonstrates that the program is staying current with industry standards and creates a professional appearance. This may likely result in an increased understanding and knowledge of the program and services.

Recommendations for future research would be to conduct a series of multiple observations within each program. Observations would provide a means of identifying the actual practices occurring within each program. A closer examination of programs accepting insurance and Medicaid would be beneficial to programs struggling with this matter. Conducting a regional and national study of these programs to examine if the findings from this study are consistent would assist in developing a more inclusive and comprehensive model appropriate for the equine therapy programs. A longitudinal study of the cases could also be conducted to examine any changes and developments that may be occurring within these programs. An examination of educational course work and programs offered by colleges and universities would assist in implementing programming at other colleges and universities. The short, medium, and long-term outcomes of programs on clients could also be examined by specifically talking with clients. A thorough review of current and potential funding sources available to assist local programs should be conducted that could lead to further growth and development. Finally, an examination of other special needs, therapy, and learning programs that utilize equine should be investigated to expand and refine the program logic model developed in this study.

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Identifying Student Cultural Awareness and Perceptions of Different Cultures

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Abstract

The population of the United States is growing and increasing in cultural diversity. Of the total U.S. population in 2010, 50.48 million were of Hispanic or Latino origin. Colleges and universities must prepare students to be successful in this diverse work place. Agricultural college students must know how to navigate diversity in order to adapt to an ever-changing industry; one that employs a large number of foreign-born and possibly undocumented immigrants, and all the complexities of decisions made that involve this workforce. Bandura's social cognitive theory provides the framework for teaching students to have a multicultural mindset leading to positive attitudes and behaviors toward immigrants. This study investigated the colorblind racial attitudes of undergraduate students in a College of Agriculture. The relationship between colorblindness and their attitudes toward undocumented immigrants was found to have a correlation. A regression analysis showed level of colorblindness as a significant predictor of attitudes toward undocumented immigrants. Therefore showing that if students adopt a colorblind racial attitude, it can be predicted they will have less favorable attitudes toward undocumented immigrants and vice versa. Improving students' attitudes of immigrants by teaching multiculturalism can lead to better engagement in the agricultural industry by up and coming professionals.

Introduction

The population of the United States is ever growing and increasing in cultural diversity. In 2010, the U.S. Census reported a population of 308.7 million people, a total population increase of about 9.7% (United States Census Bureau, 2011). Of the total population in 2010, 50.48 million were of Hispanic or Latino origin. This represents a 43% increase in the Hispanic population from 2000-2010. Overall, nearly 40 million, or approximately 13%, of the total population were foreign-born, representing those born in other regions of the world including Africa, Asia, Europe, Latin America and the Caribbean, Northern America, and Oceania (United States Census Bureau, 2012). Not all foreign-born people are illegally in the country, as many have the right to work and live in the United States legally. However, in 2011 there was an unauthorized population of an estimated 11.5 million immigrants (DHS office of Immigration Statistics, 2013). Mexico was the leading source country of unauthorized immigration to the United States, followed by El Salvador, Guatemala, Honduras, and the Philippines (DHS office of Immigration Statistics, 2013).

Immigration reform is a pervasive issue that is consistently present in national discussions. In recent years, there has been greater attention paid to the growing number of people immigrating into the United States. In a public opinion poll conducted by Gallup (2014), 17% of polled citizens said immigration is a top issue facing the United States. Immigration has increasingly become a hot topic of conversation not only at the federal level, but also at the state level, impacting many different sectors including agriculture (Zahniser, Hertz, Rimmer, & Dixon, 2012).

Immigration reform can have immense effects on the agricultural industry. Agricultural production in the United States depends on migrant farm workers. In 2007-2009, 71% of surveyed crop workers were foreign-born (67% from Mexico and 4% from elsewhere) and 48% of those crop workers indicated they were not legally authorized to work in the United States (World Agricultural Economic and Environmental Services, 2014). The agricultural work force is as diverse as ever, creating challenges for those that work within it.

Colleges and universities are faced with the challenge of preparing students to be successful in navigating an increasingly diverse work place (Platt, 2004). University scholars, administrators, and business communities within universities have seen an increasing need to be more engaged in international education (Bruening & Frick, 2004). Not only must students engage in international and cultural education, there is also a demonstrated need for globally competent graduates who will be able to expertly work with different cultures (Platt, 2004). Students in colleges of agriculture and life sciences across the nation must be prepared to face the challenges of this century. Additionally, they must be educated about the diverse workforce in which they will find themselves employed.

Although there is a desire and need to produce culturally competent students, universities still lack sufficient cultural diversity education (Bell, Connerley, & Cocchiara, 2009). Attitudes toward diversity are often engrained and negative, shaped by the media, stereotypes, socialization, and formed from experiences in and out of the classroom (Bell, 2007). Agricultural focused students stand to enter the workforce with inaccurate perceptions of diversity and unprepared to work in diverse environments due to a lack of cultural diversity education during their university experience (Bell et al., 2009).

Agricultural college students must know how to navigate diversity so they can adapt to an ever-changing industry; one that employs a large number of foreign-born and possibly undocumented immigrants, and all the complexities of decisions made that involve this workforce. The need for increased cultural diversity training is also true for future educators. Secondary and postsecondary agricultural education programs are not keeping up with the changing demographic shifts (Vincent, Killingsworth, & Torres, 2012). Preparing the workforce to meet these changes directly relates to the National Research Agenda Priority Area 3, preparing a scientific & professional workforce (Doerfert, 2011).

Theoretical Framework

The theoretical framework for this study is based on the social cognitive theory (Bandura, 1986). Bandura (1986) stated that there are three factors that influence human behavior: cognitive, behavioral, and environmental factors. Working with diverse populations requires a change in what Bandura calls the cognitive factors which in turn can also influence the behavioral factors, more specifically, skills. In order to influence the knowledge, attitudes and skills students have pertaining to working with diverse populations, the multiculturalism approach can be adopted.

Views and attitudes toward different cultures can vary from one approach to another. Two predominant approaches to dealing with the various interracial tensions and stratifications are multiculturalism and colorblindness. Multiculturalism is a response to cultural and religious diversity (Richeson & Nussbaum, 2003). Multiculturalism proposes that group differences should be acknowledged, considered, and celebrated (Richeson & Nussbaum, 2003). The opposite of this is colorblindness, also known as race blindness. Colorblindness proposes that racial categories do not matter and should not be taking into consideration (Richeson & Nussbaum, 2003). The premise for this approach is that social categories should be dismantled and disregarded in an attempt to create equal treatment for all, as individual parts of a collective group (Richeson & Nussbaum, 2003). There is research to support and advocate for both approaches.
Multiculturalism has been shown to be an effective method to increasing diversity in the workplace. Multiculturalism changes the way diverse people are perceived. Bandura (1989) stated that what people think, believe, and feel, directly affects how they behave. A multicultural mindset can influence the how students behave toward diverse people in various settings. As organizations, especially agricultural organizations, continue to work with a diverse workforce, there is a need for all employees, supervisors, and managers to value multicultural differences in their associates and customers so that everyone is treated with dignity (Green, Lopez, Wysocki, & Kepner, 2002). Embracing diversity has the potential to yield greater productivity and competitive advantages as well as helping to ensure the creation, management, and valuing of a diverse workforce (Lockwood, 2005). In turn, this will lead to organizational effectiveness and sustained competitiveness. Not only do organizations benefit from multiculturalism, so do the relationships amongst work teams, customers, and other stakeholders.

On the opposing side, colorblindness is used to combat the negative outcomes that stem from social categorization, as well as prejudice and stereotyping (Richeson & Nussbaum, 2003). While the intentions are perhaps in the right place, colorblindness can also have negative effects. Colorblindness can often serve to maintain, rather than break down, racial separations. Individuals who hold a colorblind ideology also tend to hold more prejudicial views (Bonilla-Silva, 2003). In their study on multiculturalism and colorblindness and their effects on racial bias, Richeson and Nussbaum (2003) found that explicit racial bias was greater when subjects were exposed to a colorblindness perspective. This racial bias can greatly impact how people interact with and perceive undocumented immigrants.
Individuals use their own culture, life experiences, and the people around them to build their values (Hall, 2004). They must clarify their values upon which they base personal decision-making (Bell, 2011). A person’s perceptions and biases toward other cultures can create issues when working and making decisions in diverse situations (Ely & Thomas, 2001). When colorblindness influences one’s values, it can have adverse effects on how people work together. Groups that do not encourage members to use their cultural experiences create tension, competitiveness, and distrust (Ely & Thomas, 2001). Ultimately, colorblindness has the potential to hinder learning, limit members' sense of self and overall group efficacy, and can prevent the success of an organization (Ely & Thomas, 2001). Additionally, there are other challenges imparting from colorblindness pertaining to individual social interaction. Avoiding mentioning race detracts from the quality of interracial interactions (Apfelbaum, Sommers, & Norton, 2008). This may lead to misinterpretations of one another’s intentions or disinterest during such encounters, thus creating barriers to future positive interactions (Apfelbaum et al., 2008). The

impact of colorblindness and people's perceptions of different cultures are essential to understand. In doing so, agricultural students will be better prepared to enter and ensure success in an ever diversifying workforce that includes a large contingent of undocumented immigrants.

Purpose and Objectives

The purpose of this study was to explore how the colorblind racial attitudes of College of Agriculture undergraduate students influence their perceptions of undocumented immigrants. The objectives were to:

1. Identify student's attitudes toward undocumented immigrants.
2. Identify student's level of colorblindness racial attitudes.
3. Identify if relationships exist between student's attitudes toward undocumented immigrants and their level of colorblindness and racial attitudes.
4. Determine if colorblindness predicts attitudes toward undocumented immigrants.

Methods

Participants

The population for this study was undergraduate students in the College of Agriculture. Researchers took a convenience sample of two large lecture courses required of most undergraduate students obtaining a degree in the College of Agricultural at [the University]. Due to practical constraints, efficiency, and accessibility, the use of a convenience sample was deemed appropriate for this study (McMillan & Schumacher, 2010). Although data from convenience samples cannot be generalized to the general population, they can still provide insight into the relationships in question (McMillan & Schumacher, 2010).

Instrumentation & Data Collection

A questionnaire was developed and administered using Qualtrics, an online survey development tool. The tailored design method was followed in the design of the questionnaire (Dillman, Smyth, & Christian, 2009). Specific data were collected using two separate, previously developed scales: (a) Attitudes Towards Immigrants and (b) the Color-Blind Racial Attitudes Scale. The first scale, Attitudes Towards Immigrants, was adopted from the Attitudes Towards Illegal Aliens scale developed and tested by Ommundsen and Larsen (1997). Their scale consisted of 30 items on a five point Likert-type scale with a Spearman Brown corrected split-half correlation coefficient of .89 ($p < .001$). The scale was modified for this study resulting in a 19 item instrument. The responses to the 19 items were averaged to create an attitudes toward immigrant index that was found to be reliable with a Chronbach's a of .93 when calculated *ex post facto*.

The second scale, the Color- Blind Racial Attitudes scale, was originally developed by Neville, Lilly, Duran, Lee and Browne (2000). The original version consisted of 26 items that requests responses on a six-point Likert-type scale. Their scale yielded a Chronbach's a of .86 for the total instrument. The scale was modified for this study resulting in a 20 item instrument. The responses to the 20 items were averaged to create a level of colorblindness index that was found to be reliable with a Chronbach's a of .86 when calculated *ex post facto*. The researchers were unable to conduct a pilot test of the instrument therefore they present the *ex post facto* Chronbach' s a for both scales.

In addition, respondents were asked to identify their gender, race/ethnicity, place of birth, and their connection with any immigrants to the U.S. The entire questionnaire consisted of 36 items, two of the items providing the adapted scales mentioned above. Access to the Internet by the target population allowed for an online survey instrument to be used (Dillman, Smyth, & Christian, 2009). A list of the students' names and email addresses enrolled in the courses were acquired from the instructors (N= 253). All students were contacted by email and invited to take the survey. Students who fully completed the survey were offered extra credit, the value determined by their instructors. A total of 209 responses were received with complete responses, yielding a response rate of 83%.

Respondents were primarily female (n = 137, 66.2%) and represented several different racial groups: Caucasian or White (n = 147, 71.0%), American Indian/ Alaskan Native (n = 5, 2.4%), Asian (n = 23, 11.0%), and Black or African American (n = 26, 13.0%). The majority was born in the United States (n = 170, 82.1%). Additionally, the majority of the respondents knew someone that had immigrated to the United States with or without documentation (n = 175, 84.5%).

Data Analysis

Quantitative methods were used to achieve the proposed research objectives. Data were analyzed using SPSSv22 statistical software package for Windows. Descriptive statistics were calculated for the first and second objectives. Correlations were used for the third objective and linear regression was used to investigate the fourth objective.

Results

Objective 1 - Attitudes toward Undocumented Immigrants

Participants were asked to rate their level of agreement with 19 statements signifying their attitudes toward undocumented immigrants on a five-point Likert-type scale with 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Undecided*, 4 = *Agree*, 5 = *Strongly Agree*. Items were summed and averaged to create an attitude toward undocumented immigration index score (M = 3.01, SD = .66). Overall, students demonstrated a moderate attitude toward undocumented immigrants.

Table 1
Attitudes toward undocumented immigrants (n = 207) (%)

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Undocumented immigrants should not benefit from my tax dollars *	5.8	7.2	27.5	40.1	19.3
Our taxes should be used to help those residing without documentation in the U.S.	19.8	36.7	30.4	10.1	2.9
There is enough room in this country for everyone	4.8	24.2	27.5	32.9	10.6
Undocumented immigrants are not infringing on our country's resources	8.2	34.8	30.9	19.8	6.3
Undocumented immigrants are a nuisance to society *	18.4	47.3	24.6	6.8	2.9
There should be open international borders	22.2	39.6	22.2	12.6	3.4
Access to this country is too easy *	7.2	39.6	32.9	16.4	3.9
Undocumented immigrants should be excluded from social welfare *	9.2	34.8	32.4	17.9	5.8
Undocumented immigrants who give birth to children in the U.S. should be made citizens	5.8	23.7	39.6	23.2	7.7
Undocumented immigrants cost the U.S. millions of dollars each year *	4.8	12.6	48.3	29.5	4.8
Undocumented immigrants should be eligible for welfare	13.0	34.8	33.8	15.9	2.4
Undocumented immigrants provide the U.S. with a valuable human resource	1.9	10.6	32.9	47.8	6.8
The government should pay for care and education of undocumented immigrants	15.0	36.7	33.3	11.6	3.4
Undocumented immigrants should not have the same rights as U.S. citizens *	7.7	22.2	31.9	29.0	9.2
Undocumented immigrants have rights, too	1.4	3.9	17.9	57.0	19.8
Taking care of people from other nations is not the responsibility of the U.S. *	6.8	31.4	30.0	24.2	7.7

All undocumented immigrants deserve the same rights as U.S. citizens	11.1	32.4	35.3	16.4	4.8
Undocumented immigrants should be forced to go back to their own countries *	13.5	34.3	34.3	14.5	3.4
Undocumented immigrants should not be discriminated against	1.9	6.8	27.1	40.6	23.7

Note. *Questions were reverse coded when the index score was calculated (results presented in this table are of the respondents' original responses).

Objective 2 - Colorblind Racial Attitudes

Participants were asked to rate their level of agreement with 20 statements demonstrating their colorblind racial attitudes on a six-point Likert-type scale with 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree,* 6 = *Strongly Agree*. The responses to all 20 statements were summed and averaged to create a colorblindness index score (M = 3.39, SD = .68). Here, students presented a moderate colorblind racial attitude.

Table 2
Colorblind Racial Attitudes (%)

	SD	*D*	*SoD*	*SoA*	*A*	*SA*
Everyone that works hard, no matter what race they are, has an equal chance to become rich	4.8	9.7	11.6	22.2	24.6	27.1
Race plays a major role in the type of social services (such as type of healthcare or day care) that people receive in the U.S. *	3.4	11.6	15.5	40.6	21.3	7.7
It is important that people begin to think of themselves as American, not African American, Mexican American, or Italian American	7.2	14.5	15.5	21.3	23.2	18.4
Due to racial is discrimination, programs such as affirmative action are necessary to help create equality *	4.8	10.6	14.5	40.1	21.7	8.2
Racism is a major problem in the U.S. *	2.9	7.2	13.5	38.6	24.6	13.0
Race is very important in determining who is successful and who is not *	20.3	28.5	22.7	18.8	7.7	1.9
Racism may have been a problem in the past, it is not an important problem today	24.6	21.7	30.9	16.4	4.3	1.9
Racial and ethnic minorities do not have the same opportunities as white people in the U.S. *	8.7	15.9	31.4	19.3	18.4	6.3
White people in the U.S. are discriminated against because of the color of their skin	14.0	30.0	21.7	25.6	6.8	1.9
Talking about racial issues causes unnecessary tension	7.2	16.4	25.1	32.9	13.5	4.8
It is important for political leaders to talk about racism to help work through or solve society's problems *	13.0	26.6	37.7	15.0	5.8	1.9
White people in the U.S. have certain advantages because of the color of their skin *	13.0	21.3	31.9	20.8	6.8	6.3

Immigrants should try to fit into the culture and values of the U.S.	6.3	17.4	22.7	34.8	14.5	4.3
English should be the only official language in the U.S.	14.0	17.4	17.9	24.6	3.5	12.6
White people are more to blame for racial discrimination than racial and ethnic minorities *	15.0	14.0	26.6	28.5	13.0	2.9
Social policies, such as affirmative action, discriminate unfairly against white people	8.7	19.8	33.3	27.1	7.7	3.4
It is important for public schools to teach about the history and contributions of racial and ethnic minorities *	1.9	2.4	5.8	30.4	33.3	26.1
Racial and ethnic minorities in the U.S. have certain advantages because of the color of their skin	5.8	14.5	29.5	36.7	9.7	3.9
Racial problems in the U.S. are rare, isolated situations	18.4	36.2	27.5	15.0	2.4	0.5
Race plays an important role in who gets sent to prison *	7.2	16.9	19.3	32.9	13.0	10.6

Note. SD = *Strongly Disagree*, D = *Disagree*, SoD = *Somewhat Disagree*, SoA = *Somewhat Agree*, A = *Agree*, SA = *Strongly Agree*; *Questions were reverse coded when the index score was calculated (results presented in this table are of the respondents' original responses).

Objective 3 - Relationship between Colorblindness and Attitudes toward Undocumented Immigrants

A correlation was run between the colorblindness index score and the attitudes toward immigrants index score to determine if there was a relationship between colorblind racial attitudes and attitudes toward undocumented immigrants. A Pearson's correlation coefficient of -.52 was found. Therefore, as level of colorblindness increased, attitudes toward immigrants decreased or became more negative in nature. According to Cohen's convention (1988), the relationship found between colorblindness and attitudes toward immigrants represents a large effect size.

Objective 4 - Prediction of Colorblindness on Attitudes toward Undocumented Immigrants

To further investigate the relationship between colorblindness and attitudes toward undocumented immigrants, a regression analysis was conducted. In the first model (see Table 3), colorblindness was found to have a significant negative effect (b = -.50; p = .00) on attitudes toward undocumented immigrants. The literature suggests race may play a role in level of colorblindness therefore a second model, using race as a mediating variable, was run. When the mediating variable of race was added in the second model, the influence of colorblindness on attitudes continued to be significant. Race was not found to have a significant effect.

Table 3
Multiple Regression of Colorblindness and Race on Attitudes toward Undocumented Immigrants

	Model 1		Model 2	
	b	*p*	*b*	*p*
Constant	4.69		4.51	
Colorblindness	-.50	.00**	-.46	.00**
Hispanic			.16	.110
Race				
Black			.08	.54
American Indian			-.38	.15
Asian			-.06	.64
Other			.22	.09

Note. *$p < .05$; **$p < .01$

The results of the linear regression suggested that a significant portion of the total variation in attitudes toward undocumented immigrants could be predicted by level of colorblind racial attitudes (Model 1). In other words, a student's level of colorblindness is a significant predictor of attitudes toward undocumented immigrants ($F(1, 205) = 74.151$, **$p < .00$). In addition, 27% of the variation ($R^2 = .27$) in participants' attitudes toward undocumented immigrants was explained by the first model or colorblindness. The addition of race made no contribution to the explanation of variance (Model 2).

Conclusions

This study provides insight into attitudes of students in Colleges of Agriculture toward undocumented immigrants. It also shows how their level of colorblindness affects their attitudes. Overall, students reported being undecided in their attitudes toward undocumented immigrants. Despite being undecided in their overall attitudes, it is interesting to note the contradictory answers to the individual questions. For example, participants stated agreement with statements that reflected a less than positive attitude toward undocumented immigrants such as: undocumented immigrants should not benefit from my tax dollars (40.1%); and undocumented immigrants should not have the same rights as U.S. citizens (29.0%). Yet, participants also indicated their agreement with statements with a more positive attitude toward undocumented immigrants such as: Undocumented immigrants have rights, too (57.0%); and undocumented immigrants provide the U.S. with a valuable human resource (47.8%). Examining each question helps to better illustrate the undecided attitude of undergraduate students toward undocumented immigrants. As Bell, Connerley, and Cocchiara (2009) stated, students may enter the workforce with inaccurate perceptions of diversity and unprepared to work in diverse environments.

In addition, the study indicated students' level of colorblind racial attitudes. Undergraduate students in the College of Agriculture were found to have a moderate level of colorblindness. As mentioned before, colorblindness can serve to maintain prejudicial views and enhance racial bias (Bonilla-Silva, 2003). This study found that participants' moderate level of colorblindness does in fact influence their attitudes toward undocumented immigrants. The results from this study align with previous research stating that the higher the level of colorblindness, the more bias and lesser attitudes an individual has toward people of different cultures (Richeson & Nussbaum, 2003).

Furthermore, the findings show that there is in fact a relationship between colorblind racial attitudes and attitudes toward immigrants. As the level of colorblindness increased, attitudes toward immigrants decreased or became more negative in nature. This supports other research findings. As seen by Richeson and Nussbaum (2003), greater racial bias was seen when students were presented with the colorblind racial perspective. The regression analysis took this one step further in showing that a student's level of colorblindness is a significant predictor of attitudes toward undocumented immigrants. Therefore showing that if students adopt a colorblind racial attitude, it can be predicted that they will have less favorable attitudes toward undocumented immigrants and vice versa.

Implications and Recommendations

Given the large contributions immigrants make to the agricultural industry, including 71% of crop workers being foreign-born (World Agricultural Economic and Environmental Services, 2014), agricultural educators need to be conscious of how undergraduate students preparing to enter the workforce view people from other cultures. Like the majority of other industries, agriculture is becoming more diverse and in need of a culturally competent workforce. Colorblindness has been proven to be contra-beneficial to interactions between culturally or racially different people (Apfelbaum et al., 2008; Bonilla-Silva, 2003). Multiculturalism, on the other hand, can lead to better working relationships and increased production within an organization (Lockwood, 2005). Agricultural undergraduate students should be taught to foster multiculturalism. This can encourage students to be better informed about how immigration and immigration reform affects the industry and prepare them to work in a field where diversity needs to be valued. Furthermore, multiculturalism can help to raise overall cultural awareness and foster better attitudes toward different cultures.

The results of this study implies agricultural educators should be integrating cultural diversity education into courses offered to students in colleges of agriculture and life sciences to assist with the lack of cultural knowledge and to limit students' perceptions associated with colorblindness. Cultural diversity education strives to engage in formal efforts to enhance development of awareness, knowledge, and skills to effectively work with, work for, and manage diversity in various contexts (Bucher, 2004; Connerley & Pedersen, 2005). Through this education, students will not only have a better understanding of how to work with diverse populations, but also how important it is to the agricultural field to be knowledgeable about and engaged with discussions surrounding immigration.

Integrating cultural diversity education in the classroom can be done in several ways. While planning a cultural day can be useful, it is more important for agricultural educators to integrate lessons and activities that complement the curriculum throughout their courses. Gay (2002) calls for "culturally responsive teaching", which uses culture, experiences, and perspectives of ethnically diverse students to help teach topics more effectively. Additionally, it is important for agricultural educators to encourage critical thinking with the topic of multiculturalism. Making a connection with students and their lives sets the stage for more engagement and understanding.

This connection is vital and can help to raise student's self-awareness. In helping students be open-minded and to analyze other perspectives, they may become more open to self-reflection and further critical examination of the multicultural information being presented (Anderson, MacPhee, & Govan, 2000).

Teaching multiculturalism in the classroom, while keeping social cognitive theory in mind allows educators to work with the personal and behavioral factors. Educators can use social cognitive theory as the foundation for learning. Educators should provide students with proper models of the knowledge, skills, and behaviors associated with cultural diversity education. Additionally, the material should be personally relevant and interesting to engage the learners. Learning as a social process can help integrate cultural diversity education into the curriculum and help students increase their self-efficacy, which can potentially lead to positive behaviors when working with diverse people.

Although this research provides a sound argument for agricultural educators to integrate cultural diversity education into their undergraduate courses and the need to teach multiculturalism, there is plenty more research that could be conducted. This topic can benefit from a qualitative study in which the participants are asked about their perceived levels of colorblindness to investigate their intercultural interactions. Future research should be conducted to gauge the effects of cultural diversity education on students' perceptions of working with documented and undocumented immigrants. This study can also be replicated with high school students as not all students that enter the agricultural workforce attend university. Furthermore, [this state] is not the only state with a large immigrant population. In 2010, over half of all foreign-born people lived in just four states: California, New York, Texas, and Florida (United States Census Bureau, 2012). This study could be conducted in many other states, especially in states where there is a large immigrant population and where there is a strong agricultural sector.

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Harnessing Cooperation to Support Polytechnic AET Instructor Professional Development in Nigeria

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Abstract

Implementing high quality professional development for postsecondary Agricultural Education and Training (AET) instructors is a critical step in facilitating inclusive economic development abroad. Most technical agricultural graduate programs in developing nations do not include training in instructional methods, creating lesson plans, or assessment techniques and lecturers are usually forced into learning the craft of teaching through trial and error. Unfortunately, poor teaching and a lack of innovative strategies do little to break the status quo view that agriculture is a distasteful option for youths. It is likely that economic progress will be attenuated in developing nations if AET systems cannot attract and motivate capable students to engage in addressing the critical problems surrounding food security, sustainability, and climate change. The purpose of this descriptive study was to create information about the employment of cooperative learning processes to support polytechnic Agricultural Education and Training (AET) instructor professional development in Nigeria. The findings reveal that participants believed by cooperating together they were able to: a) learn an exceptional amount; b) create more outputs; and c) achieve higher quality outputs and outcomes.

Introduction / Theoretical Framework

High quality instruction and functional Agricultural Education and Training (AET) systems are pivotal to the growth and development of any nation. In recent years a resurgence in the drive to use AET has been fueled by a recognition of its potential impact on economic and human capital development (Akryod, & Smith, 2007). However, globally effective AET instructors are needed for the implementation of authentic learning opportunities which assist pupils in mastering the foundations they will need as productive citizens (Wu, Ho, Nah, & Chau, (2014). The current study was undertaken after an intensive four week institute for postsecondary AET instructors in Nigeria. The project was implemented to foster the development and dissemination of customized professional development workshops and resource materials for postsecondary AET instructors in Nigeria which could be diffused using a train the trainer model. The current study focused on agricultural educator institute participants in order to create a deeper understanding of their specific professional development needs and serve as one output of the institute which can inform future AET programing.

Meaningful learning occurs only when learners process experiences and connect those experiences to their own existing knowledge and established frames of reference (Owens & Smith, 2000). Learning is nested within interactions with the environment and the mind of the learner seeks meaning through the interpretation of those interactions (Perkins, 1999). Therefore, knowledge and experiences are contextualized and the connection between what is learned and how it fits into reality is explicit (Gredler, 2001). The institute learning experiences and activities were designed to help participants make deep connections between the concepts they were learning and how the knowledge could be utilized.

Based on an understanding of how meaningful learning is constructed, institute planners determined that cooperative learning would be utilized as one of several central instructional techniques to facilitate learning during the institute and that cooperative learning would be presented to participants as a strategy to include in their own teaching and training. It follows then that the institute cooperative learning activities and the actual cooperative learning contextual environment provided scaffolding structures which likely promoted knowledge construction, long term memory encoding, and organization for memory recall (Clifford & Wilson, 2000).

Cooperative learning strategies and the related research findings have been built on top of a foundation laid by social interdependence theory. Social interdependence is one of the most fundamental and ubiquitous aspects of being a human being and it affects all aspects of our lives (Deutsch, 1949, 1962). Social interdependence arises when individuals share common goals and the outcomes each individual experiences are dependent on the actions of others to which they are connected (Deutsch, 1962; D.W. Johnson & Johnson, 1989). As defined by Deutsch (1962) there are two types of social interdependence: 1) positive social interdependence, exists when there is a positive correlation among individuals' goal attainments and individuals perceive that they can only attain their goals if the other individuals with whom they are cooperatively linked attain their goals; and 2) negative social interdependence, exists when there is a negative correlation among individuals' goal attainments and individuals perceive that they can only attain their goals if the other individuals with whom they are competitively linked fail to attain their goals. A condition of no interdependence exists when there is no correlation among the goal attainments of individuals and individuals perceive that their goal attainment is independent from the actions of other (Deutsch 1949a).

The second concept that Deutsch based social interdependence theory on was the type of actions enacted by the people involved (Johnson & Johnson, 2005). Social interdependence theory then is based on the conception that how participants' goals are structured, positive or negative interdependence, determines the ways they interact and the resulting interaction pattern determines the outcomes of the situation (Deutsch 1949; Johnson & Johnson, 2009). Within Duetsch's theory the relationship between the type of social interdependence and the interaction pattern it elicits is assumed to be bidirectional (Figure 1). Meaning if oppositional interactions typify the exchanges between individuals it will cause the emergence of negative social interdependence. Similarly, if negative social interdependence exists between individuals oppositional actions will come to typify the exchanges between those same individuals. Conversely, if promotive interactions typify the interaction patterns between individuals, positive interdependence will be an emergent phenomenon. Based on the bidirectional relationship between social interdependence and interaction patterns it follows that goal attainment results in greater feelings of well-being, enhanced well-being increases personal commitment to goals, which fosters further successful efforts to achieve goals (Sheldon & Houser-Marko, 2001).

Synthesizing the research surrounding social interdependence that took place over a thirty year period, Johnson & Johnson (2009), were able to modify and extend social interdependence theory in two distinct ways: a) they were able to identify and validate variables that mediate the effectiveness of cooperation; and b) by investigating numerous independent variables they were able to expand the scope of the theory. Based upon their research investigating the

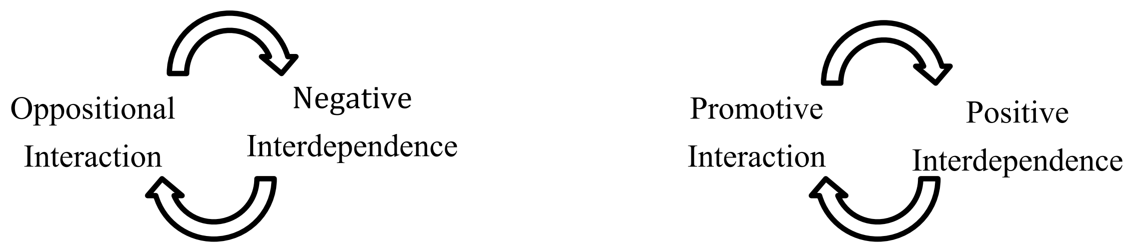

Figure 1. Bidirectional social interdependence and interaction pattern relationship (Duetsch, 1962)

implementation of cooperation, Johnson and Johnson (2009) have posited that five variables mediate the effectiveness of cooperation and cooperative learning: a) positive interdependence; b) individual accountability; c) promotive interaction; d) appropriate use of social skills; and e) group processing.

The five mediating variables forwarded by Johnson and Johnson (2005, 2009) are essential components for successful cooperative learning. Much of the research on Cooperation has been undertaken in educational settings where cooperation has been utilized as an instructional strategy that employs small groups or teams to create collaborative student interactions that support and optimize the learning of each individual (Mader & Smith, 2009). Research has demonstrated that cooperative learning, when the five mediating variables are appropriately enacted, has a positive impact on learning outcomes and outputs (Kunchenbrandt, Eyssel, & Seidel, 2013).

Various researchers have structured positive interdependence differently, however, the assorted structural divisions can be organized around three categories: outcome, means, and boundary (Johnson & Johnson, 2009; Smith, 2004). Table 1 contains brief descriptions of the three types of positive interdependence found within the associated literature. Research indicates that simple group membership and interpersonal interactions are insufficient phenomena for supporting changes in productivity and achievement (Hsiung, 2012). Positive interdependence structures are required in order to foster interactions that are more likely to lead to increased productivity and achievement. Research also reveals that positive interdependence structure promotes critical thinking and the development of new insights within collaborations (Ding, Li, Piccolo, Kulm, 2007).

Going back to Deutsch’s (1962) work, positive interdependence is conceptualized as a phenomenon that adds responsibility forces to group members’ motivation. It is posited that group members feel responsibility to pull their own weight and help to enable the work of other group members (Ding, Li, Piccolo, Kulm, 2007). Relevant research illustrates that the effect of responsibility forces are multiplied for each group member when there is group and individual accountability (Francisco, 2013). Individual accountability, is created when individual member performance, outputs, and outcomes are assessed and reported to the group. With respect to individual accountability, as with positive interdependence, purposeful structure is critical for achieving more desirable results from cooperative learning experiences. In fact, individuals are likely to reduce their contributions towards the achievement of the group goals if individual accountability is vague or it is difficult to identify the specific contributions of members (Rasmussen & Stephan, 2008). Therefore, for collaborations to be more successful, structures should be included that support individual accountability and clear recognition of the effort that each member is contributing to the attainment of the common goal (Johnson & Johnson, 2009).

Table 1. Positive interdependence structures in cooperative groups

Outcome interdependence	Includes goals and rewards. Goals can be real or imaginary (example: designing a completely sustainable city).
Means interdependence	Subsumes resource, role, and task interdependence. Resource, role, and task ownership or responsibilities can be divided among group members. Care must be taken to ensure strong common goals or achievement will be stagnated.
Boundary interdependence	Includes the overlapping categories of identity (binds group together as one entity), environmental (work location), and outsider enemy (shared negative interdependence with another group) interdependence.

Note: Adapted from Johnson & Johnson, 2009; Francisco, 2013

As described earlier, positive interdependence and negative interdependence are on opposite sides of the same conceptual coin. Promotive interactions between group members arise from positive interdependence and oppositional interactions arise from negative interdependence (Francisco, 2013; Johnson & Johnson, 2009). Structuring opportunities to engage in promotive interactions within cooperative learning will help to create trust between group members and facilitate sharing of resources (Deutsch, 1962; Schunk, 2008). Group members whose interactions are charactersized as promotive tend to be share more efficient assistance, provide more effective performance feedback, and take the perspectives of others more accurately (Johnson & Johnson, 2009).

Effective cooperation is supported by task accomplishment and proficient teamwork (Francisco, 2013). Without at least a moderate level of small group social skills, group members will not be able to work together in productive ways or cope with the stresses and strains of cooperating together. Small group social skills include concepts such as active listening, contributing ideas, encouraging, mutual respect, and sharing ideas (Rasmussen & Stephan, 2008). When operationalizing cooperative learning, it is likely that the small group social skills needed to support high quality collaboration will need to be taught or explicitly discussed (Schunk, 2008). Research shows that for cooperative teams to be more successful they need to focus on employing small group social skills to: a) build trust; b) communicate with precision; c) build open inclusivity; and d) resolve strife (Johsnon & Johnson, 2009).

Group processing is a very important part of optimizing collaboration and cooperative learning (Deutsch, 2000). Further, group members will not be able to optimize learning about the process of collaboration if they do not reflect on their experiences (Johnson & Johnson, 2005). Group members need time to examine and discuss the enactment of their cooperative efforts and how well they are achieving the defined cooperative goals. Without sufficient time to deliberate reflectively as a group it will be difficult to address challenges and improve the effectiveness of cooperative strategies and activities (Deutsch, 2000; Francisco, 2013). According to Johnson and Johnson (2005), group processing in cooperative learning has the following purposes: a) allows the group to improve its work together continuously; b) focuses attention on group members contributions for individual accountability; c) streamlines collaborative processes; and d) reduces or eliminates nonfunctional actions and structures.

The success of cooperative learning as a strategy for improving student learning is most likely related to its robust theoretical foundation and many validating research studies (Johnson & Johnson, 2009). This is because beyond research findings which have substantiated operational procedures, many researchers have provided practitioners clear and explicit advice for implementing cooperative learning in classrooms and trainings. Given the robust nature of the evidence supporting cooperative learning and its use across the world, the institute planners were keen to utilize it as both subject matter within the institute and as a method for assisting participants to better understand and assimilate the institute content. However, from a research perspective, more research needs to be completed to understand cooperative learning in different cultures. While the basic theory of cooperation is well established the need for research regarding cultural nuances and how it is perceived across cultural contexts needs to be conducted (Jahng, 2013; Johnson & Johnson, 2005)

The purpose of this descriptive study was to create information about the employment of cooperative learning as both a content and process component of polytechnic AET instructor professional development in Nigeria. Within the scope of this study, cooperative learning was operationally defined as collaborative efforts which included all five necessary mediating variables. The objectives of the study were to assess the AET instructors' perceptions of: a) their institute cooperative learning experiences; b) their institute cooperative learning experience outputs and outcomes; and c) simultaneously learning about and participating in cooperative learning. It is also hoped that this study will begin to more clearly define best practices associated with cooperative learning across cultures. This study aligns with the key outcome of priority area 6 vibrant resilient communities of the National Research agenda (Doerfert, 2011).

Methods / Procedures

The target population for this study consisted of polytechnic AET instructors in Nigeria that had participated in one of ten three week long train the trainer model professional development institutes (N=252). The institutes were taught at agricultural polytechnics across the country by a core group of instructors that were trained in curriculum development, research based instructional methods, and instructional assessment. The focus of the institutes was to develop the capacity of the participants to construct and deliver high quality instruction which raises the achievement level of AET polytechnic students.

The institute included instruction regarding the theoretical underpinnings, effective strategies, and example activities related to cooperative learning. Institute participants were sorted into cooperative learning groups of three to four based on their specialized fields of study. Once sorted, the cooperative groups worked on a series of smaller assignments and tasks that were additive components of a larger more comprehensive final project. Benchmarks, guided activities, and required reflections utilized with the participants where designed be congruent with the five mediating variables necessary for cooperative learning. Instruction was focused on assisting participants to experience cooperative learning while they learned about it. Participant outputs included group processing reflections, individual accountability reports, and concept maps which depicted pathways to interdependent goal achievement.

The participant frame for the study was obtained by using a listing of all AET instructor participants provided by the University of Nigeria at Nsukka, the lead institution on the project. Usable responses were obtained from 214 respondents for an overall response rate of 85%. A cover letter describing the study and a link to an online survey instrument were emailed to potential research participants in an invitation email. Two weeks after the initial contact an additional invitation email containing a follow-up cover letter and a survey link were sent to potential research participants that had not already responded. All responses were recorded within four weeks following the initial invitation to participate.

The researcher developed survey instrument used to collect data for the study consisted of 36 items in three separate subscales. Subscale 1 of the instrument measured participant perceptions of cooperative learning experiences. Subscale 2 created information regarding participants' perceptions of how their cooperative learning experiences impacted their outputs and outcomes. Subscale 3 measured participant perceptions regarding their learning about and participating in cooperative learning groups simultaneously. Each of the three subscales included four subgroupings composed of three questions. The three questions that composed each of the subgroupings were very similar and the data associated with them are meant to be reported as a mean aggregate score.

Participants responded to the survey instrument by clicking responses on Likert type rating scale. The response scale for ranged from 5 = strongly agree to 1= strongly disagree. Expert AET reviewers from Nigeria were consulted to affirm the content and face validity of the survey instrument. English is the official language of Nigeria and is the medium for instruction at Nigerian educational institutions. Based on the data collected the internal consistency of the survey instrument was estimated to be as follows: entire instrument = .79; substituteability subscale 1 = .82; cathexis subscale 2 = .80; and inducibility subscale 3 = .76.

Results

The 214 participants in this study had a mean age of 44 years (standard deviation = 6.6). 12% of the participants were female, 32% were at the level of professor, and 68% had a Master's degree as their highest degree completed. A slight majority (53%) of the 64 participants who had attained a doctoral degree, received their highest degree from a U.S. or European institution. The most common fields of specialization among participants were agricultural extension management (22%), agricultural technology (17%), animal health and production technology (16%), crop production (13%), and agricultural business (13%).

Table 2 illustrates the mean ratings for each of the aggregated subgrouping items. The aggregate subgrouping item stems listed in Table 2 are a composite of the three items there were used to compose each of the respective subgroupings. The data in Table 2 indicate that, overall, the AET instructors had positive perceptions related to cooperative learning and their experiences with cooperative learning during the 3 week institute.

Table 2. Subgrouping mean Likert scores

Subscale	Subgrouping	Aggregate Subgrouping Item Stem	Ratings ^{x}
1	1	improved institute engagement	4.3^{z} / 0.21^{y}
1	2	increased commitment to achieve goals	4.6 / 0.30
1	3	reduced dysfunctional process barriers	3.8 / 0.58
1	4	facilitated learning and output creation	4.8 / 0.18
2	1	raised individual and group output quality	4.5 / 0.24
2	2	led to greater individual and group productivity	4.7 / 0.32
2	3	experience improved my instruction	4.1 / 0.47
2	4	improved collegial problem solving	4.2 / 0.36
3	1	improved knowledge transfer	4.8 / 0.12
3	2	aided understanding of student challenges	4.7 / 0.16
3	3	substantially improved learning	4.4 / 0.39
3	4	increase instructional diversity	4.7 / 0.20

Note: Cooperative Learning = CL. ^{z} Mean. ^{y} Standard Deviation. ^{x} Scale 5 = Strongly agree, to 1 = Strongly Disagree

Subscale 1 of the instrument created information about the perceptions of the AET instructor participants regarding their experiences with cooperative learning during their three week institute. Table 2 illustrates that the AET instructors strongly agreed that their experiences with cooperative learning facilitated learning and the creation of outputs. This echoes the findings of Manconi, Aulls, and Shore (2008) who found that cooperative learning tends to promote higher levels of cognitive function and learning. The perception of the AET instructors that their cooperative experiences facilitate the creation of outputs is also supported by research that demonstrates that cooperative learning promotes greater levels of productivity than individualistic scenarios (Kuchenbradt, Eyssel, & Seidel, 2013).

Table 2 reveals that the participants perceived their cooperative learning experiences positively impacted both institute engagement and overall commitment to achieve institute goals. That finding is supported by Sheldon and Houser-Marko (2001) who found that goal progress results in an increase in commitment to goals. The perceived increase in overall commitment is also supported by Johnson and Johnson (2005) who indicated that cooperative learning increases willingness to take on difficult tasks and be persistent in pursuit of goal accomplishment. Table 2 also indicates that while the AET instructors perceived their cooperative learning experiences to have reduced dysfunctional process barriers, the agreement level was not robust and the standard deviation indicates those items had the most response variation.

The information created by subscale 2 of the survey instrument was concerned with the participants' perceptions of how their cooperative learning experiences impacted their institute outputs and outcomes. Table 2 reveals that the AET instructor participants believed that their cooperative learning experiences assisted them in achieving greater individual and group output productivity and quality. The AET instructors perceptions of higher achievement match with research by Johnson and Johnson (1989) who found that persons participating in cooperative learning groups achieved at a statistically higher level than those functioning in competitive or individualistic scenarios.

Table 2 illustrates that the participants perceived that their cooperative learning experiences led to the improvement of their instruction and colleague engagement. This finding is supported by research that indicates cooperative learning experiences help cooperators to distill more frequent insights into higher level cognitive challenges, such as teaching, than other methods of instruction (Johnson & Johnson, 2005). In addition, the data in Table 2 show that the AET instructors perceived that their experiences with cooperative learning facilitated an improvement in their collegial problem solving. Research by Johnson and Johnson (1989) reveals that cooperative learning tends to promote interpersonal satisfaction and acceptance among individuals which supports collegial interactions.

Subscale 3 measured participant perceptions regarding their learning about and participating in cooperative learning groups simultaneously. Table 2 depicts that the AET instructors believed that by intertwining content instruction about cooperative learning with actual cooperative learning experiences they were able to develop a deeper level of knowledge and transfer their understandings to other contexts. Previous research supports the AET instructors' perception that cooperative learning experiences assist learners to transfer knowledge and skills in new ways or novel situations. Schunk (2008), reports that carefully constructed cooperative learning facilitates knowledge transfer and tends to promote greater long-term retention. Further, research also indicates that cooperative learning facilitates knowledge transfer between groups and individuals withing those groups (Johnson & Johnson, 2005).

Table 2 illustrates that that AET instructors perceived that simultaneously learning about and experiencing cooperative learning aided their understanding of student challenges in cooperative learning contexts. This finding is supported by research which reveals that contextualized learning activities, like the cooperative learning activities experienced by the AET instructors, reflect the real-world nature of authentic tasks and knowledge challenges (Karweit, 1993). When knowledge is constructed in a context learners do not need to form artificial connections between what they are learning and how it fits into their reality, it is automatic (Schunk, 2008). Table 2 further reveals that the participants believed that simultaneously learning about and experiencing cooperative learning increased the diversity of the instructional techniques within their professional toolbox.

Summary

Instructors and providers of professional development often forget to account for the way learners interact with each other during learning experiences. How instructional and professional development planners design learner interactions is a consequential determinant of: how much is learned; learner motivation; and learner productivity. The close relationship between the supporting theory, confirmatory research, and best practice provides cooperative learning a robust foundation.

This study sought to create information about the employment of cooperative learning as both a content and process component of polytechnic AET instructor professional development in Nigeria. Overall, the findings indicated that the AET instructors perceived cooperative learning to be a robust and beneficial framework for planning and directing instruction. That finding is well supported by the existing body of literature and is rooted in strong connections between theory, research, and practice. However, one challenging area within the existing cooperative learning literature is the need for research regarding cultural nuances and how it is perceived across cultural contexts. This study begins to address questions about how cooperative learning is perceived in Nigeria, one of the most populous countries in the world.

The first objective of this study was to assess the AET instructor's perceptions of their institute cooperative learning experiences. Overall, the AET instructors perceived that their cooperative learning experiences facilitated learning and increased engagement and commitment. With respect to these findings it is recommended that further quantitative research be carried out to assess how cooperative learning effects learning and the commitment level of groups and individuals. Presently, there are no robust standardized achievement measures that are accessible for assessing the effect of cooperative learning on achievement in Nigeria. Researcher developed instruments would be required to engage in those veins of inquiry.

The second objective of the study was to assess the AET instructors' perceptions of their cooperative learning experience outputs and outcomes. The data illustrate that the AET instructors perceived that their cooperative learning experiences improved their productivity and the quality of their outputs and outcomes. It is recommend that future research utilize quasi experimental or experimental methods to determine whether cooperative learning experiences improve AET instructor output productivity. It is also recommended that research be carried about utilizing well established rating scales or rubrics to rate the quality of cooperative learning to determine if there is a difference between cooperative learning participators and non-participators.

The third objective of this study was to assess the AET instructor's perceptions of simultaneously learning about and participating in cooperative learning. The data indicate that the AET participants perceived that their depth of knowledge and the transferability of what they were learning was improved by intertwining cooperative learning as the subject of instructional content and a method for delivering that content. Additional research should be carried about to compare groups that utilize contextualized cooperative learning experiences and groups that use other methods for enacting instruction or professional development.

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Globalizing the Undergraduate Experience in Agricultural Leadership, Education, Extension, and Communication

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Abstract

University graduates are entering a workforce where global competencies are important; yet, a vast majority graduate with limited international educational experience. The purpose of this basic qualitative study was to describe themes of international educational experiences currently being offered to students of agricultural leadership, education, extension, and communication. The study was guided by Roberts' (2006) model of experiential learning contexts. Interviews were conducted with eleven faculty representing diverse departments of agricultural leadership, education, extension, and communications geographically from the Southeast, Northeast and Midwest. Participants indicated five major themes of international educational experiences: curricular experiences, seminars, interactions with international students, co-curricular and extracurricular activities, and international travel. Overall intended outcomes from cited international educational experiences were global awareness, applying theory to practice, providing on roads for students and recruitment, empathy, meeting demand for global learners from industry, and for them to be "life changing." Recommendations for practice and future research are addressed, as are possible implications for the discipline.

Introduction

University graduates today face a world where knowledge and experience in a global context is increasingly important. The United Nations Food and Agriculture Organization states that the world's population is expected to reach 9.1 billion by 2050 with over 70 percent of that population living in urban areas (FAO, 2009). This increasing population places pressure on agriculturists to understand the complexities of how to meet the demands of producing and marketing agricultural products globally. Further, students are expected to prepare for an increasingly globalized agriculture industry. Employers are seeking individuals who have developed a global perspective and relevant competencies (National Research Council, 2009).

In response to industry demands for globalized employees, colleges of agriculture are seeking ways to better integrate international experiences (Irani, Place, & Friedel, 2005) and incorporating global experiences has gained increased emphasis (Elliot & Yanik, 2002; Etling & Barbuto, 2002). Perhaps as a result, colleges of agriculture nationwide are responding to the demands of the agriculture industry by creating relevant international experiences for undergraduate students (Foster, Rice, Foster, & Barrick, 2014). Yet, in spite of the emphasis placed on the internationalization of the undergraduate curriculum by many institutions, undergraduates nationwide are still failing, graduating with inadequate global competencies.

Evidence suggests many students from colleges of agriculture in universities across the United States graduate with limited international experience or knowledge (Wingenbach, Boyd, Lindner, Dick, Arispe & Haba, 2003; Irani et al., 2005). Faculty in colleges of agriculture, ranging from administrators seeking to implement holistic change in the internationalization of the undergraduate experience to individual instructors seeking to enhance global thinking, are attempting to implement a variety of international experiences with their undergraduate students, with varying levels of success. Yet, despite myriad international experiences available to faculty and students in colleges of agriculture across the nation, numbers of globally prepared graduates from colleges of agriculture remain low (Wingenbach et al., 2003). Clarity on the issue may be found from scholars engaged in the integration process of international dimensions into their coursework.

Theoretical Framework

Colleges of agriculture are well positioned to impact students' global competency. Moriba, Edwards, Robinson, Cartmell, and Henneberry (2012) found that attending an international dimensions course positively impacted students' views of aspects of enhanced international awareness. A possible implication of these findings is that international experiences, contextualized in a variety of ways, may influence a student's attitude and perception of globalization, resulting in a more global minded student. It is also of note that these findings emanate from a single course. One may conjecture that an integrated approach of several international experiences, offered in several ways, may improve students' global competencies even more.

The reality, however, in many colleges of agriculture nationwide is students are not engaged in international experiences. Beyond required general education demands, which typically necessitate a single course with international designation; little else is often required of students. Additionally, students have different levels of motivation to participate in international educational experiences. Bunch, Lamm, Israel, and Edwards (2013) found significant differences in motivation and perceived barriers between two geographically diverse groups of university students when assessing students' choices to participate in international experiences. Further, involvement in more advanced programming is limited. Short-term study abroad trips, often lauded for their multiple benefits, are weakly attended. Wingenbach, Chmielewski, Smith, Piña Jr., and Hamilton (2006) cite four barriers to involvement in study abroad by undergraduate students in the college of agriculture: concerns about personal safety, language, financial, and being away from family and friends. Also, faculty may not even realize, or may be unable to prioritize, all the options for international experiences available to them.

Literature points to the wide variety of international experiences available to undergraduate students. A review of the literature base related to international agricultural and extension education reveals a variety of available experiences aimed at improved global education such as attending conferences (Rutherford, 2012); listening to presentations and having dialog with those who have worked long term in relevant countries; field studies/trips to view various agricultural practices and internships (Bruening & Shao, 2005); participation in online simulations (Boyd, Dooley, & Felton, 2005); viewing online videos (Harder & Bruening, 2008); long term service such as Peace Corps (Smith, Moore, Jayaratne, Kistler, & Smith, 2009); participation in study abroad programs (Sharp & Roberts, 2013); using technology (Krueger & Reese, 2002), and participating in youth exchange programs (Williams, Lawrence, Gartin, Smith, & Odell, 2002). Further, many universities offer seminars on international topics, as well as clubs and other extracurricular activities to engage students in international experiences. Interaction with international exchange students is also a recognized source of experience. While there is a vast scope of possible experiences, understanding of the contextual dimensions of these experiences is limited. Further, while the aforementioned list of experiences reflects what is possible, it does not shed light on what is actually happening with students in agricultural leadership, education, extension, and communication.

This study is best framed by the theory of experiential learning. Experiential learning, as defined by Kolb (1984), is the process of creating knowledge. Clark, Threeton, and Ewing (2010) further contextualize experiential learning from an educator's perspective as "a series of pragmatic activities sequenced in such a way that it is thought to enhance the educational experience for the student learner" (Shoulders & Myers, 2013, p. 101). Experiential learning is rooted in constructivism which is a psychological and philosophical perspective contending that individuals form or construct much of what they learn and understand (Shunk, 2012). Roberts (2006) synthesized a model of experiential learning contexts (Figure 1). This model frames the context of an experience on four dimensions: duration, level, setting and intended outcome. As international experiences can vary widely in multiple dimensions, this model provides a theoretical foundation from which to categorize that variability.

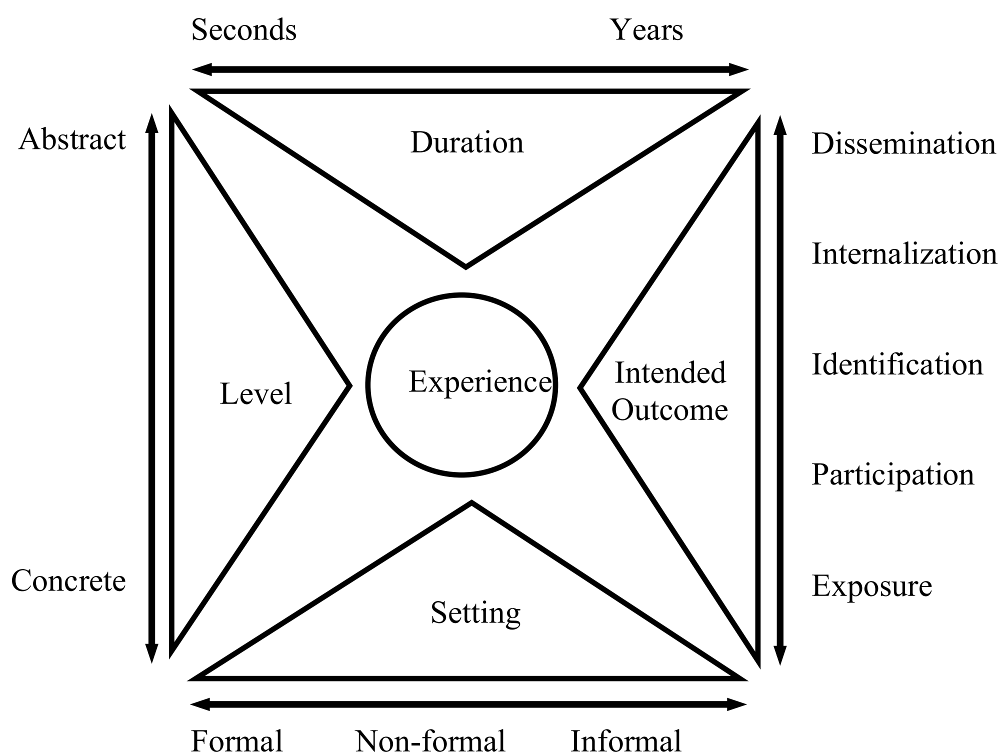

Figure 4. Model of Experiential Learning Contexts (Roberts, 2006)

Purpose and Objectives

The purpose of this study was to describe themes of international educational experiences currently being offered to students of agricultural leadership, education, extension, and communication. This research study addresses Research Priority 4, "Meaningful Engaged Learning," of the American Association for Agricultural Education Research Agenda for 2011-2015 (Doerfert, 2011). The objectives of the study were as follows:

1. Describe the scope and type of international educational experiences that were being offered to students.
2. Describe the international educational experiences based on the context of their duration, setting, intended outcome and level of cognitive engagement.

Methods

This was a basic qualitative study which provides rich descriptive account targeted at understanding a phenomenon, a process, or a particular point of view from the perspective of those involved (Ary, Jacobs, & Sorenson, 2010).

An initial seven faculty participants in agricultural leadership, education, extension, and communications were selected for interview based on their research in the *Journal of Agricultural Education* and *Journal of International Agricultural and Extension Education*. Snowball sampling was used to identify an additional four participants. Snowball sampling "occurs when the initially selected subjects suggest the name of others who would be appropriate for the sample. These next subjects might then suggest others and so on. Such sampling occurs when potential respondents are not centrally located but scattered in different sites" (Ary et al., 2010, p. 430).

Participants were interviewed via the telephone using a researcher developed interview guide based on the four dimensions of Roberts' (2006) model. Interviews were conducted until saturation was met. Data saturation is "the point when no new information is forthcoming from new units" (Ary et al., 2010, p. 429). All interviews were digitally recorded and lasted approximately 45 minutes each.

Trustworthiness of the study was maintained through peer debriefing, an audit trail, and triangulation of the data (Dooley, 2007). The lead researcher met weekly with the second researcher to discuss the interviews and analysis that occurred that week and review the audit trail. Triangulation was established by collecting supporting documentation such as course syllabi.

Data were transcribed verbatim. Transcribed data from the interviews were analyzed using the constant comparative method. This method "combines inductive category coding with simultaneous comparisons of all unites of meaning obtained. The researcher examines each new unit of meaning (topics or concept) to determine its distinctive characteristics and then compares categories and groups them with similar categories" (Ary et al., 2010, p. 489). Creswell (2005, p. 406) stated, "raw data are formed into indicators which are then grouped into several codes and then formed into more abstract categories. Throughout this process, the researcher is constantly comparing indicators to indicator, codes to code, and categories to categories which eliminates redundancy and develops evidence for categories." Pseudonyms were given to all participants in order to protect the individual identify of participants and are used in this manuscript.

The first researcher of this study is a PhD student of agricultural education. His coursework focuses on teaching and learning and international dimensions of education. He is a former agriculture teacher and lived abroad for an extended period of time. The second researcher is a professor of agricultural education and an advocate for global education. He has led study abroad programs and regularly integrates international examples in to his courses. He is a former agriculture teacher.

Results

Interviews were conducted with eleven participants: three females and eight males; five held the rank of full professor, four associate professors, and two assistant professors. All participants were faculty members in agricultural leadership, education, extension, and communications. Seven participants were from the Southeast, two from the Northeast, and two from the Midwest. None were from the Southwest or West, which was a limitation of this study. Faculty indicated five major themes of international educational experiences: (a) curricular experiences, (b) seminars, (c) interactions with international students, (d) co-curricular and extracurricular activities, and (e) international travel. Each theme had several sub-themes.

Curricular Experiences

Experiences which generally fall within the traditional scope of teaching and learning on a college campus fit the theme of curricular experiences. The two subthemes which emerged were structure and in-class experiences.

Structure is the way a department, college and/or institute was organized. The following examples are arranged from a shorter duration and less involvement to longer duration and more involvement: a certificate in international agriculture, an individual course focused on international content which may or may not be required for a particular major, a minor in international agriculture, a major in international agriculture, and a dual title degree program which involved adding an international agriculture degree onto an existing established bachelors or master's degree. Speaking of a course which was required by the department at a particular university, Charles said, "We adjusted our requirements for [omitted] so all of our students are required to complete international agriculture [omitted], a three credit course."

In class experiences are strategies described by participants which were used in one course, or a series of courses. It is important to note that the courses in question may or may not come with an international designation. Example in class experiences were: the use of pictures and videos, case studies which may have been student or instructor developed, scenarios, inviting a guest speaker or speakers, the use of a reusable learning object such as a video or picture slide show, and incorporating current world events. Often the participant would describe the instructor who was offering these experiences as a more "internationalized teacher" due to increased international travel. When discussing the use of current world events, Hugh said,

> do you realize there is a soybean frost going on in Argentina?.... students have to track the price of food [in food logs] and it helps students become more aware of how much their food costs because most students have no idea. And then we compare that with how much people pay for food in Sri Lanka or Belarus. Then they get a much better idea of, holy cow, here's what I made last year for an income and what if I had to spend 30 percent of it on food. It blows them away.

Seminars

Experiences which involved a group of people coming together to listen to speakers address international issues and opportunities were classified as seminars. There were no subthemes for this theme, but a few distinguishing characteristics are provided. Seminars were designed for both staff and students. Often, speakers were traveling dignitaries, domestic teachers with significant international travel experience, or students who were presenting about their own international travel. Stephen, who had a robust seminar series, described it as,

> [we had] what we called [an] international seminar series and basically every single speaker of the 12 speakers that I had, this is a couple years ago, all of them were either international or from a foreign country or Americans who have lived quite a bit international through teaching and extension, etc.

Nathan also saw the value in using seminars to incorporate international perspectives on campus. As he described it,

> we established a couple of years ago as part of our strategic plan in this effort, a brown bag seminar for international. It is a seminar that's really designed to highlight activities, opportunities, personalities, that are things going on across the institute…

Interactions with International Students

An informal experience around campus and in classrooms cited by many participants was the interaction between domestic and international students. There were no subthemes for this theme, but a few distinguishing characteristics are provided. International students may be graduate students who were teaching or serving as the assistant in the class. Intentional effort was being made at many institutions to increase the presence of international students on campus. While most interactions were described as random, some intentional socializing platforms were happening. Mary described an event on her campus which was designed as a platform for domestic and international students to interact. She said, "We have a full week event on campus that are hosted every October that allows students to integrate..."

Co-Curricular and Extracurricular Activities

Several experiences fell within co-curricular and extracurricular activities. Co-curricular refers to activities, programs, and learning experiences that complement what students are learning in school (Great Schools Partnership, 2013). Extracurricular refers to activities, programs, and learning experiences conducted outside of school (Great Schools Partnership, 2013). Three subthemes emerged: Greek life, clubs, and hosting high school students.

Greek life, or the presence of sororities and fraternities, is active on many campuses nationwide. One participant described a program that connected an international dimension to Greek life on campus. Through a formal university classroom setting, students engaged in several topics which centered on Greek life. Then, the class culminated in a short term international trip which reinforced concepts central to Greek life. Another participant described work done with a specific sorority to broaden their cultural perspective. Speaking of her work with the sorority, Nancy said, “It’s a professional sorority for women in agriculture so I talk to them about international perspectives of work.”

Several participants mentioned *clubs* which brought together students interested in international agricultural topics. One specific club surfaced several times as a fast growing organization around the nation: the IAAS or International Research and Agricultural Development, International Association of Students in Agricultural and Related Sciences. Students used clubs as a platform to network and discuss international dimension to coursework, research and careers.

Finally, *hosting high school students* was a non-formal way for faculty to engage university students with international experiences. One specific example was the World Food Prize. Departments hosted high school students on their respective campuses as part of the statewide competition of the nationwide World Food Prize program. This typically lent itself to exposing the university faculty, staff, and students to international content as they prepared to lead the event. Another specific example was a statewide program which brought high school students on campus for a week to learn more about agriculture. The directors of the program decided to focus on global food security, a very international topic. Again, international agriculture content was taught by university staff and students. In addition to creating another avenue for an international educational experience, both programs were cited as excellent recruiting tools for the department.

International Travel

Often, when participants spoke of international educational experiences, international travel was the first topic of conversation. Experiences cited by participants varied greatly based on the type, duration and intended outcome of the experience. The broadest subtheme of duration was used to delineate international travel and is: short and medium term travel or that ranging roughly from zero to six months; and long term travel, or that which ranges from 6 months to upwards of two years. Examples of short and medium term international travel included internships, service learning, study abroad, student exchanges, and student research.

Short and medium term international travel experiences offered many relevant details for practice. One example was international internships. Speaking of the internships offered at his program, Carl said,

> it would be probably in three categories. One would be business - so you would go work for a company that has a branch in another country. Second type would be looking at being placed to the University partner that we may have and they would be typically

> involved in research. And then the third one would be for development type work - working with a nongovernmental organization in some kind of developing country.

These internships ranged from two weeks to six months. Another unique internship opportunity mentioned was conducting a portion of student teaching in an international setting. Another short or medium term international travel experience was service learning opportunities. These opportunities were often offered without academic credit. Several participants cited partnerships with nongovernmental organizations or U.S. based non-profit organizations. These experiences were often two to six weeks in duration. Another classic example of a short to mid-term international travel experience was studying abroad. A defining characteristic of study abroad programs was the presence of a formalized curriculum which students were to master in an international setting. Yet another example of short and medium term travel included student exchanges. These exchanges included a dimension of domestic students traveling abroad and vice versa. Eric, who had worked for several years with a student exchange program, said this about U.S. students traveling abroad, "It's not unusual for the [omitted] students to invite the American students home with them over a weekend or for their various holidays and have the American student come home with them to their village or whatever." He went on to say the following about international students coming to the U.S.,

> this last fall we took them [international exchange students] up to [university] to recruit and we took them down to [university] to recruit. So they were here for it was a little over two weeks and you know they would get to see things inside out.

A final example of short to medium term international travel is student research and/or assessment. This could include graduate or undergraduate students. Hugh mentioned an undergraduate assessment program in which, "students are helping collect data, usually as part of a larger project, but they are not actually running the research." Often student travel was afforded by grant money. Charles described the involvement of students in international research as, "So, I've sent students to conduct research that are [omitted] majors to Brazil, Belize, … Sweden and then Korea with those [research] dollars."

*Long-term international travel experience*s were far less frequently cited by participants. Beyond occasional comments about an individual student conducting long term research in an international setting, only one example could be found. The Peace Corps Masters International program was mentioned by participants as a way students could earn their master's degree while conducting their data collection in an international setting through the Peace Corps program. The typical duration for the international travel was over two years for these students.

A list of international educational experiences cited by participants, coupled with the four dimensions of the Robert (2006) conceptual model of experiences, is provided below (Table 1).

Table 1
Scope and Contextual Dimensions of International Educational Experiences Identified by Faculty

Experience	Level	Duration	Intended Outcome	Setting
Using pictures and videos in class	Abstract	Minutes to Hours	Exposure	Formal
Using case studies in class	Abstract	Minutes to Hours	Exposure	Formal
Using scenarios in class	Abstract	Minutes to Hours	Exposure	Formal
Using guest speaker(s) in class	Abstract	Minutes to Hours	Exposure	Formal
Using reusable learning object (video or pictures) in class	Abstract	Minutes to Hours	Exposure	Formal
Using current world events in class	Abstract	Minutes to Hours	Exposure	Formal
Relevant examples from a more "internationalized" instructor's perspective	Abstract	Minutes to Hours	Exposure	Formal
Seminars	Abstract	Minutes to Hours	Exposure	Non-formal
Individual international course	Abstract	Months	Exposure	Formal
Completing a certificate in international agriculture	Abstract	Years	Exposure	Formal
Completing a minor in international agriculture	Abstract	Years	Participation	Formal
Completing a major in international agriculture	Abstract-Concrete	Years	Internalization	Formal
Completing a dual title degree program with international agriculture	Abstract-Concrete	Years	Dissemination	Formal
Interacting with international students	Concrete	Minutes to hours	Participation	Informal
Clubs	Concrete	Days	Participation / Identification	Non-formal
World Food Prize	Concrete	Days	Participation / Identification	Non-formal
International Internships	Concrete	Weeks to Months	Identification	Formal and Non-formal
International Service	Concrete	Weeks to Months	Internalization	Formal, Non-

Learning				formal and Informal
International Study Abroad	Concrete	Weeks to Months	Internalization	Formal, Non-formal, and Informal
International Student Exchanges	Concrete	Weeks to Months	Internalization	Formal, Non-formal, and Informal
International Research and / or assessment	Concrete	Weeks to Months	Internalization	Formal, Non-formal, and Informal
Master's Degree through Peace Corps International	Concrete	Years	Dissemination	Formal, Non-formal, and Informal

Intended Outcomes

Participants were asked to speak of the intended outcomes of the collective international educational experiences offered at and through their respective universities. Responses fit well within the range indicated by the Robert (2006) model and will be summarized as such.

Exposure is when learners would develop an awareness of the phenomenon (Steinaker & Bell, 1979, as cited in Roberts, 2006). The primary subtheme related to exposure was global awareness. Speaking of global awareness, Charles said, "I need them [students] to understand that agriculture is an integrated global system." Nancy added that, "More than anything it keeps them [students] helping them see how everything links to everything." Later, she added, "We bring a fresh set of eyes and minds too saying why do we do it this way? Why have we never done it this way? It's a way of looking at problems." Nathan viewed international educational experiences as a continuum. He said, "….this concept of international being a spectrum. There's places to get in and onramps onto that spectrum all along the spectrum. Every one of us I look at as being on a journey." Finally, Mary said, "Bringing international students into our classroom it provides an opportunity for students to begin to see exposure with the students who are bringing a different culture and different lifestyle and different perspective into the classroom."

Another intended outcome is *participation.* Participation is when learners would physically interact with the phenomenon (Steinaker & Bell, 1979, as cited in Roberts, 2006). Examples of participation level outcomes were applying theory to practice, providing on roads for students and recruitment. When speaking of applying theory to practice, Kevin said, "So, I try to give them [students] real experiences so when they graduate they can contribute if they chose to work internationally." Several examples of providing on roads for students to engage with international dimensions cropped up. One area of this was seen in an emphasis on a greater capacity for study abroad programs at many institutions. This appeared, in some instances, as an end in and of itself. Speaking about study abroad programs, Mary said, "…push at the college level is to have by 2020, 20 percent of our students who are graduating undergraduate participating in some type of international experience." About the same topic, Carl added, "We've been investing in this for probably about 15 years very aggressively. We moved from 40 students a year to 400 so we're making progress." Finally, another area of participation is when participants spoke about providing more chances for more encounters with more global content. On the topic, Nathan said,

> how do we provide as many and as varied on-ramps as possible for students as you know in [state]. Many who may come to campus from rural areas may have very limited experience or opportunities to be engaged in relationships with people from different races and different ethnicities.

A final participation level example intended outcome is recruitment. On recruitment, Charles said, "Global helps me recruit….[We help students see] you're going to be in demand across the world…. And we're going to give you an opportunity to change the world."

If the intended outcome is *identification*, participants would become involved with the experience affectively (Steinaker & Bell, 1979, as cited in Roberts, 2006). One key example of an identification level intended outcome was empathy. About empathy, Charles said, "We're developing empathy for English Language Learners." Kevin added, "… to give the students some perspective outside of their tiny little fishbowl that they live in here in [town]. It's all about perspective and giving students an opportunity to see the world."

Moving up the continuum, if the intended outcome is *internalization*, the experience would change the life-style of the learner (Steinaker & Bell, 1979, as cited in Roberts, 2006). The primary example of this intended outcome came through participants talking about the demand for global learners from industry. When speaking of meeting industry demands, Kevin said,

> I mean students need to do something that they can put on their vitae other than I graduated high school, went to college, and I got a degree in international development. You know I get e-mails, I had some yesterday, that people want students with experiences or internships or had spent time at another country. And you know if we're trying to help students meet this goal, then we need to help give them these experiences.

On the same topic, Carl added,

> … the student has to be better at working with diverse groups in the workplace so they've already been exposed to other cultures and maybe have the experience of being a minority in another country so then they interact differently with teams of diverse members…. They [students] tend to be better able to think outside of the box.

The final point on the continuum is *dissemination*. The intended outcome at the dissemination level is that the learner would share the phenomenon with others (Steinaker &Bell, 1979, as cited in Roberts, 2006). Several participants stated they wanted international educational experiences to be *life changing*. Mary said after her students participated in a medium term international travel experience, "They realize the world is not as big as they originally thought." Later she added, "So, it's very life changing for our students. Because many times when they travel when we take them abroad or they travel abroad it may be the first time that they've left the state let alone their country."

Conclusions / Recommendations / Implications

The scope and dimensions of international educational experiences currently being offered to students of agricultural leadership, education, extension, and communication vary widely. These experiences were: curricular experiences which varied based on structure and in-class experiences; seminars; interactions with international students; co-curricular and extracurricular activities which varied based on Greek life, clubs, and hosting high school students; and international travel which had examples that varied widely and was loosely categorized as short and medium term travel and long term travel. Overall outcomes for students who are the intended audience for these international educational experiences, categorized into five domains framed by Roberts' (2006) conceptual model, were: global awareness at the exposure level; applying theory to practice, providing on roads for students and recruitment at the participation level; empathy at the identification level; meeting demand for global learners from industry at the internalization level; and *life changing* at the dissemination level.

Practitioners may begin incorporating international dimensions into programming at various levels. Instructors seeking a relatively easy way to begin offering an international perspective to curricula may find some of the more abstract, short duration experiences, such as inviting a guest speaker or introducing an article from an international journal, a good place to start. Seasoned practitioners may seek more advanced programming to offer students, such as offering short term research projects or internships abroad. Second, educators may consider seeking one of the myriad opportunities for professional development with an international focus. Instructors who are able to speak candidly about international dimensions in agriculture provide a relevancy and dimension to the classroom which students may demand. International travel or simply staying abreast of current world events may be a good place to start. Third, departments may consider organizing themselves in such a way so as to offer a strategic series of international educational experiences for their students, and not simply rely on the devotions of a few passionate faculty members to meet the ends of globalizing a student's experience. Irani et al. (2005) found the perception of barriers to be inversely related to intent to participate in international activities. Perhaps findings from this study may guide strategic and sequential programming focused on reducing perceived barriers which may yield greater participation in international activities. Finally, specific attention should given to preservice teacher preparation. Foster et al. (2014) found preservice agriscience teachers had sustained changes in perceived knowledge, skills and dispositions related to global competencies following a short term international trip and corresponding coursework. Preservice teachers with globalized perspectives are well positioned to influence future school based agriscience classrooms with an international perspective, and will further perpetuate a globally competent society.

Future research should identify common antecedents to students who participated in short and medium term international travel. This may be done through focus group or personal interviews. Student antecedents have been found to affect students' willingness to engage with international experiences (Bunch et al., 2013). Understanding common antecedents to participating in study abroad programs may help guide early interventions beginning possibly as early as elementary school. Secondly, a study should be conducted using a causative-correlational or experimental design to measure the predictability of students choosing to become more involved with more advanced international programming, such as study abroad program, if less advanced programming, such as participation in a series of seminars, is a precursor. Finally, departments may consider incorporate a common scale to measure global mindedness and cultural awareness. Several scales currently exist such as the Cultural Intelligence Scale (Cultural Intelligence Center, 2014) and may be used to identify practices which individually, or used in tandem, may increase student's collective score.

Conceptualizing international educational experiences as existing on a continuum of less to greater involvement may prove useful. The Roberts' (2006) model serves as a framework for four possible contextual dimensions of an international educational experience. Offering a series of strategic interventions based on a continuum to students beginning in their freshman year, or earlier, may help departments of agricultural leadership, education, extension, and communication across the nation meet the demands for developing students with an international perspective and meet industry demands as indicated in the National Research Council's (2009) report.

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Multicultural Teaching Concerns of Beginning Pre-Service Teachers in Agricultural Education at Oklahoma State University

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Abstract

U.S. public schools reached a demographic milestone in 2014 when the average percentage of White students enrolled in K-12 schools became less than 50% for the first time in history. An investigation of the multicultural teaching concerns of beginning pre-service agricultural education teachers at Oklahoma State University was essential to inform teacher educators about the apprehensions of pre-service teachers preparing to teach students in classrooms that will be impacted by the projected demographic trends. A majority of beginning pre-service teachers were Non-Hispanic White and from a rural residence. While most participants described studying a foreign language, few participants had traveled internationally or studied abroad. Additionally, findings documented inconsistencies in coursework intended to prepare pre-service teachers to work with diverse groups. Initial multicultural teaching concerns of beginning pre-service agricultural education teachers were determined over four constructs. Teaching Strategies and Techniques, and Familial/Group Knowledge were of greatest concern for beginning pre-service teachers. Recommendations include further study to identify if educational experiences influence the multicultural teaching concerns of pre-service teachers.

Introduction

Trends published by the National Center for Education Statistics (NCES) documented a shift in the racial and ethnic distribution of students populating public schools in the United States (U.S.) over the last two decades (Aud et al., 2012). Growth of racially and ethnically diverse populations varies by region; however, a decline in the percentage of White students enrolled in public schools is a common trend across all regions of the U.S. (Kena et al., 2014). U.S. public schools reached a demographic milestone in 2014 when the average percentage of White students enrolled in K-12 schools became less than 50% for the first time in history (Kena et al., 2014). Teachers have faced the challenge of reducing the achievement gap between ethnic minority students and their White classmates for decades, but minority students continually perform lower than their White peers (Rojas-LeBouef & Slate, 2012). Some scholars (Gibson, 2004; Maxwell, 2014) argue the achievement deficiencies of minority youth will indisputably influence the welfare of the nation. Interestingly, these demographic changes are not limited to urban settings but are also present in suburban and rural communities (Maxwell, 2014). Therefore, change should be anticipated in many schools regardless of size.

Contrary to these demographic observations, an extreme shortage of minority professionals has been recognized within the agricultural education profession (Bowen, 2002; Kantrovich, 2010). However, a divergence in viewpoints exists within the discipline concerning the influence teacher race and ethnicity has on minority student enrollment in school-based agricultural education (SBAE) programs. Some argue that a lack of minority teachers impedes the enrollment of minority youth (Esters & Bowen, 2003; Lankard, 1994; Talbert & Larke, 1995), while other research findings indicate that teacher race does not influence minority student decisions to enroll in agricultural education (Jones & Bowen, 1998) or the selection of agricultural education as a career (Vincent, Henry, & Anderson, 2012a). Regardless of teacher race or ethnicity, addressing the needs of diverse learners in agricultural education is sanctioned as Priority 5 of *The American Association for Agricultural Education's National Research Agenda* (Doerfert, 2011). Unless strategies are implemented to prepare teachers to edify students who are culturally different than themselves, participation of diverse populations in agricultural education will continue to remain inactive (LaVergne, Jones, Larke, & Elbert, 2012). An investigation of the multicultural teaching concerns of beginning pre-service teachers in agricultural education at Oklahoma State University was essential to inform teacher educators of apprehensions qualifying teachers have related to teaching in classrooms impacted by racial and ethnic demographic trends.

Review of Literature

To understand the shifting educational landscape, we began by analyzing literature pertaining to race and ethnicity on both a national and state level, as well as, demographic information for both public schools and SBAE. Further, research concerning teacher demographics was also reviewed to identify factors leading to the *absence of synchronization* between the culture of contemporary schools and the ideals of the diverse students filling their hallways (Irvine, 1990).

U.S. Racial and Ethnic Demographics

Although race and ethnicity are similar, each has distinct features. Race is considered unitary, or exclusive, in nature and is used as the classification mechanism for a single group (OMB, 1997). Conversely, individuals may recognize multiple ethnic associations in relation to their heritage (OMB, 1997). White Non-Hispanic was the most frequently reported racial and ethnic combination during the 2010 U.S. Census (Humes, Jones, & Ramirez, 2011). However, trends indicate that as a group White Non-Hispanic is increasing slower than any other racial and ethnic category (Humes et al., 2011). This trend is only the beginning of a series of intriguing demographic shifts throughout the United States. A recent exodus of Latin American and Asian immigrants has dramatically begun to influence U.S. demographics (Banks, 2004). At the start of the new millennium, for instance, Hispanics surpassed Blacks as the largest minority population in the United States (Aud, Fox, & KewalRamani, 2010). By 2020, minority populations are expected to swell to represent 39% of the total U.S. population (KewalRamani, Gilbertson, Fox, & Provasnik, 2007). Numerous scholars (Cafferty & Engstrom, 2000; Leighley, 2001) suggest these changes could dramatically begin to shift U.S. political and social power.

Racial and Ethnic Demographics of Public Schools

Public schools are strongly influenced by national racial and ethnic demographic trends (KewalRamani et al., 2007). Therefore, the NCES monitors and predicts change in the racial and ethnic distribution of students populating U.S. public schools (Aud et al., 2010). Since 2002, public school enrollment of Hispanic students has exceeded that of Black students (Aud et al., 2012). Further, between 1990 and 2010, Hispanic enrollment in U.S. public schools increased by

11%, while Black enrollment decreased by 2% and White enrollment declined by 13% (Aud et al., 2012). In addition, the NCES has predicted these trends will continue over the next decade (Hussar & Bailey, 2013). The Office of Educational Quality and Accountability (OEQA, 2014) has identified similar trends in Oklahoma. In fact, 47% of students in Oklahoma public schools identify with a racial or ethnic minority group. Data gathered over the last 10 years illustrate a 32% increase in minority student enrollment across Oklahoma public schools (OEQA, 2014). These figures demonstrate the congruence between demographic trends impacting Oklahoma (OEQA, 2014) and U.S. public schools (Aud et al., 2012).

Racial and Ethnic Trends in Agricultural Education

Agricultural education has witnessed tremendous progress in relation to gender diversity (Bowen, 2002; National FFA Organization, 2013b). However, researchers (Bowen, 2002; Luft, 1996; Roberts et al., 2009; Talbert & Larke, 1995; Vincent, Killingsworth, & Torres, 2012b) suggest enrollment of racial and ethnic minority students in secondary agricultural education programs do not correspond with the demographic changes occurring in U.S. public schools. LaVergne et al. (2012) even described the inclusion of diverse populations in agricultural education as “stagnant” (p. 84). Despite these claims, minority student enrollment in agricultural education is difficult to assess as only 27 of 52 states and territories communicated racial and ethnic agricultural education enrollment data in the *Annual FFA Report* prepared by the National FFA Organization (2013a). Even so, membership in the National FFA Organization is often used as a proxy for minority enrollment in agricultural education (Bowen, 2002). Membership was recently documented as 67% White, 22% Hispanic/Latino, 8% Black/African American or American Indian and 3% Asian, Pacific Islander or two or more races (National FFA Organization, 2013b). It is important to note that although this data is reported, irregular grouping of racial categories make this data very difficult to compare to other sources.

Teacher Diversity

Racial and ethnic changes have left diverse teachers in high demand (Chambers, 2012). And, although student enrollment in U.S. public schools is rapidly transforming, the number of teachers representing racial and ethnic minorities remains disproportionately low (Bireda & Chait, 2011). Irvine (1990) described a cultural dichotomy within public schools, identifying an absence of synchronization between the educational culture operationalized by teachers and staff and the culture many students of color bring to schools. Furthermore, the National Center for Education Information (NCEI) chronicled K-12 public school teachers as overwhelmingly White and female (Feistritzer, 2011). Proportionally, K-12 teachers are described as 84% White, 7% Black, 6% Hispanic, and 4% Other (Feistritzer, 2011). Further analysis of minority teachers indicated that Hispanic teachers achieved the highest growth among minority teachers qualifying to enter the profession (Feistritzer, 2011). Even so, Bireda and Chait (2011) suggested that 40% of public schools do not employ any minority teachers. Overall, the lack of ethnic representation among U.S. teachers presents unique challenges for diverse students to succeed.

Pre-service agricultural education teachers entering the profession have been acknowledged as homogenous White in some states (Joerger & Boettcher, 2000; Vincent et al., 2012b) and exceeding 90% White nationwide (Rocca & Washburn, 2008; Kantrovich, 2010). Recognizing persistent racial uniformity within the profession, Vincent et al. (2012b) called for further examination, particularly in California (Trexler et al., 2004) and Texas (Talbert & Larke, 1995). States which both earned the designation *majority-minority* during the 2010 U.S. Census, by demonstrating collective minority populations exceeding 50% of the total state population (Humes et al., 2011).

Diversity Initiatives in Agricultural Education

Luft (1996) declared that SBAE teachers have not sufficiently addressed the needs of diverse students and are also failing in their efforts to recruit minority students. In response to this, Bell (2000) endorsed a challenge to help youth from diverse cultures attain the knowledge, skills, and attitudes needed to function in the 21st Century through agricultural education. However, the extent to which this challenge has been addressed is less than optimistic (LaVergne et al., 2012). Moreover, Talbert and Edwin (2008) called diversity efforts in agricultural education teacher preparation programs "less than desirable" (p. 59).

An examination of diversity initiatives within agricultural education teacher preparation coursework revealed substantial inconsistency in terms of the methods used to promote multicultural education (Luft, 1996). This irregularity has left SBAE instructors uncomfortable and ill-equipped to address the needs of diverse learners (Bowen, 2002). For example, University of Missouri pre-service agricultural education teachers were not as concerned about teaching multicultural students as secondary pre-service teachers of other disciplines (Vincent et al., 2012b). These deficiencies illuminate the need for further investigation related to the multicultural teaching concerns of pre-service agricultural education teachers.

Conceptual Framework

The conceptualization framing this study is based upon Fuller's (1969) teaching concern model. Fuller, Parsons, and Watkins (1974) sought to identify concerns of beginning teachers motivated by the concept that beginning teachers' concerns usually revolved around themselves and less around their students. Fuller et al. (1974) evaluated teaching concern statements of pre-service and beginning teachers to identify stages of concern. These concerns were divided across three groups including: self-concerns, task-concerns, and impact concerns (Fuller et al., 1974). Self-concerns include teacher confidence in the ability to perform adequately and survive as a teacher, task concerns relate to both instructional and non-instructional responsibilities teachers are required to perform daily, and impact concerns relate to meeting the social and emotional needs of pupils including occasionally adapting content for specific students (Marshall, 1996b). Katz (1972) posited that teachers progressively advance through the three stages of the Fuller et al. (1974) teacher concern model in the progression from beginning to experienced teacher. Additionally, Feiman and Floden (1980) acknowledged that novice teachers spent much of their energy resolving self-concerns. Consequently, Burke and Hillison (1991) emphasized the need to monitor concerns of teachers as they influence teacher morale and the overall quality of teaching and learning. As such, Fuller's (1969) teaching concern model was used as the framework for this study.

Purpose and Research Questions

The purpose of this descriptive study was to investigate the initial multicultural teaching concerns of beginning pre-service agricultural education teachers at Oklahoma State University. The following research questions guided the study:

1. What are the personal characteristics of pre-service teachers beginning coursework in agricultural education at Oklahoma State University?
2. What are the educational experiences of pre-service teachers beginning coursework in agricultural education at Oklahoma State University?
3. What are the multicultural teaching concerns of pre-service teachers beginning coursework in agricultural education at Oklahoma State University?

Methods/Procedures

The assessable population of this descriptive study consisted of 46 pre-service teachers enrolled in the pre-requisite Foundations and Philosophies of Teaching Agricultural Education course offered at Oklahoma State University during the 2014 Fall semester. This foundational course addressed many topics, including the topic of diversity, which justified the need for the study to the population. A census approach was utilized as the subject selection methodology. Researchers including two graduate teaching assistants and the lead instructor of the course presented the recruitment script to all 46 students enrolled in the course during a regularly scheduled class session. Participation in the study was voluntary with no penalty for choosing not to participate and data gathered were kept confidential. Upon consent participants completed a three-part questionnaire consisting of: (1) the Multicultural Teaching Concerns Survey (MTCS; Marshall, 1996a), (2) a demographic inventory, and (3) an experience inventory.

Multicultural Teaching Concerns Survey

Multicultural teaching concerns of beginning pre-service agricultural education teachers at Oklahoma State University were identified using the Multicultural Teaching Concerns Survey (MTCS; Marshall, 1996a). Marshall (1996b) observed that teachers develop concerns or anxieties about interactions with diverse students due to differences between the culture of schools and the culture many ethnically diverse students bring to schools. The MTCS (Marshall, 1996a) is a 30-question instrument using a 5-point Likert-type scale to measure multicultural teaching concerns ranging from extremely unimportant “1” to extremely important “5”.

The 30 questions of the MTCS (Marshall, 1996b) are divided across four constructs including: *Cross-Cultural Competence* (10 questions), characterized as attitudes and anxieties about cultural interactions between the teacher and students such as the ability to equitably engage learners without judging according to cultural background; *Strategies and Techniques* (11 questions) characterized as concerns related to selecting appropriate teaching resources and effective strategies to encourage the attainment of learning outcomes among diverse learners; *School Bureaucracy* (4 questions), characterized as concerns related to broad problems and issues beyond the classroom and the influence of public education systems on the ability to meet the needs of diverse learners; and *Familial/Group Knowledge* (5 questions) characterized as concerns related to the influence of family, ethnic and racial group culture on the educational experience of diverse learners.

A panel of six experts reviewed the MTCS (Marshall, 1996a) for face and content validity. Reliability estimates for the 30-question MTCS (Marshall, 1996a) were assessed post hoc on the population of this study using Cronbach's alpha (α). The overall reliability estimate for the MTCS (Marshall, 1996a) was $\alpha = 0.86$, deemed good by George and Mallery (2003). In addition, reliability estimates were also assessed post hoc for each of the four constructs. According to rules outlined by George and Mallery (2003), reliability of Cross-Cultural Competence $\alpha = 0.89$ and Strategies and Techniques $\alpha = 0.82$ were good, while the construct of Familial/Group Knowledge $\alpha = 0.65$ rated questionable, and the construct of School Bureaucracy $\alpha = 0.43$ rated poor. These low post hoc reliability estimates were consistent with those reported by Vincent et al. (2012b). However, unlike Vincent et al. (2012b) who modified the MTCS (Marshall, 1996a) to include 34-questions for improved reliability, the MTCS (Marshall, 1996a) was used in this study without modification, as it is more widely cited in the literature base (Mentz & van der Walt, 2007; Ponterotto, Mendelsohn, & Belizaire, 2003; Simpson, 2004).

Demographic and Experience Inventories

Demographic and experience inventories were used to summarize personal characteristics and educational experiences of the beginning pre-service teachers participating in this study. Oliver and Hinkle (1982) endorsed the investigation of group characteristics, advancing that proximate groups of an established cohort could be predicted to express similarities.

A demographic inventory was used to describe personal characteristics of pre-service teachers beginning agricultural education coursework at Oklahoma State University. Closed-ended survey questions in the form of check boxes (Creswell, 2012) were implemented for participants to self-report personal characteristics including: sex, ethnicity, race, perceived income of primary caregiver, highest level of school completed by primary caregiver, and home residence while in high school.

An experience inventory was used to identify educational experiences of pre-service teachers beginning coursework in agricultural education at Oklahoma State University. FFA involvement while in high school was assessed with "yes" and "no" check boxes. Additionally, an open-ended survey question (Creswell, 2012) asked participants to self-report the name of the high school they attended. Researchers later identified the total enrollment and percent minority enrollment of each high school identified using school report cards published by the Office of Educational Quality and Accountability (OEQA, 2014) or similar report produced by the respective state where the school was located. Open-ended survey questions (Creswell, 2012) were used to gather educational experiences including: other colleges attended, foreign language study, diversity courses completed at Oklahoma State University, international dimension courses completed at Oklahoma State University, and international travel and study abroad.

Educational experiences surveyed were determined by educational requirements of pre-service teachers attending Oklahoma State University. The Oklahoma Commission for Teacher Preparation (OCTP, 2010) requires teacher preparation candidates to attain conversational skills in a language other than English at a novice level. Therefore, participants were asked to self-report foreign language courses studied. Participants were also asked to self-report diversity and international dimension courses completed to fulfill university general education requirements (Oklahoma State University, 2014), and international travel and study abroad.

Following the data collection period, data were coded and recorded in SPSS. Descriptive statistics were computed and organized into data tables to be reported. A census was sought to effectively describe characteristics and educational experiences of pre-service teachers at the beginning stage of agricultural education coursework at Oklahoma State University.

Findings

Findings of research question one described personal characteristics of beginning pre-service agricultural education teachers at Oklahoma State University including: sex, ethnicity, race, perceived yearly income of primary caregiver, highest level of school completed by primary caregiver, and home residence while in high school.

Participants in this study were nearly evenly distributed in terms of sex, with only two more males ($f = 24$) than females ($f = 22$). See Table 1 for a detailed description of the distribution of males and females within the population.

Table 1
Sex of Agricultural Education Pre-Service Teachers (n=46)

Sex	*f*	%
Female	22	47.8
Male	24	52.2

In contrast to relative gender equity, we noted a significant deficiency in ethnic diversity among participants. For example, over 95% of participants self-reported as Non-Hispanic, this transmitted into 36 participants identifying as White and eight participants as American Indian. Other racial and ethnic categories were represented, but participants self-identifying within these categories were rare. For example, of 46 total participants only one identified within each of the following categories including: Hispanic, Black, and Multi-racial (see Table 2).

Table 2
Ethnicity and Race of Agricultural Education Pre-Service Teachers (n=46)

Characteristic	*f*	%
Ethnicity		
Hispanic	1	2.2
Non-Hispanic	44	95.6
Not Reported	1	2.2
Race		
American Indian	8	17.4
Black	1	2.2
White	36	78.2
Multi-racial	1	2.2

More than 60% (*f* = 28) of participants reported their home residence while in high school to be rural (see Table 3). In comparison, fewer participants identified residence in small towns (*f* = 11) or suburban areas (*f* = 6). And, no participants indicated an urban residence while in high school.

Table 3
Home Residence of Agricultural Education Pre-Service Teachers (n=46)

Home Residence in High School	*f*	%
Urban	0	0.0
Suburban	6	13.0
Small Town	11	24.0
Rural	28	60.8
Not Reported	1	2.2

In terms of perceived yearly income of primary caregiver among the participants, we found a high degree of variance. Interestingly, over 60% of participant's indicated their primary caregiver made over $50,000 per year (see Table 4). Of the remaining, 15 participants perceived the yearly income of their primary caregiver to be less than $50,000 with six participants reporting income to be less than $35,000 annually. Corresponding with income, more than 60% of participants indicated that their primary caregiver graduated from college. And, more caregivers were perceived as having some college with no degree earned (*f* = 11) than solely a high school diploma or a general education degree (*f* = 7).

Table 4
Caregiver Demographics of Agricultural Education Pre-Service Teachers (n=46)

Characteristic	*f*	%
Perceived Yearly Income of Primary Caregiver		
< $35,000	6	13.0
$35,000 - $49,999	9	19.6
$50,000 - $74,999	15	32.6
$75,000 - $100,000	9	19.6
>$100,000	7	15.2
Highest Level of School Completed by Primary Caregiver		
High school (diploma or GED)	7	15.2
Some college (no degree earned)	11	23.9
College graduate (degree earned)	28	60.9

Findings of research question two described educational experiences of beginning pre-service agricultural education teachers at Oklahoma State University including: FFA involvement, total enrollment of high school attended, percent minority enrollment of high school attended, other colleges attended, foreign language study, and international travel and study abroad.

The population of the study collectively represented eight different states including: Arizona, California, Illinois, North Carolina, Oklahoma, Texas, Wisconsin, and Wyoming. Ten participants, equal to more than 20% of the participants in the study reported they attended a high school outside of the state of Oklahoma. Of the beginning pre-service teachers participating in the study, all but one student reported involvement in the National FFA Organization.

Additionally, total high school enrollment was most frequently identified as under 500 students (see Table 5). School report cards published by respective state agencies (ADE, 2014; CDE, 2014; ISBE, 2014; NCPS, 2013; OEQA, 2014; TEA, 2014; WDPI, 2014; WDE, 2014) revealed that an overwhelming majority of the high schools attended (*f* = 39) documented minority student enrollment to be less than 50%. However, four high schools located in Oklahoma (OEQA, 2014) and three high schools located in Texas (TEA, 2014) documented majority-minority student populations, exceeding 50% of the total high school enrollment.

Table 5
High School Characteristics of Agricultural Education Pre-Service Teachers (n=46)

Characteristic	*f*	%
FFA Member		
Yes	45	97.8
No	1	2.2
Total Enrollment of High School Attended		
< 250	13	28.3
250 – 499	14	30.4
500 – 999	8	17.4
1000 – 1999	4	8.7
2000 – 4999	7	15.2
Minority Enrollment of High School Attended		
< 50%	39	84.8
> 50%	7	15.2

Eighty-eight percent of participants reported studying a foreign language for credit (see Table 6). Further, more participants had studied some foreign language (*f* = 34) than those who had not (*f* = 12), and more than half of participants (*f* = 26) reported studying Spanish. Other languages studied were French (*f* = 3), American Sign Language (*f* = 2), Muskogee Creek (*f* = 2), and German (*f* = 1).

Table 6
Foreign Language Study of Agricultural Education Pre-Service Teachers (n=46)

Foreign Language Studied	*f*	%
Spanish	26	56.5
French	3	6.5
American Sign Language	2	4.4
Muskogee Creek	2	4.4
German	1	2.2
None	12	26.0

Few participants reported completion of university general education requirements in diversity (*f* = 9) or international dimensions (*f* = 10). Among these few, a variety of courses were reported both within and outside of the College of Agricultural Sciences and Natural Resources (CASNR) (see Table 7). Interestingly, only eight participants identified having traveled internationally or studied abroad. However, more than 75% percent of participants (*f* = 35) reported attendance to another college in addition to Oklahoma State University.

Table 7
Educational Experiences of Agricultural Education Pre-Service Teachers (n=46)

Educational Experience	*f*	%
Completed a Diversity Course		
Within CASNR	6	13.0
Outside CASNR	3	6.5
None	37	80.5
Completed an International Dimension Course		
Within CASNR	9	19.5
Outside CASNR	1	2.2
None	36	78.3
Traveled Internationally or Studied Abroad		
Yes	8	17.4
No	38	82.6
Attended Other College(s)		
Yes	35	76.1
No	11	23.9

Findings of research question three described multicultural teaching concerns of beginning pre-service teachers at Oklahoma State University across four constructs of the MTCS (Marshall, 1996b) including: Cross Cultural Competence, Strategies and Techniques, School Bureaucracy, and Familial/Group Knowledge.

Participants of this study identified multicultural teaching concerns within the range of neutral "3" and important "4" across all four constructs of the MTCS (Marshall, 1996b). The MTCS (Marshall, 1996a) generated a mean score of 3.68 (SD = 0.41) as the overall multicultural teaching concern score of pre-service teachers enrolled in the Fall 2014 Foundations and Philosophies of Teaching Agricultural Education Course at Oklahoma State University. Participants rated Strategies and Techniques as the construct of highest concern, generating a mean score of 3.90 (SD = 0.48). Familial/Group Knowledge closely followed producing a mean score of 3.86 (SD = 0.54). Next, School Bureaucracy tabulated a mean score of 3.54 (SD = 0.53), and Cross-Cultural Competence generated the lowest mean score of 3.34 (SD = 0.81) as the construct demonstrating the greatest variance. Table 8 provides descriptive statistics across each construct of the MTCS (Marshall, 1996b).

Table 8
Cross-Cultural Competence, Strategies and Techniques, School Bureaucracy, Familial/Group Knowledge, and Overall Mean Concern Scores (n = 46)

Teaching Concern Variable	M^a	SD	Range
Strategies and Techniques	3.90	0.48	1.91 – 4.73
Familial/Group Knowledge	3.86	0.54	2.40 – 5.00
School Bureaucracy	3.54	0.53	2.50 – 4.75
Cross-Cultural Competence	3.34	0.81	1.00 – 4.50
Overall	3.68	0.41	2.60 – 4.40

[a]Scale based on: 1 = Extremely Unimportant Concern to 5 = Extremely Important Concern

Conclusions/Implications

The intent of this investigation was to describe the initial multicultural teaching concerns of pre-service teachers beginning coursework in agricultural education at Oklahoma State University. Beginning pre-service teachers were almost evenly distributed between male and female. This finding piqued our interest since the agricultural education discipline has been widely documented (Kelsey, 2006; Baxter, Stephens, & Thayer-Bacon, 2011) as a male dominated profession. We would like to note this change is a rather new phenomenon occurring in the Oklahoma State University agricultural education teacher preparation program. Only in the last two years has there been a significant rise in the number of female graduates. Interestingly, a rich supply of females also fills the foreseeable pipeline nationwide (Kantrovich, 2010); therefore, this trend is expected to persist in future years. A majority of pre-service teachers were Non-Hispanic White and from a rural residence, consistent with Kantrovich (2010) and Vincent, Kirby, Deeds, and Faulkner (2014). Over 60% of participants reported that their primary caregiver was a college graduate who earned more than $50,000 a year. This finding differs dramatically from state education statistics, which indicate that only 33% of Oklahoma residents hold a college degree (Lumina Foundation, 2014). We approach this finding with great interest since Oklahoma is consistently ranked as one of the poorest states in the United States with a median income below $40,000 per year (Lumina Foundation, 2014). Increased levels of education and income may further contribute to the absence of synchronization between qualifying teachers and the diverse students who will populate their classrooms (Irvine, 1990).

Educational experiences revealed that all but one student had been involved in the National FFA Organization. Interestingly, beginning pre-service teachers at Oklahoma State University were not solely regional, but students were representative of eight different states from across the U.S. This presents a very unique dynamic as experiences shared within the cohort reach beyond state lines. With multiple states represented, over half of participants attended a high school with a total enrollment of less than 500 students. Furthermore, an overwhelming majority of pre-service teachers attended high schools with a collective minority student enrollment below 50%. Even so, 15% of high schools attended by beginning pre-service teachers documented majority-minority student populations. Three of these schools were located in Texas, where the state average composite minority enrollment exceeds 70%, and Hispanic students represent 50% of the total student population (TEA, 2014). Plus, four pre-service teachers attended Oklahoma high schools where minority enrollment was greater than 50% (OEQA, 2014). This is evidence that growing minority student populations are present in high schools offering SBAE and potential exists for pre-service teachers to engage in field experiences in school districts of concentrated diversity.

Educational experiences intended to prepare pre-service teachers to live and work in an increasingly diverse society varied greatly among the participants of the study. Eighty-eight percent of pre-service teachers reported studying a foreign language for credit. A positive finding, as the Oklahoma Commission for Teacher Preparation (OCTP, 2010) requires teacher preparation candidates to attain conversational skills in a language other than English at a novice level. More than half of pre-service teachers identified studying Spanish as a foreign language. This finding corresponds with public school enrollment trends, as Hispanic enrollment in Oklahoma public schools has doubled over the last decade (OEQA, 2014).

While most participants described studying a foreign language, few participants had traveled internationally or studied abroad. Additionally, few participants reported completion of diversity or international dimension courses to fulfill university general education requirements (Oklahoma State University, 2014). Findings indicated Oklahoma, like many states, does not require a specific course in diversity or multicultural education for teacher preparation candidates (Akiba, Cockrell, Simmons, Han, & Agarwal, 2010). Beginning pre-service teachers who had completed diversity and international dimension requirements documented a wide variety of university courses offered both within and outside of the College of Agricultural Sciences and Natural Resources (CASNR). A strong majority of pre-service teachers reported completion of diversity and international dimension courses offered within CASNR, while fewer students reported completing courses offered through other colleges on campus. This infusion of diversity and international dimension courses within CASNR identifies "at least a minimal commitment to diversity" (Talbert & Edwin, 2008, p. 59). However, there are exceptions. Surprisingly more than 75% of beginning pre-service teachers reported attendance to another college in addition to Oklahoma State University. This finding is of great interest since transfer students may qualify for "exemption" from university general education requirements at the discretion of the academic advisor (Oklahoma State University, 2014, p. 82). Therefore, a large percentage of students could potentially bypass university diversity or international dimension course requirements. Overall, findings align with Luft (1996); documenting inconsistencies in coursework intended to prepare pre-service teachers to work with diverse groups. These inconsistencies could inevitably leave gaps in the attainment of skills necessary for pre-service teachers to address the needs of diverse learners (Bowen, 2002). This investigation acknowledged that initial multicultural teaching concerns of beginning pre-service agricultural education teachers at Oklahoma State University ranged between neutral "3" and important "4" across all four constructs of the MTCS (Marshall, 1996a). Further, Strategies and Techniques, and Familial/Group Knowledge were of greatest concern to beginning pre-service teachers. These findings are comparable to pre-service teachers at the University of Missouri (Vincent et al., 2012b) who reported Familial/Group Knowledge, and Strategies and Techniques to be of greatest concern. Vincent et al. (2012b) also found these to be significant predictors of multicultural teaching concerns across all four constructs of the MTCS (Marshall, 1996a). George and Mallery (2003) validated the overall post hoc reliability estimate for the MTCS (Marshall, 1996a). However, low reliability estimates for Familial/Group Knowledge and School Bureaucracy are limitations to the MTCS (Marshall, 1996a).

Recommendations for Future Research

Modifications to the MTCS (Marshall, 1996a) are necessary for improved reliability across all concern constructs. Further study is needed to identify if educational experiences including diversity and international dimension courses influence multicultural teaching concerns of pre-service teachers. Additionally, of the 360 secondary schools offering SBAE in Oklahoma, one in five demonstrate minority student enrollment equal to or above 50% (OEQA, 2014). This presents an opportunity for pre-service teachers to engage in field experiences in school districts of concentrated diversity. Researchers should investigate the multicultural teaching concerns of pre-service teachers engaging in field experiences at these schools, which may enrich pre-service teachers opportunities to interact with diverse students.

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An Examination of Academic Performance and Subject Area Competence of Agricultural Education Pre-Service Teachers

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Abstract

The acquisition of technical knowledge for teachers of agricultural education is an integral component of teacher preparation at Oklahoma State University. To that end, candidates are required to pass the Oklahoma Subject Area Test. The purpose of this study was to identify differences between performance in technical agriculture courses and subarea scores of pre-service teachers in the Oklahoma State University agricultural education program. Utilizing a time and place sample, the study concluded the following: Pre-service teachers are taking a variety of technical agriculture courses; Oklahoma Subject Area Test scores indicated most students meet the knowledge level necessary to pass the examination and were prepared through coursework; no relationships of higher than a moderate magnitude were found between performance in technical agriculture courses and subarea scores on the Oklahoma Subject Area Test. It is recommended changes be considered to either the technical agriculture curriculum for agricultural education at Oklahoma State University or the revision of the Oklahoma Subject Area – Agriculture examination to better reflect the technical agriculture courses currently in place. In addition, prior knowledge and experiences related to agriculture should be identified so advisors can suggest appropriate courses and experiences to improve students' proficiency in specific areas of the agricultural subject matter.

Introduction

School-based agricultural education programs are tasked with attracting and educating students from non-traditional backgrounds to continue to produce future agriculturists (Esters & Bowen, 2004). The passage of the No Child Left Behind (NCLB) legislation in 2001 required individuals to "earn a bachelor's degree, be state certified, and exhibit a specified level of competency for each content area one teaches" (Reese, 2004) to be considered a highly qualified teacher. NCLB policy mandates all core academic teachers to comply with requirements for being a highly qualified teacher. Career and Technical Education (CTE) teachers teaching courses for core academic credit are expected to follow these regulations, while courses not for core academic credit are exempt (Fletcher, 2006). "Despite this current provision, many high school CTE programs require CTE teachers to earn a bachelor's degree, teaching certificate, and pass an assessment in the particular subject area in which they teach, making them highly qualified" (Fletcher, 2006, p. 164). In Oklahoma, individuals preparing to become certified for agricultural education must pass the Oklahoma Subject Area Test (OSAT) with a minimum score of 240 (CEOE Passing Requirements, 2014). Successful completion of the OSAT fulfills half of the NCLB mandate for individuals to be highly qualified effective teachers (HQET). According to NCLB legislation, being *highly qualified* entails having "at least a bachelor's degree, and demonstrating competencies in the specific content area as defined by the state" (Simpson, Lacava, & Graner, 2004, p. 70).

The OSAT for agricultural education was revised in 2011 to include a new subarea focused on Foundations of Agricultural Education as well as a constructed response assignment anchored to the Foundations of Agricultural Education subarea (CEOE Faculty Guide, 2012; Ramsey, 2012). Revisions were in addition to the pre-existing subareas: Agricultural Business, Economics, and Marketing, Animal Science, Plant and Soil Science, Agricultural Mechanics, and Environmental Science and Natural Resources (CEOE OSAT Study Guide, 2011). Prior to the revisions, the passing rate for agricultural education pre-service teachers at Oklahoma State University was reported at 100% since the 2007-2008 school year (Edwards, 2008, 2009, 2010, 2011). After the OSAT revisions, the passing rate was 84% (Ramsey, 2012, 2013). For the 16% of students who did not pass the OSAT to become certified, they must retake the examination until a passing score is attained. According to the Annual Student Assessment Report, mean scores for the new subareas in school year 2011-2012 were (267) for Foundations of Agricultural Education and (217) for writing, while scores in 2012-2013 were 264.3 and 211.5, respectively, for those years (Ramsey, 2012, 2013).

Students who identify the agricultural education major with a teaching option at Oklahoma State University are required to complete 124 credit hours of coursework to fulfill the five curriculum sections designated on the degree plan, i.e., general education requirements; college/departmental requirements; major requirements; professional core; and electives. Three areas of the degree plan are directly related to courses offered in the College of Agricultural Sciences and Natural Resources (CASNR), with the other two sections reflecting general education requirements, and electives. The six sub areas and constructed response assessed by the agriculture OSAT are reflected within the 382 undergraduate courses offered in CASNR's 17 departments (Oklahoma State University Catalog, 2013-2014). Not all students admitted into the program complete all of the courses at Oklahoma State University; 69.74% of students in the study's population transferred to Oklahoma State University and were admitted into the program after having attended a junior or community college.

For more than 30 years, colleges of agriculture have faced issues with declining numbers of students pursuing agricultural careers through a college education (Dyer, Breja, & Wittler, 2002; Jones, 1999; Zoldoske, 1996). Not only are declining enrollment numbers a concern for colleges of agriculture, but so is the agricultural literacy of students enrolled in colleges of agriculture (Frick, Kahler, & Miller, 1991; Kovar & Ball, 2013; Mayer & Mayer, 1974). The shift from the farm to the cities is reflected in many of these students. They represent families without direct ties to production agriculture for multiple generations (Frick, Kahler, & Miller, 1991; Leising, Igo, Heald, Hubert, & Yamamoto, 1998; Powell & Agnew, 2011). Findings, conclusions and recommendations generated from this study help inform teacher educators about the technical agriculture coursework and experiences their students need as they prepare to teach school based agricultural education. Prospective agricultural education teachers must understand they deliver programs addressing a variety of topics associated with technical agriculture, regardless the area of agriculture they may be teaching i.e., animal science, horticulture, wildlife, agricultural mechanics, and so forth. (Talbert et al., 2007). According to Jayaraj (1992) "the future emphasis in agricultural education should be the development of broadly applicable, transferable skills and attributes useful to students in a wide range of jobs in agriculture" (p. 181).

Theoretical Framework

The theoretical framework for this study was the expectancy-value theory (Atkinson, 1957) using the model developed by Eccles et al. (1983). The expectancy-value model of achievement was developed by Eccles et al. (1983) to potentially understand adolescents' performance and choice in the area of mathematics achievement and was based on the original work conducted by Atkinson in 1957 (Wigfield, 1994). Eccles et al. (1983) proposed a child's persistence, choice of achievement tasks, and achievement performance are most directly predicted by the expectancies they have for success on the tasks and the subjective value they attach to the success of each completed task. A student's desire to be successful is an important determinant in their motivation to pass the OSAT, succeed in coursework, graduate, and become a certified agricultural education teacher. It is important to understand the motivational factors and rewards that lure people into a particular career and the career-decision making process in which students engage (Lucas, 1993; Zoldoske, 1996).

The two major constructs used in this study related to the expectancy-value model included achievement behaviors and expectancies. Achievement behaviors include persistence, choice and performance of students (Eccles et al., 1983). The students' persistence and performance refers to the number of times the OSAT, or a particular course must be taken, as well as their grade in each course and score on the OSAT. When considering a students' ability to succeed in the classroom, or to successfully pass the OSAT, Atkinson and Feather (1966) posited, "Let us consider the effects of success or failure on the level of motivation in a person whose motive to achieve is stronger than his motive to avoid failure" (p. 25). "The use of the expectancy concept implies that the relative frequency of success and failure following previous performance in similar activities determines the present strength of expectancies of success and failure at a particular task" (Atkinson, 1964, p. 258). Three variables constitute the theoretical model put forth by Atkinson (1957): motive, expectancy, and incentive. Two kinds of expectancies were used in this study; those that were current, and those in the future, and are defined as a belief a student has about how he or she will do on an upcoming task (Wigfield, 1994).

Oklahoma State University and peer institutions seeking accreditation or endorsement by the Council for the Accreditation of Educator Preparation (CAEP) must implement the following standards: (1) content and pedagogical knowledge; (2) clinical partnerships and practice; (3) candidate quality, recruitment, and selectivity; (4) program impact; and (5) provider quality assurance and continuous improvement. Agricultural education majors are required to take 26 credit hours' of courses identified as College/Departmental Requirements and 24 credit hours' represent the Major Requirements portion of the plan of study; all of which consist of courses within CASNR. Content and pedagogical knowledge consist of pre-clinical experiences taught by departmental faculty in the Agricultural Education, Educational Psychology and Special Education departments. Clinical partnerships and practice consist of the "on and off-campus laboratory and clinical experiences… [that] provide pre-service teachers with settings in which they may study teaching and practice what they have learned in general, content, and professional education" (Cruickshank, 1996, p. 28). A high level of subject-matter knowledge is necessary for pre-service teachers to be successful in the classroom, and is detrimental if the level of subject-matter knowledge is not complete. Henning and King (2005) found pre-service teachers did not have enough content knowledge in social studies or science to make meaningful lessons for students. The quality of the curriculum being taught reflected the students' lack of content knowledge (Henning & King, 2005).

At Oklahoma State University pre-service agricultural education teachers are required to take three tests offered by the Certification Examinations for Oklahoma Educators (CEOE). The three tests include the Oklahoma General Education Test (OGET), the Oklahoma Professional Teaching Examination (OPTE), and the Oklahoma Subject Area Test (OSAT) in Agriculture. These examinations are required by the state of Oklahoma for an individual to become certified in a content area. The OGET is a criterion-referenced, competency based test designed to assess state-mandated core general education knowledge and skills, including critical thinking, communication, and computation. The OPTE is a criterion-referenced, competency-based test designed to assess professional knowledge and skills needed by entry-level Oklahoma educators. The OSAT is a criterion-referenced, competency-based test developed to assess six competencies: agricultural business, economics and marketing; animal science; plant and soil science; agricultural mechanics; environmental science and natural resources; and foundations of agricultural education (CEOE Oklahoma Subject Area Tests Study Guide, 2011).

Purpose & Objectives

The purpose of this study was to identify differences between performance in courses of technical agriculture and subarea scores of pre-service teachers in the agricultural education program at Oklahoma State University. Three objectives guided the study:

1. Identify agricultural education pre-service teachers performance in courses of technical agriculture at Oklahoma State University between 2011 and 2013 related to the following six subareas: (a) Agricultural Business, Economics and Marketing; (b) Animal Science; (c) Plant and Soil Science; (d) Agricultural Mechanics; (e) Environmental Science and Natural Resources; and (f) Foundations of Agricultural Education;
2. Identify scores on the six subareas and the constructed response section comprising the OSAT for agricultural education pre-service teachers;
3. Describe relationships between performance in courses of technical agriculture and subarea scores on the OSAT for agricultural education pre-service teachers.

Research Design & Methods

An ex post facto research design was chosen for this study. The two dependent variables studied were performance in courses of technical agriculture and subarea scores on the OSAT. The students' transcripts of courses taken at Oklahoma State University defined performance in courses of technical agriculture, and the Oklahoma Subject Area Test (OSAT) scores in agricultural education defined subarea scores on the OSAT. A time and place sample of the population was taken. The population for this study consisted of all pre-service agricultural education majors who had completed the Oklahoma Subject Area Test while enrolled at Oklahoma State University between 2011 and 2013 ($N = 92$). Sixteen individuals did not have complete data entries for either performance in courses of technical agriculture or subarea scores on the OSAT, so they were excluded from this study, i.e., a useable sample of 76 individuals ($n = 76$). The time-bounded sample was chosen because of revisions made to the OSAT in 2011 to include two new competencies: Foundations of Agricultural Education and a constructed response assignment anchored to the Foundations of Agricultural Education subarea (CEOE Faculty Guide, 2012).

Data were collected using a review of student transcript records for each agricultural education student for the years of 2011, 2012, and 2013. The records contained information related to performance in courses of technical agriculture, including the courses, credit hours, and grade point average for each student. The six subareas of the OSAT categorized the courses taken by students. Subarea scores on the OSAT were obtained from students' professional certification portfolios provided by the agricultural education program at Oklahoma State University.

The first objective was to identify student performance in courses of technical agriculture. We obtained a complete list of courses offered through CASNR. Courses were sorted into each of the subareas. Data for this objective were calculated by subarea using the six subareas tested for on the OSAT. A total for all six subareas was also calculated. Due to similarities with this study, the formula for calculating scores used by Houck (2008), with minor modifications, was employed. "The formula developed to represent each area was the number of credits multiplied by the level of the course over one hundred multiplied by the grade received" (Houck, 2008, p. 25). The formula was modified to reflect the course numbering system at Oklahoma State University. The institution from where the formula originated used a three-digit course numbering system, however, this study used a four-digit system. The output of the formula is interval so means and standard deviations were calculated on the data. Means were calculated to determine the average performance in courses of technical agriculture for the sample, and standard deviations were calculated to show the variance of scores from the mean.

Number of credits * (course level/1000) * grade received = Performance in Courses of Technical Agriculture

The second objective was to identify scores for each of the six subareas as well as the constructed response item on the OSAT, the total overall OSAT scores were also calculated. Scores for each subarea were interval data, meaning they have equal units of measurement, but there is not an absolute zero (Glass & Hopkins, 1996). It was, therefore, deemed appropriate to calculate means and standard deviations. Data were available for 76 students for the period of time included in this study. Students with no OSAT scores on record, or who had failed to take the OSAT were removed from the sample. Approximately 18% of students taking the OSAT had to take the exam more than once to achieve a passing score. Therefore only the highest score recorded for each student were considered.

The third objective was to investigate the relationship between performance in courses of technical agriculture and OSAT scores. Performance in courses of technical agriculture scores, and the OSAT scores were interval, so the Pearson product-moment correlation coefficient was used to analyze relationships between the scores. Pearson correlations allow for the comparison of the strength (or magnitude) and direction of association between two variables (Glass & Hopkins, 1996), Davis' conventions were used to interpret the magnitude of the relationships (Davis, 1971).

Findings

Objective #1

Data were available for 76 students for the period of time included in this study. Comparing student performance in technical agriculture course work revealed the highest proficiency in the area of Foundations of Agricultural Education with a mean of 27.82 (*SD* = 12.59). The next highest mean score was Animal Science, 23.12 (*SD* = 11.27) with a range of 0 to 48. For the Agricultural Business, Economics, and Marketing content area a mean score of 22.58 was reported (*SD* = 11.29) and a range of 4 to 48. The Environmental Science and Natural Resources content area was the next highest mean 17.67 (*SD* = 7.72) with a range of 0 to 36. The Plant and Soil Science content area presented a mean of 15.48 (*SD* = 12.64) and reported a range of 0 to 64, and the last content area; Agricultural Mechanics, had a mean of 11.64 (*SD* = 5.71) and a range of 0 to 48. Overall, a mean of 21.19 (*SD* = 4.83) with a range of 0 to 72 was reported (see Table 1).

Table 1
Students' Performance in Technical Agriculture Courses (n = 76)

Subarea	*M*	*SD*	Range
Foundations of Agricultural Education	27.82	12.59	0 to 72
Animal Science	23.12	11.27	0 to 48
Agricultural Business, Economics, and Marketing	22.58	11.29	4 to 48
Environmental Science and Natural Resources	17.67	7.72	0 to 36
Plant and Soil Science	15.48	12.64	0 to 64
Agricultural Mechanics	11.64	5.71	0 to 48
Overall Mean, *SD*, and Range	21.19	4.83	0 to 72

Note. Performance in Courses of Technical Agriculture = Number of credits * Course Level/1000 * Grade Received. A score of 0 was recorded for a grade of F in any course. A score of 72 was recorded for the grade of A in a 3000 level course worth 6 credits.

Objective #2

We sought to identify the agricultural content knowledge of the participants based on the OSAT agriculture scores. A portion of the population (*n = 31* completed the OSAT before the revisions were put into place, while the remainder (*n* = 45) took the examination after it was revised. To properly account for differences in the exam, we kept separate data for students who took the test before and after revisions were made. The minimum passing score for the OSAT agriculture examination is 240 and the maximum score is 300.

For students who took the OSAT prior to its revision, the subarea with the highest mean score was Agricultural Business, Economics, and Marketing with a mean of 273.55 (*SD* = 18.23; range = 200 to 295). The next highest subarea was Animal Science; mean 270.84 (*SD* = 12.60) with a range of scores from 245 to 294. For the Environmental Science and Natural Resources subarea, mean 269.55 (*SD* = 14.84) scores ranged from 236 to 300. The Agricultural Mechanics subarea reported a mean of 269.36 (*SD* = 17.90) with scores ranging from 236 to 300. The lowest scoring subarea with a range of scores from 236 to 288 was Plant and Soil Science; mean 267.97 (*SD* = 10.98) (see Table 2).

Table 2
Agriculture Content Knowledge of Participants by Pre-Revision OSAT Scores (n = 31)

Subarea	*M*	*SD*	Range
Agricultural Business, Economics, and Marketing	273.55	18.23	200 to 295
Animal Science	270.84	12.60	245 to 294
Environmental Science and Natural Resources	269.55	14.84	236 to 300
Agricultural Mechanics	269.36	17.90	236 to 300
Plant and Soil Science	267.97	10.98	236 to 288
Foundations of Agricultural Education[a]	n/a	n/a	n/a
Constructed Response[a]	n/a	n/a	n/a
Overall OSAT Score	270.834	8.63	253 to 285

Note. [a] Subareas were not available until 2011.

Agriculture content knowledge of participants by post-revision OSAT Scores (*n* = 45) reflects Animal Science as the subarea with the highest mean score of 269.42 (*SD* = 15.62) with a range of 234 to 300. In comparison the next highest subarea was Foundations of Agricultural Education, mean 263.33 (*SD* = 22.49) with a range from 201 to 300. For the Agricultural Business, Economics, and Marketing subarea, mean 262.00 (*SD* = 20.67) the scores ranged from 217 to 300. The Plant and Soil Science subarea mean 261.18 (*SD* = 13.78) reported a range of 224 to 291. The Environmental Science and Natural Resources subarea reported a mean of 256.62 (*SD* = 20.68) and a range of 216 to 300. The next highest subarea was Agricultural Mechanics; mean 256.29 (*SD* = 23.07) and scores ranging from 208 to 300. The lowest subarea was the Constructed Response; mean 225.44 (*SD* = 36.06) with a range of 152 to 300. The overall mean and standard deviation for the 45 post-revision participants overall OSAT scores were reported a mean of 255.80 (*SD* = 9.62) with a range of scores from 241 to 286. (see Table 3).

Table 3

Agriculture Content Knowledge of Participants by Post-Revision OSAT Scores (n = 45)

Subarea	*M*	*SD*	Range
Animal Science	269.42	15.62	234 to 300
Foundations of Agricultural Education	263.33	22.49	201 to 300
Agricultural Business, Economics, and Marketing	262.00	20.67	217 to 300
Plant and Soil Science	261.18	13.78	224 to 291
Environmental Science and Natural Resources	256.62	20.68	216 to 300
Agricultural Mechanics	256.29	23.71	208 to 300
Constructed Response	225.44	36.06	152 to 300
Overall OSAT Score	255.80	9.62	241 to 286

Objective #3

Objective 3 focused on identifying the relationships between performance in courses of technical agriculture and students' agricultural content knowledge. Pearson product-moment correlations between performance in courses of technical agriculture for each subarea and OSAT test scores in all subareas were calculated to describe the relationship between the variables. Correlation coefficients ranged from negligible to substantial in magnitude (Davis, 1971). There were only four statistically significant relationships at $p < .05$. The correlation between performance in courses of technical agriculture in Agricultural Economics (AGEC) and the AGEC subarea of the OSAT was negative and low ($r = -.227$). The relationship between performance in courses of technical agriculture in Environmental Science and Natural Resources (ESNR) and the Animal Science (ANSI) subarea of the OSAT was negative and low ($r = -.251$). The last two statistically significant relationships were between the performance in course s of technical agriculture in Agricultural Education (AGED) and Constructed Response (CRESP), and the Plant and Soil Science (PSS) subarea of the OSAT which was positive and moderate ($r = .311$). The remaining correlations ranged from negligible to low in nature and included both positive and negative relationships which show no significant relationships between preparation in courses of technical agriculture related to the six subareas and any of the subareas tested for on the OSAT (see Table 4).

Table 4

Pearson Product Moment Correlations between Performance in Courses of Technical Agriculture, the Students' Overall Agricultural Content Knowledge and Sub-area Score on the OSAT *(n = 76)*

	Overall OSAT Scor	AGEC	ANSI	PSS	AGMECH	ESNR	AGED	CRESP
M-AGEC	-.092	-.227*	.019	-.094	-.069	-.147	-.045	-.009
M-ANSI	.098	-.001	-.010	-.003	.082	.036	-.082	-.059
M-PSS	.016	-.107	.197	.153	-.147	.119	.047	.001
M-AGMECH	-.016	-.152	.064	.059	-.010	.062	.151	.121
M-ESNR	.035	.135	-.251*	.09	.060	.039	-.043	-.062
M-AGED	.038	-.133	.048	.311*	.073	.056	.053	.012
M-CRESP	.038	-.133	.048	.311*	.073	.056	.053	.012

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS) * $p < .05$

Conclusions & Implications

Compared to other areas of technical agriculture, students had the least preparation agricultural mechanics. The large variability between subareas of preparation in courses of technical agriculture implies each subarea is not equal in the number of courses or course level required by the degree program at Oklahoma State University. In addition, students transferring to Oklahoma State University have the opportunity to several technical agriculture courses at their junior college. The variability also indicates the wide variety of courses pre-service teachers take to fulfill technical agriculture requirements. The range in standard deviations between technical areas and the total number of courses completed reflects a wide range of grades and a variety of courses students completed. The range of scores indicates at least one student received a grade of F in one course in every subarea other than Agricultural Business, Economics, and Marketing.

Students preparing to become school-based agricultural education teachers at Oklahoma State University routinely enroll in more than the required hours required for the major. Academic advisors encourage students to consider their agricultural background and to select courses that will prepare them for the agricultural education-related courses. Curriculum requirements at Oklahoma State University are supported by McCracken's beliefs in that general education requirements are less than the technical agricultural requirements, which is less than the professional core courses.

A comparison of the competence in courses of technical knowledge of those students who completed the OSAT before its revision with the scores of those who completed the OSAT after the revision was computed. The OSAT scores of pre-service agricultural education students at Oklahoma State University who completed the examination before revision of the OSAT had higher overall scores than those who completed the OSAT after the revision. The mean scores differed by over 15 points (see Table 1). Each of the examination's subarea scores were higher than the minimum score required for passing the OSAT. Students who completed the examination prior to the revisions performed best in the Agricultural Business, Economics, and Marketing subarea, and reported the lowest performance in the Plant and Soil Science subarea. This implies students met the knowledge level necessary to pass the OSAT, and were well prepared through their coursework. Other than preparation through coursework, the high mean scores for all of the subareas may be credited to incentives related to the expectancy-value theory. Achievement, the persistence, choice, and performance of students (Eccles et al., 1983), and expectancy beliefs could have motivated students to perform better on the OSAT to achieve certification and even a baccalaureate degree.

The OSAT scores of pre-service agricultural education students at Oklahoma State University who completed the examination after its revision had lower scores in each subarea when compared to students who took the examination before the revision. Revisions included the addition of the foundations of agricultural education subarea and a constructed response section with the focus on concepts associated with the foundations of agricultural education subarea. In the revision process, all subareas were reviewed and the vendor who created the exam provided the test questions. In spite of efforts to validate the exam by representatives of teacher education and its stakeholders, the examination may not accurately represent the technical agriculture currently delivered in the degree program. The addition of a constructed response proved to be challenging for pre-service teachers. The constructed response mean was the only subarea score below the minimum passing score (see Table 3). The questions for the constructed response section are based on the foundations of agricultural education subarea, so the preparation in courses of technical agriculture in this subarea was not identifiable. The six subareas were all above the minimum passing score with animal science being the highest OSAT score mean, and the sub-area earning the lowest mean OSAT score was agricultural mechanics.

The relationships between the OSAT examination scores and the students' competence of technical agriculture related to the six subareas as demonstrated by the performance in courses were low to moderate (see Table 4). It is important to consider the lack of relationships when discussing the implications for each subarea. The data show no real relationships between preparation in courses of technical agriculture as related to the six subareas tested for on the OSAT. The lack of relationships could indicate the need for the concepts tested in the six subareas to be evaluated. A misalignment in the curriculum being taught to pre-service teachers and the alignment with the undergraduate technical agriculture curriculum tested for on the examination may exist. The only statistically significant ($p < .5$) relationship with a moderate relationship in magnitude was between the foundations of agricultural education subarea and the plant and soil science subarea. The moderate relationship may imply, to a certain extent, as preparation in courses of technical agriculture in the foundations of agricultural education subarea increases, students' scores in the plant and soil science subarea increased as well. This may be attributed to the investigation and synthesis of content knowledge required when pre-service teachers begin to lesson plan. The animal science subarea mean scores were the highest both prior to and after the revisions of the OSAT (see Table 2 and 3). So, faculty and graduate students responsible for directing microteaching labs encourage students to create and deliver lessons focused on plant science and other others that are consistently lower as reported by the OSAT.

Recommendations for Research & Additional Practice

Research

Replication of this study at teacher preparation programs across the state of Oklahoma and the United States that have agricultural education teacher preparation programs could be valuable, especially in states that border Oklahoma, i.e., (Arkansas, Colorado, Kansas, New Mexico, Missouri, and Texas). The challenge of preparing pre-service teachers who can teach the scientific, technical nature of agriculture is faced by teacher preparation programs across the country. More research examining the relationship between students experience and completion of technical agriculture coursework may shed light on potential solutions. Houck (2008) reported the need to use the break out scores from certification exams for a more complete picture to be discovered. By replicating this study across schools in the state of Oklahoma, the curriculum and needs of only pre-service agricultural education students can be addressed from a state-wide level, and not just from each individual teacher preparation program's viewpoint.

Related to the OSAT, research should be conducted examining roles of prior knowledge in agricultural subareas and their effects on OSAT scores. The role of agricultural experiences and their effects on OSAT scores should be examined, as well. The scope of this study did not take into account either of these variables, but future studies may identify the roles these variables have in the development of a pre-service agricultural education teacher's content knowledge.

Practice

Department heads and faculty tasked with preparing pre-service agricultural education students should work together with department heads and faculty in the various disciplines within colleges of agriculture to identify courses where students would benefit from having a separate section dedicated to aspiring agricultural education teachers.

To address the low mean scores seen in each subarea, a provisional admission program could be implemented for incoming pre-service agricultural education students. A provisional admission program would help transition students into the agricultural education program, and would give faculty a predictor to future success in agricultural education. Findings by Kulik, Kulik, and Shwalb (1983) asserted that, "individuals in professional programs would fail less often than their peers in conventional programs. Their college records might become a source of pride instead of a point of embarrassment" (p. 408). The expectancy-value theory supports the *pride versus embarrassment* argument regarding college records because it implies that the frequency of success or failure follows previous performance in similar activities, and determines the strength of expectancies for success versus failure (Atkinson, 1964). Although more than 70% of students who transfer from community colleges eventually earn bachelor's degrees (Boswell, 2004), the low mean scores present in this study indicate both transfer and traditional students are facing problems in the classroom.

Discussion

The purpose of this study was to identify differences between performance in courses of technical agriculture and subarea scores of pre-service teachers in the agricultural education program at Oklahoma State University. The genesis of this inquiry was based on observation, advisement, and anecdotes presented in microteaching sessions that occurred during the preparation of pre-service teachers completing their degree requirements.

The profile of students aspiring to become school-based agricultural education teachers has changed significantly over the past decade. Many of today's students represent families that are multiple generations away from the farm and have no direct connection to production agriculture or its ancillary support systems; their primary introduction to agriculture comes through their experiences with school-based agricultural education and FFA. Not only have students changed, but also the societal norms that once embraced an agrarian culture have shifted to a technology driven society that views agriculture as an artifact of another era.

Teacher preparation programs are not alone in this dilemma; students who lack the basic skills and knowledge needed in the agricultural industry also effect departments in the college of agriculture and schools of veterinary science.

Given the changing profile of students and the glacial speed of the institution to adapt to change, what can be done to equip future school-based agriculture teachers with agricultural knowledge needed to ensure an agriculturally literate society? Perhaps teacher educators should seek out faculty in the "technical" agriculture departments and begin to investigate the knowledge and skill "gaps" needed to inform an agriculturally literate society and once identified, create courses and opportunities that will afford students the opportunities to have hands-on experiences with the knowledge they will be required to know via examination and ultimately teach to school-based agricultural education students and FFA members.

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Current and Perceived Grading Practices of Iowa Agriculture Teachers

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Abstract

Research on grading reveals that grading practices have not changed much since they were first introduced. However, with alternative approaches, like standards-based grading, being introduced, it is important to look at how agricultural educators are using grades to evaluate student learning. The purpose of this study was to determine the perceived and current grading practices of Iowa high school agricultural educators. The accessible population consisted of 236 high school agricultural educators. Findings were based on responses of 157 (69.8%) participants who responded to the study via an online questionnaire. Results indicated that agricultural educators use a variety of learning approaches and their beliefs align with their grading practices. The results also confirm that agriculture teachers incorporate more than student learning into their grades including effort, responsibility, and attendance. This study serves as a starting point and building block to help agricultural educators develop grades that will accurately portray a student's knowledge.

Introduction and Review of Literature

Assigning a letter or grade to student achievement has been the traditional grading system used but what that grade means is questionable. The valuable information is the details of the achievement on each learning goal, not the overall score (O'Connor, 2009), and the intent of grades was to describe the student's progress in class (Dockery, 1995). In short, grades are about what students learn; not earn (Brookhart, 2011).

However, Alpren (1960) acknowledged that the grade rarely represents true student accomplishment in terms of academic standards and "as soon as grades are introduced in schools, teachers, parents, and students emphasize grades rather than learning" (O'Connor, 2009, p. 17). Many times grades may include exams, quizzes, presentations, projects, homework, attendance, portfolios, participation, attitude, effort, and progress made, and teachers rely on various combinations of these elements to construct an overall grade (Guskey, 2009). These combinations cause an unclear picture about student learning and fail to accurately articulate student achievement with parents (O'Connor, 2011).

The most logical reasons to grade students are those that help teachers teach and students learn. Wrinkle (1947) outlined four classifications of grades, which were later updated to five purposes of grades, which included administrative purposes, student achievement feedback, guidance for students, instructional planning, and student motivation (Airasian, 1994). Feedback and motivation seem to be the most prevalent in the literature.

Feedback was identified as a primary purpose of grading. Studies by Austin and McCann (1992) and Marzano (2000) indicate educators and administrators believe feedback about student achievement is the primary purpose of grading. Communicating student achievement is the primary purpose of grades (O'Connor, 2009) because "parents rely primarily on teacher-assigned grades when ascertaining the achievement of their children" (Randall & Engelhard, 2010, p. 1372). Grades can be "clear communication vehicles, if there is a shared understanding of how they are determined and thus, what they mean" (O'Connor, 2009, p. 16).

Motivation as a purpose of grading is one of the most controversial purposes. Grades that have the purpose to motivate, punish, or sort dilutes grade accuracy, usefulness and manipulates students (Wormeli, 2006). While motivation can be viewed as a purpose to grades, Guskey and Bailey (2001) report that a student isn't motivated by a D or 0 in the gradebook. Students distance themselves from learning and extra effort must be made by educators to bring the students back (Wormeli, 2006).

Grades also influence college admissions and future opportunities. While many colleges and universities require achievement test scores and high school grade point average (GPA) as traditional admissions requirements (Mattern, Patterson, & Wyatt, 2013), studies contradict one another on the correlation of standardized admission exams such as the SAT or ACT and high school GPA. Studies completed by the United State Department of Education showed improvement in GPA between 1999 and 2000. However, The College Board and ACT conducted studies showing that while GPAs were higher than before, standardized tests scores were lower than in previous years (Taylor, 2007). An analysis of student SAT scores and GPAs in a Georgia high school found a significant relationship between composite SAT scores and cumulative GPAs (Taylor, 2007).

Agricultural educators and other Career and Technical Education (CTE) teachers have been familiar with holding students accountable. "There has always been considerable emphasis on performance activities in instructing and assessing students in CTE" (Cutshall, 2001, p. 39). *Handbook on Agricultural Education in Public Schools* outlines a variety of authentic and traditional forms of assessment including record books, portfolios, self-reflections, debates, and presentations. Each assessment, graded with a rubric, becomes a reliable tool to measure student learning (Phipps, Osborne, Dyer, & Ball, 2008). CTE has been using these tools for years while other teachers have more recently begun using them (Cutshall, 2001). In agricultural education and CTE, authentic assessment on practical application of academic knowledge comes naturally (Willhoft, 2013).

In a span of six years, CTE saw two versions of the Carl D. Perkins Act and a non-content specific NCLB Act. Putting student attainment on paper, the 2006 Perkins Act also required educators to report out "state-established, industry-validated career and technical skills" (Stone, 2009, p. 21). These technical skills can be defined further as objectives and competencies required by a specific occupation (Stone, 2009). Technical skill attainment assesses each CTE student's knowledge, skills, and abilities to succeed in an occupation (Stone, 2009). By looking at where students are performing, determining a proficient level, and coming up with a plan on how to get there, CTE programs can begin to use what is reported to improve their program (Hoachlander, 2000).

With Perkins requirements, CTE teachers including agricultural educators are familiar with high quality standards and assessing students on those standards. When Iowa Core Curriculum was introduced in 2008, CTE teachers could play a valuable role in helping other teachers incorporate some of common core curriculum requirements like developing activities to meeting standards with real-life application (Willhoft, 2013). However, Willhoft (2013) advises CTE teachers to stay on top of professional development and activities to understand how core curriculum can be connected to their CTE programs.

And yet, there is very little research available for grading in agricultural education or in the overarching CTE. Research and literature within CTE has focused on changes in NCLB requirements and Perkins Act readministration. Furthermore, CTE has focused on making the adjustment of incorporating STEM and Core Curriculum into CTE curriculum (Pearson, Young, & Richardson, 2013; Ulmer, Velez, Lambert, Thompson, Burris, & Witt 2013; Wooten, Rayfield & Moore, 2013; Haynes, Robinson, Edwards, & Key, 2012; Hyslop, 2010). As educational reform continues and new standards are developed, little research has been conducted on grading in secondary agricultural education classes. More information about agricultural educators' current grading practices is needed.

Conceptual Framework

The research on teacher grading focused primarily on practice and in only a few instances theoretical frameworks were developed (Brookhart, 1984). One conceptual framework focused on grading was Natriello's (1987) model of evaluation processes in schools and classrooms. This circular model identified eight stages of the evaluation process: 1) establishing the purposes, 2) assigning tasks, 3) setting criteria, 4) setting standards, 5) sampling information, 6) appraising, 7) providing feedback, and 8) monitoring outcomes. The model provides the breadth needed to explore the various assessments while establishing a framework for rigorous school and classroom assessments.

Purpose and Objectives

The purpose of this study was to determine the perceived and current grading practices of Iowa's school-based agricultural educators. The objectives of this study were to:

1. Describe the perceived purpose, definition, and components of grades;
2. Describe agriculture teachers' grading practices; and
3. Identify the definitions and types of assessments used.

Methods and Procedures

This study was part of a larger study focused on high school agricultural educators grading practices and their understanding of standards-based grading (SBG). This study used a descriptive survey research design for the collection and analysis of data. The population for this study consisted of all high school agricultural educators in Iowa (N=236). A list of current agricultural educators was obtained from the Iowa Agricultural Education Directory on the Iowa FFA Association website.

A literature review revealed very few instruments to evaluate teachers' knowledge and perceptions of grading. The instruments developed by Marzano (2000), Schmidt (2002), and Urich (2012), along with the discussion statements by Brookhart (2011), were used as a foundation for designing an instrument to determine teachers' current grading practices. The instrument was reviewed for content validity by two non-agricultural education instructors from area high schools using SBG, a College of Education graduate assistant in educational research, and one professor in the Department of Agricultural Education and Studies at Iowa State University. A second group consisting of five out-of-state agricultural educators also reviewed the instrument for face validity. These agricultural educators were asked to evaluate the survey and provide feedback regarding the questionnaire format, question syntax, and implementation.

Contact with participants was made following recommendations by Dillman, Smyth, & Christian (2009) to achieve high response rates. A pre-notice email was sent to participants with the study's purpose and importance of their responses. Using Qualtrics and email, a link to the survey was sent to each participant. The email included a URL to the questionnaire, which was specific to each participant. Reminder emails were sent to nonrespondents two days after the initial link was sent and again after seven days. A final notice was sent 11 days after the first link was distributed. Qualtrics ensured only those who had not completed the survey were sent reminder email messages. A total of 165 teachers (69.9%) responded with a usable response rate for the study of 66.5% (n = 157).

The instrument was divided into three sections and included a variety of question types including Likert-type scale, multiple-choice, multiple-select, short answer, order rank, and frequency questions. The first section of the instrument explored current grading practices of teachers and asked them to describe their beliefs and purposes of grading. In addition, general questions were asked about extra credit, retesting, and accepting late work followed by more specific questions making it easier for participants to respond (Ary, Jacobs, & Sorensen, 2010). Participants also addressed the number of standards taught and the standard sets used in their classrooms. In Iowa, a local control state, there are no state approved agricultural education standards.

Cronbach's alpha coefficients were calculated to determine the reliability of the survey and performed as a post-hoc reliability test. According to Ary et al. (2010), a modest reliability coefficient of 0.60 should be obtained when used for research purposes. The reliability tests for this study were calculated for grading beliefs and SBG knowledge. An alpha coefficient of 0.683 was found for grading beliefs and 0.608 for SBG knowledge, which were both acceptable (Ary et al., 2010). Descriptive statistics, including frequencies, means, and standard deviations were calculated and reported for this study.

Findings

All respondents (n = 157) were secondary agricultural educators employed by a high school in Iowa, although 52% also reported teaching at least one middle school course. An equal number of respondents (25%) were in their first three years of teaching high school agriculture courses or have been in the profession for over 25 years. Similarly, 19% of respondents have taught between four to nine years or 10 to 15 years. Only 14% identified 16 to 25 years as the total number of years teaching high school agriculture. Of the respondents, 40% were certified to teach at least one CASE (Curriculum for Agricultural Science Education) course.

Perceived Purpose, Definition, and Components of Grades

Respondents were provided four statements regarding the purpose of grading and were asked to provide their level of agreement to those statements. The findings, as shown in Table 1, showed participants most strongly agreed that grades should reflect student achievement of intended learning outcomes. Participants also agreed that a grade should reflect an individual's achievement.

Table 1. Iowa agricultural educators level of agreement with the purposes of grading

Purpose of Grades	*N*	Min.	Max.	Mean	SD
Grades should reflect achievement of intended learning outcomes.	150	3	4	3.57	0.50
Grades should reflect a particular student's individual achievement.	150	2	4	3.40	0.51
Grading policies should be set up to support motivation to learn.	148	1	4	3.18	0.70
Students and parents are the primary audiences for the message conveyed in grades.	150	1	4	3.07	0.58

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Participants also responded to a second set of questions regarding their beliefs on the purpose of grades in a traditional grading system (Table 2). Participants most highly agreed that grades should be used to provide feedback about student learning to students and parents. Respondents also indicated that grades should be used to make administrative decisions such as advancing to the next course, class rank, and credits earned. Agricultural educators were similar with their agreement on the extent to use grades to motivate students, provide guidance, and plan instruction.

Table 2. Agricultural educators' beliefs of grade purposes in a traditional grading system

Grading Statement in Traditional Grading Systems	n	Mean	SD
Grades should be used to provide students and parents with feedback about student learning.	125	4.13	0.74
Grades should be used to make administrative decision such as student's progress to the next course level, class rank, credits earned and so on.	125	3.81	0.75
Grades should be used to motivate students.	122	3.57	0.98
Grades should be used to provide students with guidance relative to courses they should take, occupations they should consider and so on.	125	3.53	0.82
Grades should be used to plan instruction.	124	3.47	1.00

Scale: 1 = Not at All, 3 = Somewhat, 5 = To a Great Extent

Respondents were provided with a list of the five most common grading components and asked to select all those they believed should be included in a student's grade (Table 3). Most teachers (95.1%) believed grades should include current knowledge while only 50.3% agreed that including prior knowledge in a grade is important.

Table 3. Grading components agricultural educators believe should be included in student grades (*n*=143)

Grade Components	*f*	%
Current Knowledge	136	95.1
Effort	124	86.7
Responsibility	99	69.2
Prior Knowledge	72	50.3
Attendance	60	42.0

Respondents also identified their agreement with statements directly related to a traditional grading system. Respondents most strongly agreed that academic achievement should be the primary basis for grades (n = 122, M=3.99, SD=0.82). Participating agricultural educators believed that student effort should also contribute to grades in a traditional grading system (n = 123, M=3.76, SD=0.90) and student behavior should make the least influence on grades (n = 126, M=2.94, SD=1.18).

Respondents were asked to define the term 'grades' in their own words. Of the 137 definitions provided, 24 common terms and phrases were used to define grades. Definitions containing the term know or knowledge were found most in the respondents' definitions (n=20). Examples of how the terms were used to define grades are:

> "An indicator of where the student's knowledge is at this time."
>
> "A tool to help students understand where their knowledge base is in relation to my expectations and course expectations."
>
> "A measure of how well students know the material."

The second most commonly used terms were learn, learning, or learned. These terms were found in 18 responses. The following examples of how the terms were used:

> "A caption of what a student has learned or provided evidence of knowledge learned based on outcomes and components taught in the classroom."
>
> "A measureable way to show student learning."
>
> "A way to identify how students are learning and completing work."

Reflection was the third most commonly found term in the respondents' definitions of grades. Reflection or similar versions was found in 15 responses. This term was used with terms such as learning, knowledge, or understanding. Other terms were used once with the following terms:

performance, comprehension, potential, assessment, completion. Some examples of how reflect or reflection was used were:

> "Reflection of student's work and understanding of the material."
>
> "A scale to reflect student performance."
>
> "Reflection of what a student has learned in my course."

Requirement (*n* = 14), achievement (*n* = 10), effort (*n* = 10), level of competency/mastery (*n*= 8), performance (*n* = 8), completion of work (n = 7), points earned (*n* = 7), content utilization/application (*n* = 6), and understand (*n* = 6) were mentioned often when defining grades. Other terms mentioned included snapshot (*n* = 5), rank (*n* = 4), work ethic/responsibility (*n* = 3), skills (*n* = 3), measuring stick(*n* = 3), feedback/communication (*n* = 3), motivation (*n* = 2), progress (*n* = 2), ability to regurgitate (*n* = 2), needed for college/scholarships (*n* = 2), attitude (*n* = 1), and potential (*n* = 1),

Actual Grading Practices

Participants identified what grades reflect in their classroom (*n* = 157). The most identified criterion for grades was knowledge (*n* = 148, 94.3%). Effort was the second highest criterion included in respondents' students' grades (*n* = 135, 86.0%) while responsibility was identified as the third most frequent (*n* = 118, 75.2%). Attendance also influenced grades in 49.0% (*n* = 77) of participants' classrooms but still identified by nearly half of respondents. Ranking students or grading performance in relationship to their peers was lowest at 43.4% (*n* = 68).

Respondents provided further explanation of grades in their classroom through a written explanation and their explanations (*n* = 131) could be organized into six common categories, which included student behavior (*n* = 46), knowledge (*n* = 36), involvement/participation (*n* = 32), understanding (*n* = 29), achievement (*n* = 25), and performance (*n* = 17).

Respondents were asked about retests and retakes. Of the responding agricultural educators, 75% of respondents offer students the opportunity to retest (*n*=148). Retakes and retests were offered for a variety of reasons. Participants were asked to provide the circumstances when retakes and retests were offered (Table 4). A total of 108 responses were analyzed and 13 common phrases or terms were used to define these circumstances. The most frequent circumstance when agricultural educators offer a retake or retest was found to be low individual performance (*n* = 40).

Table 4. Terms and phrases used to describe circumstances in which agricultural educators offer the opportunity to retake or retest (*n*=108)

Circumstances	*f*
Low Individual Performance	40
Low Class Performance	22
Absence	15
Student Explanation and Development of Relearning Plan	14
Effort	10
School Policy	8
Special Education, 504 Plan, IEP	7
No Limits to Retakes/Retests	7
Limited Number of Retakes/Retests	4
Limited Retake Grade/Percent	4
Teacher Initiated	4
Course Specific	2
Limited Retake Time Window	2

Respondents provided the circumstance for which late work would be accepted (Table 5). Time and grade restrictions, absences, and school policies were among the most frequent reasons for allowing late work.

Table 5. Circumstances and requirements on when agricultural educators accept late work (*n*=125)

Circumstances and Requirements	n
Time Restriction	45
Grade Restriction	30
Absence	24
School Policy	18
Time and Grade Restriction	14
No Restrictions or Circumstances	12
Teacher Arranged	8
Teacher Discrepancy	5
Effort	3
Failed to Complete the First Time	1

Agricultural educators (*n*=149) were asked to provide the frequency in which they provided extra credit. Extra credit opportunities are not given in 23.5% of responding agricultural education classrooms while 27.5% of agricultural educators sometimes offer extra credit. Only 2% offer extra credit often. Extra credit was rarely offered by 46.3% of participating agricultural educators. Only one respondent said they offer extra credit all the time.

One hundred three respondents provided a written explanation for offering extra credit. Those statements were summarized into eight categories (Table 6). Additional content activities were mentioned most frequently in 49 responses. Examples of additional content activities included extra problems, supplemental worksheets, key term research, project-based activities, or additional presentations.

Table 6. Extra credit opportunities offered by Iowa agricultural educators (*n*=103)

Extra Credit Opportunity	*f*
Additional Content Activities	49
Out-of-class Activities	33
FFA Participation	11
Non-content Items	9
Chores	4
Community Service	2
SAE Recordbooks	2
Correcting Answers	2

Assessment Practices

Participants were asked to define assessment in their own words. Respondents provided 116 definitions with nine common themes. The most common definition by respondents was a measurement of learning (47.7%). Others defined assessment as a measurement of understanding (13.8%), measurement of application (7.7%), and measurement of performance (5.2%). Four respondents (3.4%) described assessment as a measuring device while two (1.7%) believe assessments compare a student to their peers. Others defined assessment as a test (8.6%) or student reflection of their work (1.7%).

Many respondents (63.1%) identified using both but more formative assessments while 7.4% use only formative assessments (Table 7). Summative assessments only were used by 2.0%. More summative assessments with few formative assessments were identified being used by 27.5% of respondents.

Table 7. Use of formative and summative assessments by agricultural educators (*n* = 149)

Type of Assessments Used	*f*	%
Both but more Formative Assessments	94	63.1
Both but more Summative Assessments	41	27.5
Formative Assessments Only	11	7.4
Summative Assessments Only	3	2.0

With assessment, agricultural educators identified the frequency to which they use each assessment type (Table 8). Individual projects and written papers are most frequently used by participants. Group projects were the third most frequently noted type of assessment. Portfolios and standardized exams were least used by participants as forms of assessment.

Table 8. Types of assessment used by Iowa agricultural educators (n = 149)

Assessment Type	*n*	*Mean*	*SD*
Individual Projects	139	3.97	0.92
Written Papers	141	3.97	1.37
Group Projects	140	3.87	1.01
Hands-On Assessments	138	3.83	0.90
Written Exams	136	3.82	0.95
Rubrics	138	3.81	1.01
Student Self-Assessment	138	3.49	1.46
Oral Exams	136	3.04	1.61
Portfolios	134	2.07	1.43
Standardized Exams	138	2.05	1.50

Scale: 1 = Never Used, 2 = Less than once per semester, 3 = 1-3 times per semester, 4 = 4-7 times per semester, 5 = 8 or more times per semester

Conclusions and Recommendations

The findings revealed grading practices of agricultural educators vary greatly from teacher to teacher which align with the literature that grades are "an amalgam of homework, classroom behavior, quizzes, projects, and tests" (Fisher, Frey, & Pumpian, 2011, p. 46). Types of assessments and learning approaches used by agricultural educators to develop a student's grade are one of these varying practices. A majority of agricultural educators use projects and hands-on assessments more often than oral exams or portfolios. However all assessments were identified as being used more than eight times per semester by at least one agricultural educator.

Results revealed agricultural educators use a variety of learning approaches within their classrooms that impact a student's grade. Literature (Brookhart, 2011; Cutshall, 2001;O'Connor, 2009; Willholf, 2013) indicated an emphasis on performance activities and an increase in authentic assessments both of which are used in CTE. Participating agricultural educators justified this and indicated using hands-on activities and real-life problems most often in their classrooms when compared to lecture and standardized tests. Because of their experience, administrators should use agricultural educators and other CTE professionals to help other teachers develop more authentic activities and assessments or coordinate team teaching opportunities that merge agricultural concepts with core areas and evaluates student knowledge using authentic assessments.

Results indicated agricultural educators believe non-academic factors including effort should be a large part of a grade. Other grading criteria where variances were found were student behavior and participation. Agricultural educators most often mentioned student behavior when explaining grading to a student or parent. Combined, parents and students would receive a grade explanation that would encompass student behavior, knowledge, and participation.

When asked to define grades, effort was rarely mentioned in responses but 86.7% of agricultural educators believe effort should be included. Using definitions of grades provided by respondents, an overall definition can be formed. Based on responses, agricultural educators define grades as *a reflection of student learning and knowledge that is a required part of education*. To hold programs accountable and to attain statewide consistency, agricultural educators as a group need to come to an agreement as to what a grade includes and the best method to communicate student achievement.

Defining grades for agricultural education would be easier if grades in agricultural education had a clear purpose. Results showed no overarching purpose for grades and most purposes were neither strongly agreed nor disagreed with. Motivation was one purpose that agricultural educators agreed with that researchers disagree with. Points and percentages have become a reward to students rather than learning and mastering a skill. Students do not ask what they did wrong or how they can improve but what extra credit can they do to get points back. Grades should be used as feedback, and many agricultural educators agree with this purpose, but the feedback needs to be a clear indicator of what students know not how many points they can accumulate because of extra credit.

The following recommendations were made based on the findings of this study:

1. Since agricultural education programs vary between school districts, agricultural educators should create a shared purpose of agricultural education and grading in agricultural education courses.
2. To construct a professional learning community for those agricultural educators implementing or have implemented SBG in their classroom.

The following recommendations for further research are offered based on the findings of this study:

1. A similar study should be conducted about agricultural educator perceptions of grading practices in other states especially those that have set curriculum standards.
2. Other content area teachers such as math, English, and science should be surveyed to gain their perceptions about grading practices and content standards. This will help gain an understanding of the total school needs.

Agricultural educators have been successful in implementing educational reforms such as technical skill attainment with the Perkins Act. Agricultural educators already use hands-on activities and real-life problems within their classrooms which has been a recent focus with authentic learning and assessment.

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A Descriptive Analysis of Student Self-Efficacy Based on Their Involvement in the Three Component Model of Agricultural Education

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Abstract

The purpose of this quantitative descriptive study was to compare the means of agricultural education student's total, academic, social, and emotional self-efficacies based on participation levels in the three components of agricultural education. The population of this study consisted of agricultural education students (n=368) from four high schools in the North District of Alabama that ranged in age from 14-18. The participants' self-efficacy was measured using the Self-Efficacy Questionnaire for Children (Muris, 2001), and agricultural education participation data was collected using a general questionnaire. Results from the study did indicate that students who had completed 5 agricultural education courses and participated in 4 or more FFA activities yielded a higher mean total, academic, and social self-efficacies compared to the participants who had lower participation levels. Also, students who participated in 40 hours or more per semester on their SAE produced higher mean social self-efficacies scores in contrast to the other domains of self-efficacy; which indicated that students who spent between 11-20 hours per semester had higher mean self-efficacy scores. When mean self-efficacy scores of participants were compared to participants in a similar study of general education students, agricultural education participants produced higher mean self-efficacy scores.

Introduction

Alfassi (2003) stated, "Self-efficacy is defined as the level of confidence an individual has in their ability to execute courses of action to attain specific performance outcomes" (p.28). However, an individual's self-efficacy has been determined to be domain specific which indicates that an individual may be more confident in their ability to attain desirable results on one task than they are for another task (Bong & Clark, 1999). According to Paunonen & Hong (2010) "Domains can refer to any activity, or class of activities, where individuals can differ in their success rates and, more important, in their beliefs about their success rates" (p. 340). Domains influenced by one's self-efficacy may include performance in an academic course, physical feats, or even maintaining a relationship (Paunonen & Hong, 2010).

When considering the influence of self-efficacy from an academic perspective, higher achievement and learning have been associated with a student's academic self-efficacy (Linnenbrink & Pintrich, 2002). Linnenbrink and Pintrich (2002) determined that self-efficacy was positively related to higher levels of academic achievement and persistence towards achievement. Self-efficacious learners, in comparison to students who doubt their capabilities for learning, tend to work harder, be more persistent, and achieve at a higher level (Schunk, 2003). According to Paunonen and Hong (2010):

> people low in self-efficacy, even if they are at the same skill as those high in self-efficacy, might not be as motivated to do their best, might be the first to give up on the task, might otherwise be easily sidetracked by performance-debilitating cognitions, and

> might consequently do worse at the task than would be predicted by their level of ability. (p. 343)

Self-efficacy has also been shown to have influence in the social domain. Smith and Betz (2000) defined social self-efficacy as “an individual’s confidence in his or her ability to engage in the social interactional tasks necessary to initiate and maintain interpersonal relationships” (p. 286). Research has indicated that social self-efficacy is an integral part of an individual’s success in the world (Erozkan & Deniz, 2012). A person’s level of social self-efficacy is associated with their confidence in their ability to communicate in social situations, and his or her ability to control emotions as problems arise (Erozkan & Deniz, 2012). According to Erozkan and Deniz (2012), “This includes behaviors such as negotiating interpersonal conflict, meeting new people, displaying assertiveness in social situations, cultivating romantic relationships, developing friendships, and interacting group settings” (p. 58).

There have even been connections identified concerning the influence of self-efficacy on the emotional domain. Emotional self-efficacy is related to an individual’s ability to handle their emotions. Emotional self-efficacy has been found to impact a person’s level of anxiety, stress, and level of depression (Alfassi, 2003). “People differ widely in how well they manage their emotional experiences in everyday life, and the manner and degree to which they regulate their emotions likely depends, in part, on how they appraise their affective experiences” (Caprara, Giunta, Pastorelli, & Eisenberg, 2013, p. 106).

While the development of an individual’s self-efficacy may not be blatantly stated in many educational mission statements, there are certainly attempts to address it both directly and indirectly. For example, Scott and Sarkees-Wircenski (2008) stated, “Career and Technical Education (CTE) curricula include materials that focus on the development of foundational skills, such as basic skills, thinking skills, and personal qualities, as well as a common core of workplace competencies and the specific skill competencies required for each occupational area” (p. 1). Further, Agricultural Education was designed to provide students with the knowledge, skills, and personal attributes required to explore and prepare for careers in agriculture and natural resources.

While secondary agricultural education programs vary appropriately concerning the specific agricultural applications that are taught, there is a common model that serves as a guide to these programs. The primary model for organizing instruction in agricultural education involves the interrelationships between three major components: classroom and laboratory instruction, supervised agricultural experience (SAE), and FFA participation (Phipps, Osborne, Dyer, & Ball, 2008). Student involvement in each component of the model creates the complete agricultural education program. The model components are interrelated with one another to help provide students with a variety of learning opportunities. Croom (2008) stated “classroom and laboratory instruction are those activities that provide learning experiences within the confines of a school facility” (p. 110). Classroom and laboratory instruction includes lectures, demonstrations, practice, review, and assessment as a means to create student learning (Croom, 2008). The SAE component of the model is the method in which students apply learned information from their agricultural education courses in an independent environment (Croom, 2008). According to Talbert, Vaughn, Croom, & Lee (2007) participation in SAE provides students with the following benefits:

> Development of decision-making skills, including career and personal choices, improves self-confidence and human relation skills, application of knowledge learned in the classroom, knowledge of a variety of occupations and careers, development of time management and record-keeping skills, document of experience needed on job applications, discovery of areas of personal interest, practice of responsibility and development of independence, and development of pride through personal accomplishment. (p. 420-421)

FFA is the final component of the model that Croom (2008) defined as an instructional tool that compliments both instruction and SAE. Participation in FFA exposes students to several factors that help foster the development of their self-efficacy. The National FFA Organization strives to make a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education (FFA Mission, 2013).

Concurrently, as a more diverse and technical workplace has developed over the last 25 years, school administrators have realized the need to prepare students to be well-rounded individuals that are ready to meet the challenges of the world. Akers, Miller, Fraze, and Haygood (2004) noted:

> Today, educators have renewed their perspectives on what common sense has always suggested: when schools attend systematically to students' social and emotional skills, the academic achievements of students increase, the incidents of problem behaviors decrease, and the quality of relationships surrounding each student improves. (p. 86)

Further, it has been surmised that emotional intelligence predicts as much as 80% of a person's success in life, while IQ predicts only 20% (Goleman, 1995).

Agricultural education has a rich history of incorporating academic, social, and emotional intelligence into the curriculum through the components of agricultural education (Akers et al., 2004). According to Phipps and Osborne (1988), "Practical application and successful transfer of knowledge, skills, and attitudes into real-world settings is the goal of instruction" (p. 19). The goal mentioned by Phipps and Osborne (1988) has been accomplished by agricultural education programs through the multifaceted approach of incorporating academics, social skill development, and emotional develop through classroom instruction, FFA opportunities, and SAE practices (Akers et al., 2004).

Theoretical Framework

The theoretical framework of this study lies in the combination of the social cognitive theory (Bandura, 1986) and the self-efficacy theory (Bandura, 1997). According to Ormrod (2004), "the social cognitive theory, initially known as the social learning theory, evolved from behaviorism, but now includes many of the ideas that cognitivists also hold, hence the gradual shift in label to social cognitive theory" (p. 124). This particular theory focuses on what and how people learn from one another, encompassing such concepts as observational learning, imitation, and modeling (Ormrod, 2004). There are several general principles underlying the social cognitive theory. The first principle indicates people can learn by observing the behaviors of others, as well as by observing the outcomes of those behaviors (Ormrod, 2004). Second, learning can occur without a change in behavior, and the consequences of behavior play a role in learning (Ormrod, 2004). Finally, cognition plays a role in learning (Ormrod, 2004). Bandura (1997) indicated that self-efficacy, a central factor of the social cognitive theory, was a substantial factor contributing to an individual's behavior. Bandura (1986) defined perceived self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses" (p. 391). The development of self-efficacy is very similar to the factors contributing to the social cognitive theory. Bandura (1994) suggested that self-efficacy is developed from mastery experiences, physiological and emotional arousal, vicarious experiences, and social persuasion.

In regards to agricultural education, student self-efficacy development is fostered through participation in all three facets of the program as students are given opportunities to enhance their academic, social, and emotional self-efficacy through a multifaceted approach that provides mastery experiences, physiological and emotional arousal, vicarious experiences, and social persuasion (Akers et al., 2004; Croom, 2008; FFA Mission, 2013; Parr & Edwards, 2004).

Purpose of the Study

The purpose of this quantitative descriptive study was to compare the means of agricultural education students' total, academic, social, and emotional self-efficacies based on participation levels in the three components of agricultural education. Agricultural education not only serves the purpose of teaching students about the field of agriculture, it has been linked to the development of a student's academic achievement in other courses, development of a student's social skills, and development of a student's emotional control (Phipps et al., 2008). Since agricultural education was designed to help prepare students academically, socially, and emotionally, the influence of classroom and laboratory instruction, FFA participation, and SAE involvement needed to be analyzed to assess their impact on a student's self-efficacy. It is important for agricultural education professionals to examine how the various components of agricultural education and their activities influence a student's cognitive and affective learning outcomes. Also, by examining the self-efficacy of agriculture students, it is possible to learn if current practices involving classroom/laboratory instruction, FFA, and SAE are potentially providing students with meaningful, engaging learning experiences that promote a heightened level of confidence in their abilities that transfers to other aspects of their lives. The following research objectives guided this study.

1. Describe the total self-efficacy of students based on their participation levels in the three components of agricultural education.
2. Describe the academic self-efficacy of students based on their participation levels in the three components of agricultural education.

3. Describe the social self-efficacy of students based on their participation levels in the three components of agricultural education.
4. Describe the emotional self-efficacy of students based on their participation levels in the three components of agricultural education.
5. Describe how participants' self-efficacy scores compare to individuals from prior studies using the SEQ-C instrument.

Methods and Procedures

To complete the study, a quantitative descriptive research design was used. The population for this study consisted of agricultural education students from four high schools in the North District of Alabama that ranged in age from 14-18 years (a convenience sample). A total of 427 surveys were submitted, but 368 were entirely completed and useable. The student population for this study consisted of 279 males and 89 females.

The first instrument used to collect data was the *Self-Efficacy Questionnaire for Children* (SEQ-C); (Muris, 2001). The SEQ-C, according to Muris (2001) is a self-report instrument that contains twenty-four items that analyze three domains of self-efficacy, which are academic, social, and emotional. Each domain is measured through eight questions that are scored on a 5 point Likert scale with 1 being "Not at all" and 5 being "Very well." It was understood that 2, 3, and 4 on the scale were different levels of measurement, but there were no stated descriptors for the values since the instrument wasn't modified from its original version. A total self-efficacy score is generated by tallying the scores across all three domains, which has a total possible score of 120 with each domain contributing a total possible score of 40. The Cronbach's alpha for the SEQ-C instrument was calculated in SPSS for total self-efficacy and each domain of self-efficacy measured by the instrument in the study. The Cronbach's alpha for total self-efficacy was determined to be .90. Next, the Cronbach's alpha for academic self-efficacy was .85, social self-efficacy was .78, and emotional self-efficacy was .80.

A general questionnaire developed by the researcher was used to gather data about the participants' participation in agricultural education. The general questionnaire had participants indicate their gender, number of agricultural education courses they had taken, the number of FFA activities they had participated in, and the amount of time they spent on their SAE per semester. Students were to select one response for each question on the instrument. The number of agricultural education courses ranged from a selection of 1 to 5 possible courses taken. The possible responses for FFA participation ranged from 0 FFA activities participated in to 4 or more FFA activities participated in. The amount of time spent working on their SAE per semester was divided into ranges from 0-10 hours spent on SAE, 10-20 hours spent on SAE, 20-30 hours spent on SAE, 30-40 hours spent on SAE, and 40 or more hours spent working on an SAE.

Findings

Total self-efficacy mean scores were compared based on the participants in a complete agricultural education program (classroom/laboratory, SAE, and FFA). Data analysis revealed that the participant's total self-efficacy typically increased with the number of agricultural education courses completed, as reported in Table 1. The only exception was in the group of participants that had completed four agricultural education courses which produced the lowest self-efficacy score of 84.91. Even though there was a dip at 4 classes completed, participants who had completed 5 agricultural education courses had the highest overall mean total self-efficacy score of 91.86.

Table 1
Total Self-Efficacy based on the Number of Agricultural Education Courses Completed

Agricultural Education Courses	N	Mean	Std. Deviation
1	151	85.14	14.40
2	105	87.55	12.79
3	62	88.01	13.20
4	35	84.91	13.99
5	15	91.86	13.47

Data also indicated that students who participated in 4 or more FFA activities had the highest average total self-efficacy of 88.79. The group that participated in at least 2 FFA activities had the lowest average total self-efficacy score of 84.73.

Table 2
Total Self-Efficacy based on the Number of FFA Activities

FFA Activities	N	Mean	Std. Deviation
0	129	85.45	13.07
1	99	87.69	14.56
2	60	84.73	13.86
3	21	87.04	16.07
4 or more	59	88.79	12.53

Next, total self-efficacy means were compared based on the participants' level of involvement with their SAE. Data analysis indicated that students who spent between 11and 20 hours per semester on their SAE had the highest average total self-efficacy (M= 89.74).

Table 3
Total Self-Efficacy based on the Amount of Time Spent on SAE per Semester

Time spent on SAE	N	Mean	Std. Deviation
10 hours or less	175	85.30	14.04
11-20 hours	79	89.74	13.39
21-30 hours	40	85.82	14.36
31-40 hours	12	86.08	8.34
More than 40 hours	62	86.64	13.31

Objective two of this study sought to compare the participants' academic self-efficacy means based on their participation levels in their complete agricultural education programs. The only decrease in average academic self-efficacy occurred with students who had completed 4 agricultural education courses (M=26.82). Students who had completed 5 agricultural education courses had the highest average academic self-efficacy of 30, as presented in Table 4.

Table 4
Academic Self-Efficacy based on the Number of Agricultural Education Courses Completed

Agricultural Education Courses	N	Mean	Std. Deviation
1	151	28.23	6.22
2	105	28.84	5.57
3	62	29.16	5.18
4	35	26.82	5.66
5	15	30.00	5.43

Next, the means of academic self-efficacy were compared based on the number of FFA activities students had participated in. Data indicated that students who had participated in 4 or more FFA activities had the highest average academic self-efficacy of 29.76.

Table 5
Academic Self-Efficacy based on the Number of FFA Activities

FFA Activities	N	Mean	Std. Deviation
0	129	27.95	5.73
1	99	28.96	5.94
2	60	27.48	5.59
3	21	29.09	6.64
4 or more	59	29.76	5.46

Participants' mean academic self-efficacy was also compared based on their level of involvement with their SAE. Participants that spent between 11 and 20 hours per semester on their SAE had the highest average academic self-efficacy (M=29.77). The lowest average academic self-efficacy was held by students who spent between 31 and 40 hours per semester on their SAE (M=28).

Table 6

Academic Self-Efficacy based on the Amount of Time Spent on SAE per Semester

Time Spent on SAE	N	Mean	Std. Deviation
10 hours or less	175	28.21	5.56
11-20 hours	79	29.77	6.12
21-30 hours	40	27.95	6.80
31-40 hours	12	28.00	3.66
More than 40 hours	62	28.17	5.62

Objective three of this study sought to compare the participants' social self-efficacy means based on their participation levels in their complete agricultural education programs. Data revealed that students who had completed 5 agricultural education courses had the highest average social self-efficacy (M=30.80).

Table 7

Social Self-Efficacy based on the Number of Agricultural Education Courses Completed

Agricultural Education Courses	N	Mean	Std. Deviation
1	151	29.14	5.25
2	105	30.34	5.07
3	62	30.33	4.85
4	35	29.88	4.81
5	15	30.80	4.75

Participants' mean social self-efficacy was compared based on the number FFA activities they had participated in. Data revealed that students who participated in 4 or more FFA activities had the highest average social self-efficacy (M=30.59).

Table 8

Social Self-Efficacy based on the Number of FFA Activities

FFA Activities	N	Mean	Std. Deviation
0	129	29.46	4.79
1	99	29.95	5.74
2	60	29.45	5.13
3	21	30.33	4.62
4 or more	59	30.59	4.66

Participants' mean social self-efficacy was also compared based on the amount of time that they spent on their SAE per semester. Data indicated that students who spent more than 40 hours per semester on their SAE had the highest mean social self-efficacy (M=30.70).

Table 9
Social Self-Efficacy based on the Amount of Time Spent on SAE per Semester

Time Spent on SAE	N	Mean	Std. Deviation
10 hours or less	175	29.22	5.45
11-20 hours	79	30.56	4.48
21-30 hours	40	29.62	4.80
31-40 hours	12	29.83	3.12
More than 40 hours	62	30.70	5.10

Objective four of this study sought to compare the participants' emotional self-efficacy means based on their participation levels in their complete agricultural education programs. Data indicated that participants who had completed 5 agricultural education courses had the highest emotional self-efficacy (M=31.06), and that the participants who had completed only 1 agricultural education course had the lowest mean emotional self-efficacy (M=27.76).

Table 10
Emotional Self-Efficacy based on the Number of Agricultural Education Courses Completed

Agricultural Education Courses	N	Mean	Std. Deviation
1	151	27.76	5.71
2	105	28.36	4.96
3	62	28.51	5.25
4	35	28.20	5.95
5	15	31.06	5.24

Further data analysis revealed that students who had just participated in1 FFA activity possessed the highest mean emotional self-efficacy (M=28.76).

Table 11
Emotional Self-Efficacy based on the Number of FFA Activities

FFA Activities	N	Mean	Std. Deviation
0	129	28.03	5.30
1	99	28.76	5.51
2	60	27.80	5.57
3	21	27.61	6.56
4 or more	59	28.44	5.16

Next, a comparison of students' average emotional self-efficacy, based on the amount of time they spent per semester on their SAE, was performed. Results indicated that students who spent between 11 and 20 hours per semester on their SAE had the highest mean emotional self-efficacy (M=29.40).

Table 12
Emotional Self-Efficacy based on the Amount of Time Spent on SAE per Semester

Time Spent on SAE	N	Mean	Std. Deviation
10 hours or less	175	27.87	5.74
11-20 hours	79	29.40	5.10
21-30 hours	40	28.25	4.96
31-40 hours	12	28.25	4.09
More than 40 hours	62	27.75	5.47

Finally, in an effort to compare agricultural education students to other student groups, comparisons were made between the self-efficacies of the participants in this study and the participants in another study that utilized the SEQ-C instrument. In a study conducted by Muris (2001), 330 students in a regular secondary school, that were 14-17 years old, completed the SEQ-C instrument and self-efficacy scores were derived. Data comparisons indicated that students who participated in agricultural education had higher self-efficacy scores compared to students who were selected from a general education pool in the study conducted by Muris (2001).

The study conducted by Muris (2001) indicated that the participants' mean total self-efficacy score was 76.8. In comparison, the mean score of the participants in this study was 86.5, which is nearly 10 points higher than those in the Muris study. Data comparisons also indicated that agricultural education students had a higher overall mean academic self-efficacy compared to general education students in Muris's study. Participants in Muris (2001) study had a mean academic self-efficacy score of 23.6; however, participants in this study had a mean academic self-efficacy of 28.5. The social self-efficacy scores of participants in this study were slightly higher than the scores of participants in Muris's study. Data analysis indicated that agricultural education students had a higher overall mean social self-efficacy of 29.8 when compared to the participants in Muris's study, which produced a mean social self-efficacy score of 28.2. Finally, a comparison was made between the emotional self-efficacy scores of participants in both studies. The data indicated that agricultural education students in this study had a higher overall mean emotional self-efficacy score in comparison to participants in Muris's study. Participants in the Muris (2001) study produced a mean emotional self-efficacy score of 25; however, participants in this study had a mean emotional self-efficacy score of 28.2.

Discussion, Recommendations and Implications

The results from objective one and two revealed that as a student increased his or her levels of participation in each of the three components of agricultural education that his or her total self-efficacy and academic self-efficacy generally increased (with some exceptions). Results indicated that students who had completed 5 agricultural education courses and participated in 4 or more FFA activities yielded higher total and academic self-efficacies on average. The higher participation levels in classroom/laboratory instruction and FFA generally indicate that students have been afforded more opportunities to master academic content in the classroom and more opportunities to engage in FFA activities that promote personal growth and success. According to Bandura (1997) these increased opportunities with positive results should increase a student's self-efficacy. In contrast, students who spent between 11 and 20 hours per semester had a higher mean total self-efficacy and academic self-efficacy compared to individuals who spent more time and less time on their SAE's. This result may indicate that students who are spending more time above 20 hours per semester on their SAE are receiving more of a negative impact towards their self-efficacy due to increased problems. Problems could be attributed to many things that would cause the student stress such as equipment breakdowns, livestock diseases, crop pests, etc. The increased stress caused from negative experiences associated with SAE issues would support Bandura's belief that negative experiences lower an individual's self-efficacy (Bandura, 1997). This could have been an issue with a few students, and their scores significantly lowered the overall mean. Overall, the data do support the inference that increased student participation in classroom/laboratory instruction and FFA increases their total and academic self-efficacy, which may transfer to their success in academic courses.

The results from objective three indicated that students who completed 5 agricultural education courses, participated in more than 4 FFA activities, and spent 40 hours or more on their SAE per semester had a higher mean social self-efficacy compared to students who had completed less. These results indicate that as students participate more in agricultural education, they are afforded more opportunities to increase their social self-efficacy. Smith and Betz (2000) define social self-efficacy as "an individual's confidence in his/her ability to engage in the social interactional tasks necessary to initiate and maintain interpersonal relationships" (p. 286). Based on the results from this study, students engaged in the higher levels of involvement are provided more opportunities to interact with their peers and other individuals thus increasing their social self-efficacy. Agricultural education is unique in comparison to many other programs, academics included, in that it encourages students to work collaboratively with one another, promotes student networking through local, district, state, and national FFA events, and teaches students how to interact with people through participation in SAE programs. The frequent social interactions involved with agricultural education provides students with opportunities to develop their abilities to effectively communicate with others, which has been associated with a higher social self-efficacy (Erozkan & Deniz, 2012).

Objective four indicated that the variable that produced the highest mean emotional self-efficacy based on the greatest level of participation was the number of agricultural education courses completed. Students that had completed 5 agricultural education courses produced the highest mean emotional self-efficacy when compared to students who had completed fewer courses. This result indicates that students who have engaged in more agricultural courses seem to have more emotional control or confidence in their abilities. According to Wolf, Foster, and Birkenholz (2010), "Physiological and emotional arousal also affects the sense of self-efficacy. When a person can reduce their stress reactions and alter negative tendencies in the face of adversity, their sense of self-efficacy increases" (p. 39). On the other hand, it was interesting to see that individuals who participated in only 1 FFA activity had higher mean emotional self-efficacy scores. Typically, as with the other domains of self-efficacy measured, increased participation in FFA produced higher mean self-efficacy scores in participants. Participation levels with SAE indicated that students who spent between 11 and 20 hours per semester had the highest mean emotional self-efficacy when compared to students who spent more or less time with their SAE. The results of the mean emotional self-efficacy score were consistent with total self-efficacy and academic self-efficacy scores. It seems that students who spend between 11 and 20 hours per semester tend to develop a stronger sense of self-efficacy.

When analyzing objective 5, results from the study indicate that students who participate in agricultural education produced higher mean self-efficacy scores than participants from a general school population in another study. This suggests that participation in agricultural education provides students with more opportunities to develop stronger academic, social, and emotional self-efficacies. When examining the three-component model of agricultural education, it is recognizable that students are presented with the factors established by Bandura (1986; 1997) that have been associated with positive self-efficacy development. As the results indicate, any level of involvement with classroom/laboratory instruction, FFA and SAE promotes student self-efficacy development. Phipps and Osborne (1988) noted, "Practical application and successful transfer of knowledge, skills, and attitudes into real-world settings is the goal of instruction" (p. 19). The data do provide limited support that students involved in agricultural education are more confident in their abilities to apply knowledge, skills, and attitudes. Also, an inference can be made that student participation in all three components of agricultural education provides them with more opportunities, compared to non-agricultural education students, to develop their self-efficacy through mastery experiences, physiological and emotional arousal, vicarious experiences, and social persuasion (Bandura, 1997), which are intertwined in each component of a complete program.

Scores on the SEQ-C were relatively high across all participants. There are no bench marks established to indicate a high or low score on the SEQ-C. In this study, scores ranged from a low of 39 to a high of 120, with 120 being the highest possible score. The mean score on the instrument was 86, and the mode was 86 as well. This provides a descriptive picture that students who participate in agricultural education are self-efficacious. There was a wide range when comparing student self-efficacy scores, but the mean was relatively high in comparison to the results from other SEQ-C studies. While the results from the study are not generalizable to any agricultural education student population, the data do present some interesting questions that should follow.

Future research is needed to examine the relationship between the domains of self-efficacy and the influence that participation in agricultural education may have on students. Also, the relationship between an agricultural education student's self-efficacy and how it impacts his or her performance in academic courses should be examined. A link between the development of a student's self-efficacy through agricultural education and its influence on his or her performance in academic courses could provide strong support for the profession. This study does provide some support that students who participate in agricultural education have a higher mean self-efficacy when compared to general education students from another study. Teachers should consider this as supportive data for their program and continue utilizing all three components of the agricultural education model to help prepare their students academically, socially, and emotionally.

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Standards-Based Grading Knowledge of Iowa Agricultural Educators

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Abstract

Grading practices have not changed much from one generation to the next. While research confirms this, new grading approaches have made their way into the education system. One new approach, standards-based grading (SBG), uses clearly defined standards to assess and report a student's mastery allowing clearer communication about a student's knowledge. Research on SBG is very limited especially on the secondary level and within career and technical education and agricultural education. The purpose of this study was to determine the perceptions of Iowa high school agricultural educators regarding SBG. The accessible population consisted of 225 high school agricultural educators and findings were based on responses of 157 (66.5%) respondents through an online questionnaire. Findings indicated that agricultural educators are unfamiliar with SBG and need more information for them to fully implement within their programs. This study is a building block to not only help educators implement a grading system that accurately portrays a student's knowledge but help develop professional development opportunities.

Introduction and Review of Literature

Student achievement has been reported by teachers using many different approaches. Teachers in the late 1800s provided students with a written description of their progress and areas of improvement (Guskey, 2013). At the beginning of the 20th century, teachers began using percentage grades at the same time the US Army introduced the Alpha Test, a multiple-choice test used to sort recruits based on their percentage score (Marzano, Pickering, & Pollock, 2001). Today, teachers use fewer categories in the form of letter grades to report student achievement.

From the Reagan administration and the release of *A Nation at Risk* to the more recent No Child Left Behind Act of 2002, legislation has had its impact on the education system. Agricultural educators are also familiar with the Carl D. Perkins Act readministration, asking career and technical education (CTE) teachers to incorporate STEM and Core curriculums (Pearson, Young, & Richardson, 2013; Ulmer, Velez, Lambert, Thompson, & Burns, 2013). While legislation has focused on implementing more into the curriculum, the means of evaluation have relied on student achievement reported through grades and results of standardized tests.

While policy makers deal with legislation, researchers have struggled to frame scholarship associated with student evaluation. Brookhart (1984) contended that research on teacher grading focused primarily on practice and in only a few instances theoretical frameworks were developed. Therefore, Natriello's (1987) model of evaluation processes in schools and classrooms provided the conceptual framework for this study. The framework identifies eight stages of the evaluation process: 1) establishing the purposes, 2) assigning tasks, 3) setting criteria, 4) setting standards, 5) sampling information, 6) appraising, 7) providing feedback, and 8) monitoring outcomes. The model not only provides a framework for establishing rigorous school and classroom assessments, but it also provides the breadth needed to explore the various assessment approaches.

Grading today varies between classrooms and from school district to school district (Fisher, Frey, & Pumpian, 2011) and can be categorized into two different approaches: traditional grading and standards-based grading (SBG). Traditional grading presents student achievement as a percentage or letter grade and is the foundation of many state grading policies (Guskey, 2013; Reeves, 2011). Traditional grading systems usually average scores of exams, quizzes, homework, participation, and extra credit to determine a student's final percentage or letter grade. Validity, reliability, and limitations are challenged when it comes to the traditional grading approach as criteria used to grade varies from teacher to teacher (Allen, 2005). Traditional grades limit the accuracy of what students know and are able to do (Wrinkle, 1947; Urich, 2012).

Standards-based grading presents a grade for each learning outcome or standard with no overall grade (O'Connor, 2009; Townsley, 2013). This newer approach places more emphasis on learning content rather than earning points (Cornally, 2013). The purpose of learning and clearly defined standards are presented to students in a SBG classroom (Vogel, 2010). Educators use these standards to develop curriculum to meet the needs and interests of their students (Vogel, 2010). Because each standard is evaluated separately, communication about what the students know becomes clearer. Teacher feedback provides a clear representation of student strengths and areas of improvement without non-academic influences like participation, attendance and effort (Guskey, 2013).

Not only does SBG provide feedback for each standard, but it also eliminates a one-shot approach to grading objectives. Students have many opportunities to exhibit student success (O'Connor, 2009). Using the identified standards, students are allowed multiple opportunities to reassess until a prescribed level of proficiency is reached (Rosales, 2013). SBG also places an emphasis on descriptive feedback and formative assessments.

Agricultural educators and other CTE teachers are familiar with learning standards, holding students accountable, and authentic assessments. "There has always been considerable emphasis on performance activities in instructing and assessing students in CTE" (Cutshall, 2001, p. 39). CTE teachers have become familiar with the requirements of the Perkins Act and reporting "state-established, industry-validated career and technical skills," or objectives and competencies that assess students' knowledge, skills, and abilities (Stone, 2009, p. 21). In addition, CTE has been using authentic assessments for years including record books, portfolios, self-reflections, debates, and presentations (Cutshall, 2001; Phipps, Osborne, Dyer, & Ball, 2008).

Agricultural educators are familiar with SBG strategies including standards and assessment. As educator and administrator discussions on grading continue, little research is available on grading practices and knowledge of secondary agricultural educators. More information is needed to help train and prepare agricultural educators in SBG.

Purpose and Objectives

The purpose of this study was to determine the perceptions of Iowa high school agricultural educators on standards-based grading (SBG). The objectives of this study were to:

1. Explain what agricultural educators know about SBG
2. Define the local driving force of the SBG movement
3. Determine agricultural educators' attitudes towards SBG

Methods and Procedures

This study was part of a larger study focused on high school agricultural educators grading practices and their understanding of SBG. This study used a descriptive survey research design for the collection and analysis of data. The population for this study consisted of all high school agricultural educators in Iowa (N=236). A list of current agricultural educators was obtained from the Iowa Agricultural Education Directory on the Iowa FFA Association website.

The literature revealed very few instruments to evaluate teachers' knowledge and perceptions of SBG, a relatively new grading approach. The instruments developed by Marzano (2000), Schmidt (2002), and Urich (2012), along with the discussion statements by Brookhart (2011), were used as a model for designing an instrument to measure teachers' current grading practices and perceptions of SBG. The instrument was reviewed for content validity by two non-agricultural education instructors from area high schools using SBG, a College of Education graduate assistant in educational research, and one professor in the Department of Agricultural Education and Studies at Iowa State University. Five out-of-state agricultural educators also reviewed the instrument for face validity. These agricultural educators were asked to evaluate the survey and provide feedback regarding the questionnaire format, question syntax, and implementation.

The instrument was formatted using Qualtrics, an online survey program. A welcome page was provided to participants that included a thank you for participating and consent information as required and approved by IRB. Participants were also provided with the operational definition of SBG for this study within the welcome. This definition by Tomlinson and McTighe (2006) stated standards-based grading measures students' proficiency levels using well-defined course objectives.

Contact with respondents was made following recommendations by Dillman, Smyth, & Christian (2009) to achieve high response rates. A pre-notice email was sent to respondents with the study's purpose and importance of their responses. A link to the survey was sent to each participant. The email included a questionnaire link specific to each respondent. Reminder emails were sent to those still needing to participate in the study two days after the initial link was sent and again after seven days. A final notice was sent 11 days after the first link was distributed. Qualtrics ensured only those who had not completed the survey were sent reminder email messages. A total of 165 teachers (69.9%) responded with a usable response rate for the study of 66.5% (n = 157).

The survey instrument for this study contained a variety of question types including Likert-scale questions, multiple-choice questions, multiple-select questions, short answer, order rank, and frequency. The first section of the survey explored the current grading practices of teachers and defined their beliefs about grading and its purposes. The second section of the survey asked agricultural educators to identify the frequency and extent of professional development training.

The next section looked to identify agricultural educators current knowledge about SBG. Eight statements were presented asking agricultural educators to identify their agreement with each in the context of a traditional grading system using a Likert scale. The same set of questions was then presented in the context of an SBG system. A final short answer question asked respondents to define SBG. A section was also included to identify SBG implementation for those respondents who indicated using SBG in their classroom. The final section included demographic questions such as years of teaching experience, school district size, agriculture class size, and Curriculum for Agricultural Science Education (CASE) certifications.

Results and Findings

Respondents (n=157) were all secondary agricultural educators employed by a high school in Iowa, with an equal number (25%) teaching high school agriculture for less than three years or more than 25 years. Very few respondents taught in school districts with less than 50 students (4%) in grades nine through 12 or more than 600 students (6%). A majority of respondents taught in high schools with 151 to 400 students (55%). Most respondents (58%) class sizes ranged from 10 to 20 students with 16% teaching an average of 30 or more students per class. Fewer (14%) had average class sizes between 20 and 30 students and 11% had average class sizes of less than 10 students. On average, agricultural educators spend 81.9% of their day teaching.

The first objective of the study was to explain what agricultural educators know about SBG. Respondents' definitions of SBG were used to determine agricultural educators' knowledge of SBG. A majority (51.0%) had some understanding of SBG but would need more information to implement it into their classroom. Most respondents (32.3%) viewed SBG as a check-off system or a dichotomous yes-no system where students either know the standard or they don't know the standard. Fewer respondents (8.3%) provided a solid definition of SBG, while a similar group (8.3%) admitted to not knowing how to define SBG.

Respondents also identified their knowledge of statements directly related to a SBG system (Table 1). Respondents believed that academic achievement is the main grading criteria in a SBG system. Respondents believed that effort should somewhat impact a student's grade within a SBG system while student behavior should have less of an impact on grades.

Table 1. Agricultural educators' beliefs on grading criteria in a SBG system

Grading Criteria	*n*	Mean	*SD*
Grades should be based on academic achievement.	117	3.92	0.84
Grades should be based on student effort.	122	3.64	1.06
Grades should be based on student behavior.	119	2.72	1.21

Scale: 1 = Not at All, 3 = Somewhat, 5 = To a Great Extent

When it comes to the purpose of grades in a SBG system, respondents believed grades are primarily used as feedback about student learning (M=4.25, SD=0.73) (Table 2). Respondents also indicated strongly that grades are used to make administrative decisions, provide students with guidance, and plan instruction. Respondents also believe grades should motivate students in a SBG system.

Table 2. Agricultural educators' beliefs of grade purposes in a SBG system

Grading Statement in SBG	*n*	Mean	*SD*
Grades should be used to provide students and parents with feedback about student learning.	122	4.25	0.73
Grades should be used to make administrative decision such as student's progress to the next course level, class rank, credits earned and so on.	123	3.90	0.75
Grades should be used to provide students with guidance relative to courses they should take, occupations they should consider and so on.	120	3.77	0.92
Grades should be used to plan instruction.	121	3.62	1.05
Grades should be used to motivate students.	121	3.47	1.03

Scale: 1 = Not at All, 3 = Somewhat, 5 = To a Great Extent

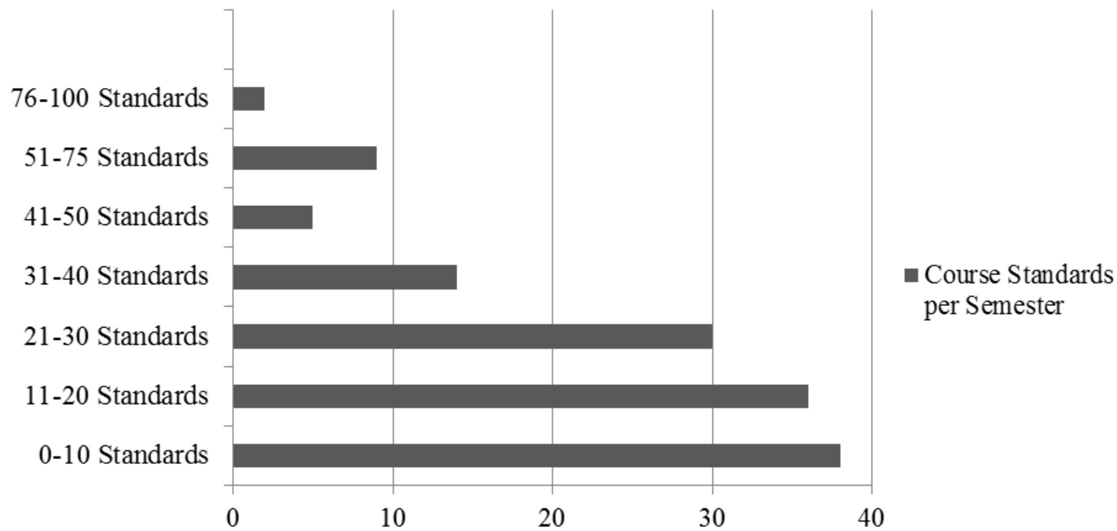
Respondents varied when it came to identifying standards for each course. A majority of respondents (54.9%) have standards identified for all agricultural education courses while 40.2% of respondents have standards for courses listed in their program of study. Very few respondents (4.9%) said they do not have standards identified.

Because Iowa choses to be a local control state, there is not a set of required agricultural education learning standards. Of those with standards identified, many respondents (61.8%) have standards aligned with the National Agriculture, Food and Natural Resource standards (2009). Fewer respondents (25.0%) are using the Iowa Agricultural Education Standards and Benchmarks (1999) and 13.2% of respondents use locally-developed standards.

In addition to agricultural education standards, respondents also use other non-agricultural education standards. Many respondents (80.0%) use Iowa Core Curriculum standards. Over half of respondents use national science education standards (60.0%) and national math standards (50.9%). Fewer respondents use the National Standards for English and Language Arts (44.7%) and social studies standards (20.0%).

In one semester, respondents cover anywhere from four to 100 standards within each agriculture course taught. A similar number of respondents identified covering less than 10 content standards in one semester (28.4%) and between 11 and 20 standards (26.9%). Only 10.4% said they covered 30-40 content standards during a semester in one course while fewer (6.7%) covered 50 to 75 content standards. In one semester of one course, 40 to 50 content standards and 75 to 100 content standards were only covered by 3.7% and 1.5% respectively.

Figure 5. Number of standards covered per semester per course



The second objective of this study was to determine the driving force of the SBG movement. While SBG is a newer approach to grading, discussions are taking place in respondents' school districts (23.6%) and pilots are being conducted in others (32.1%). SBG has not made it into 35.9% of respondents' school districts. Very few respondents reported full implementation at a building level (3.8%) while 4.6% said SBG is implemented throughout their entire district.

A majority of respondents stated that SBG is being used to some extent at the high school (85.1%), but only 27.1% of respondents are using SBG in their courses. These respondents were asked a series of questions regarding their implementation of SBG, successes, frustrations as well as support provided and still needed.

SBG for agricultural educators was either an individual choice (42.9%) or an administrative decision (57.1%). Respondents who made the decision to use SBG made the following statements:

> "After discussing with our building principal, a science teacher and I began to implement for the 2012-2013 school year."
>
> "I took it upon myself to change the grading procedure in my one classroom."
>
> "So far, it has been experimental. I have tried to implement in my courses but have a steep learning curve to find out what works and is manageable."

Responses to those making the change because of an administrative decision describe their SBG implementation experience as follows:

> "The superintendent introduced it as our pilot attempt. Each year a different area is placed on cycle to begin implementation. First year is curriculum development, second year is curriculum verification, third year is resource selection and development of assessments, and fourth year is implementation and validation of new assessments."

> "(SBG) started out at elementary and middle schools. When freshmen move to high school this year, (SBG was) implemented with them. Next year all courses will be required to implement."

> "We had training and then we started the process through PowerSchool."

The third objective of the study was to determine agricultural educators' attitudes toward SBG. Respondents expressed both positive and negative remarks with SBG and the implementation process. The most common success among responses was improved student learning. Respondents explained they saw an improvement in student work quality and that students have a better understanding on what is required for them to succeed resulting in a higher emphasis on student learning.

> "I see a lot more hard work in my classroom from students."

> "Students seem to realize they are responsible for the material and instances of less quality work is going down."

Curriculum alignment and better prepared lessons were also described by respondents. Respondents said feedback and clear learning goals has also gained parent support for SBG.

> "SBG improves my preparation for knowing where my lessons are going and what my goals are for students to learn."

> "Better feedback and more priority placed on student learning."

Respondents also reported their frustrations with SBG implementation. Time was the most often mentioned response to align curriculum, make changes to grade books, and to develop reassessment strategies.

> "Teaching multiple preps in the agriculture classroom is very difficult to keep up with re-teaching sessions and retesting of materials."

> "We still have to convert to traditional grades, and students use the first assessment as a 'practice' so we spend too much time reassessing."

> "Set-up was difficult because of the curriculum mapping that had to take place ahead of time."

> "It is hard to make rubrics with (AFNR) standards for projects."

Respondents also described misconceptions and perceptions by others in the school community as a frustration.

> "Parents and other teachers not understanding how it (SBG) works; a lot of communication (is needed) with other teachers and parents."

> "Perception by parents knowing what it is and how it is being implemented."

Support from administrators varied for respondents who have or are implementing SBG. Some respondents reported a book study led by administrators, time during professional development for curriculum development, and spending time during in-service devoted to SBG training. Some respondents explained their administrators have been supportive in implementing SBG and developing own assessments as long as grades can still be converted to the school's required grading scale. Few respondents identified administrative support as limited to approval to implement in their classroom.

Respondents identified a need for more support. The most identified response was more time to develop curriculum, materials, and understanding of SBG. One identified the lack of examples in a high school setting and in CTE courses, while another respondent said it would be helpful to sit down with a group of agricultural educators and work through a unit or course using SBG. Respondents described needing a clear understanding and approach to be communicated between administration, teachers, students, and parents.

Conclusions and Recommendations

Based on the results of this study, agricultural educators are familiar with learning standards and are using them in their agricultural education program of study courses. In addition to agricultural education standards, many are using non-agricultural education content standards including Iowa Core Curriculum, science, and math standards. A majority (55.3%) of agricultural educators also limit the number of standards covered per semester to less than 20 standards, which aligns with Marzano's (2006) recommendation of 15 to 20 standards per course. While developing their programs of study, agricultural educators should learn about SBG and how to implement it in their classrooms to better develop standards.

The results of this study also indicate that a majority of agricultural educators cannot provide a definition of SBG that closely aligns with definitions by Tomlinson and McTighe (2006), O'Connor (2009), or Townsley (2013). Very few (8.3%) were able to provide a definition indicating their knowledge of SBG was enough to implement in an agricultural education classroom. Agricultural education associations should provide opportunities for agricultural educators to learn about SBG and provide time at conferences for agricultural educators to collaborate.

It can also be concluded that the biggest obstacle to implement SBG is time and understanding. Agricultural educators who have or are currently implementing SBG noted time to align curriculum and developing reassessments as a hurdle. In addition, communication with those unfamiliar with SBG has also been a setback with SBG.

Finally, terms including standard, benchmark, and competency are used differently by educators. The 1999 Iowa agricultural education standards use terms like standards and benchmarks while National Agriculture, Food and Natural Resource standard set uses terms such as elements and concepts. A well-defined term needs to be determined so that agricultural educators can elaborate across school districts and even states.

There are implications for agricultural educators and administrators planning to implement SBG. Agricultural educators need training on SBG and time to collaborate with others. For many agricultural educators, it will be important to utilize time with other agricultural educators. Administrators can use this knowledge to help guide professional development that is content focused, includes active learning and collective participation (Desimore, 2009). When implementing, teachers and administrators will need to make sure parents and students are included in the implementation process. Misconceptions and issues can be deterred if communication is conducted throughout every level of implementation and after through the clear distribution of clearly defined learning objectives and proficiency levels associated with each.

Future research should be conducted to further gain an understanding of agricultural educator perceptions of grading practices and SBG in other states and in other content areas especially those with a set curriculum standards. A study should also be conducted on implementing SBG in an agricultural education classroom or other career and technical education content area as no studies are currently available.

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Exploring Agricultural Communications Students' Perceptions of Communication Apprehension and Writing Apprehension in the Classroom

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Abstract

Employers have identified oral and written communications skills to be the most important skills graduates should possess when entering the workforce. In order for faculty to better understand their students' oral and written communications skills, they should understand what apprehension the students have toward oral and written communications. Specifically, no studies have been found that explore communication apprehension (CA) or writing apprehension (WA) in agricultural communications students. The purpose of this study was to qualitatively explore agricultural communications students' perceptions of CA and WA. Participants believe agricultural communications instructors set up an environment that is conducive to changing behavior. However, students realized and identified areas of improvement that could help them lower their CA and WA. Recommendations for practice are provided in order to help alleviate CA and WA in agricultural communications students.

Introduction

Early in agricultural communications programs, much emphasis was placed on writing. However, agricultural communications is an ever-evolving degree program due to technological advances in communications, changing agricultural demographics, and external trends (Doerfert & Miller, 2006). Irlbeck and Akers (2009) found that agricultural communications graduates are entering the workforce with a satisfactory skill set in photo editing, page layout, public relations, graphic design, and radio production. However, graduates do not have a satisfactory skill set in writing, photography, news editing, and Web design. Morgan (2012) conducted focus groups with alumni from the University of Georgia to better understand the competencies students in agricultural communications should possess. He found participants emphasized the importance of writing regardless if they went into a career that demanded writing skills or not, which is parallel to findings in other studies (Irlbeck & Akers, 2009; Morgan, 2010; Sprecker & Rudd, 1997; Terry et al., 1994). Another skill set participants deemed important was public speaking skills, which one focus group said was the second most important skill students should possess behind writing (Morgan, 2012). Others have also found public speaking to be an important skill (Morgan, 2010; Terry et al., 1994). Furthermore, Morgan's (2010) study found verbal communication was the most important communication skill identified by practitioners.

Beyond the agricultural communications discipline, the Association of Public and Land-grant Universities and the University Industry Consortium conducted a study to understand the soft skills needed for new graduates (Crawford et al., 2011). "Soft skills are personal or coping skills in working with other people that a person needs in order to be successful" (Fernandez, 2003, p. 263). Seven soft skill clusters were developed including communication skills, leadership skills, and professionalism skills. Two descriptive characteristics of the communication skills cluster included effective oral communication and effective written communication. Participants were asked to rank the seven clusters in order of importance. All participants (students, faculty, alumni, and employers) ranked the communication skills cluster as most important. More than half (53.3%) of the employers surveyed ranked the communication skills cluster as the most, or second most, important skills cluster (Crawford et al., 2011). It is important for faculty to teach verbal and written communications skills in order for today's students to be successful in the workforce. In order to do this, faculty need to understand what apprehension students have toward oral and written communications skills.

Theoretical and Conceptual Framework

To understand how instructors can improve students' verbal and written communications skill sets, social cognitive theory and the concept of self-efficacy should be taken into account. Social cognitive theory is based on the idea that "human functioning is a product of the interplay of intrapersonal influences, the behavior individuals engage in, and the environmental forces that impinge upon them" (Bandura, 2012, p. 11). In the social cognitive view, people are neither driven by inner forces nor automatically shaped and controlled by external stimuli. Rather, human functioning is explained in terms of a model of triadic reciprocality in which behavior, personal factors, and environmental events all operate as interacting determinants of each other (Bandura, 1986, p. 18)

One of the underlying constructs of social cognitive theory is self-efficacy. Self-efficacy is one's belief in how well one can accomplish something (Bandura, 1994). Schunk (2003) found that "effective learning does not require that efficacy be extremely high" (p. 162). On the same token, Salomon (1984) found that students with high self-efficacy may be overconfident in their abilities and not put out as much effort which negatively affects them. The difficult part is finding the balance. "Self-efficacy beliefs are strengthened by reducing anxiety and depression, building physical strength and stamina, and correcting the misreading of physical and emotional states" (Bandura, 2012, p. 13). The challenge faculty have is being able to help students reduce anxiety and depression in the classroom.

Schunk (1985) developed the model of motivated learning by merging several theoretical perspectives such as social learning, attribution, and instructional psychology. This model includes four general class variables: student characteristics, expectancies, task engagement variables, and efficacy cues. Students have different approaches to learning tasks due to varying aptitudes and experiences. These aptitudes and experiences can influence students' self-efficacy toward new material, which in turn influences students' motivation to promote task success and skill development. From task success and skill development, efficacy cues transpire. These efficacy cues are essential to how students measure their performance outcomes and have a great deal of influence on a student's self-efficacy. This is a reciprocal process because of the interactive relationship between self-efficacy and learning experiences (Schunk, 1985).

It is imperative that instructors' instructional methods have an effect on both the students' learning and self-efficacy (Schunk, 2004). Even though a teaching method produces learning, it may not affect self-efficacy, which only hinders the students. Instead, in order for performance accomplishments to occur, it is important for the student to display periods of self-directed mastery in order to practice their skills independently. Researchers (Bouffard-Bouchar, Parent, & Larivee, 1991; Schunk, 2004) reported that when students have high self-efficacy, they perform at increased levels due to their persistence, exhibit less anxiety, and possess higher levels of intrinsic interest.

One way to help students with their self-efficacy in speaking and writing is to understand the degree of communication apprehension (CA) or writing apprehension (WA) they possess. CA and WA pertain to ones' fear, anxiety, or avoidance affecting oral or written communications (Daly & Miller, 1975a; McCroskey, 1977). CA is a "cognitive response to communication that arouses one internally" (Richmond, Wrench, & McCroskey, 2013, p. 42). The lower CA one has, the less discomfort one feels. CA pertains to one's ability to orally communicate whether it is one-on-one communication or in front of an audience. Typically, high CA individuals experience discomfort, fright, being unable to cope, and inadequacy (Richmond et al., 2013). Externally, individuals have three behavioral responses: avoidance, withdrawal, and disruption (Bourhis & Allen, 1992; McCroskey, 2011; Richmond et al., 2013). Blume, Baldwin, and Ryan (2013) conducted a study to understand CA and how it affects students' leadership, adaptability, and multicultural appreciation. What stood out most to them from the results was "how detrimental CA can be to the achievement of important educational outcomes, even among otherwise highly capable students" (Blume et al., 2013, p. 165). If one is fearful, typically one will avoid the situation all together; therefore, he or she will choose to not communicate with others when possible and choose to avoid communicative situations (Richmond et al., 2013). If one has a low willingness to communicate and finds him or herself in a communicative situation, he or she will typically withdraw by either not answering or minimally communicating. When people have disfluencies in verbal speech or nonverbal behaviors they are considered to be disruptive. Examples of a disruptive individual include stuttering, forgetfulness, nail biting, and avoiding eye contact (Richmond et al., 2013).

As discussed earlier, self-efficacy is an important factor to student achievement. Hopf and Colby (1992) found that "CA is more closely related to feelings about one's ability to accomplish goals than it is to feelings of self-worth" (p. 133). Furthermore, Bourhis and Allen (1992) found a negative relationship existed between CA and cognitive performance. Therefore, CA can be tied to social cognitive theory and self-efficacy and how it affects students in the classroom. When a student possesses CA, it can have a negative impact on their learning (McCroskey, 1977; McCroskey, Booth-Butterfield, & Payne, 1989). Frymier (1993) found a negative relationship between students' CA and motivation to study – as motivation decreased, CA increased. When instructors have high verbal immediacy, regardless of the student's CA level, students' motivation to study was higher (Christophel, 1990; Frymier, 1993). "Teacher immediacy is nonverbal behavior that reduces physical and/or psychological distances between teacher and students" (Reisbeck, 1982, p. 27). When someone exhibits non-verbal immediacy, he or she is likely "to communicate at a close distance, smile, engage in eye contact, use direct body orientation, use overall body movement and gestures, touch others, relax, and be vocally expressive" (Andersen, 1979, p. 548). In addition, Kelsey (2000) found that high CA students were as interested and motivated by course content as low CA students and enjoyed being in the class but did not want to actively participate in the course. Instead, these students would rather vicariously participate.

Like CA, WA can have an impact on a student's ability to learn. "Writing well is a major cognitive challenge, because it is at once a test of memory, language, and thinking ability" (Kellogg & Raulerson, 2007). WA is defined as a trait, but the measurement of WA is the reaction to a specific state of encoding of written messages (Daly & Miller, 1975b) and represents a subject-specific disposition (Daly & Wilson, 1983). Daly and Wilson (1983) found WA and general self-esteem, WA and the way people feel about themselves, and WA and feelings of competence to all be significantly and inversely related to each other. Pajares and Johnson (1994) found WA has a strong, negative relationship with writing self-efficacy.

One recommendation of Faigley, Daly, and Witte (1981) was that instructors should use different instructional techniques and materials for high WA students especially since evaluation can play a major role in WA (Smith, 1984). Instead of merely instructing students, instructors should train them as writers (Kellogg & Raulerson, 2007). Training them will help them to effectively utilize their knowledge in order to practice the craft of writing extended texts. Furthermore, students who can practice writing as a professionally relevant task can improve their writing abilities and motivate their learning efforts (Kellogg & Raulerson, 2007). Mascle (2013) also emphasized the importance of student learning. She suggested that instructors foster conversations and activities in class in order for students to become better writers and to reduce their apprehension. Some examples of classroom activities include writing workshops and reflection journals to contribute to students' writing self-efficacy. It is important for people to believe they have the power and capability to act in order for them to be actively engaged in the writing process and not simply going through the motions (Pajares, Johnson, & Usher, 2007; Pajares & Valiante, 2008). Writers should also set their own goals in order to ensure progress is the main focus instead of the end product, which will increase their self-efficacy (Bandura, 1997).

Students' self-efficacy increases when they perceive their instructor in a positive manner (Crumbo, 1999). One way to help students have a positive perception of their instructor is for the instructor to demonstrate faculty support and mentoring (Martinez, Kock, & Cass, 2011) such as paying attention to students' self-perception of writing competence versus their actual competence of writing (Hackett & Bentz, 1989). Faris, Golen, and Lynch (1999) noted that WA is a significant barrier to the development of written communication skills. Attending to the differences in perception can help reduce apprehension and in turn produce higher efficacious students. "If we can nurture the self-beliefs of our student writers and help them overcome this apprehension, then we can move on to the necessary process of attending to their growth and development as writers" (Mascle, 2013, p. 218).

By faculty knowing their students' apprehension toward oral and written communications, they can help their students to become more efficacious in those areas and help them to perfect those skill sets in the classroom. Oral and written communications are two of the most important skill sets employers are looking for; therefore, developing these competencies in students is extremely important for their future career success.

Purpose

Research priority area 4 of the *National Research Agenda* for the American Association for Agricultural Educators is meaningful, engaged learning in all environments (Doerfert, 2011). Within this area, teacher preparation was identified as one of the challenges to overcome in order to provide 21st century students with meaningful, engaged learning environments. Understanding the complex phenomenon of CA and WA in agricultural communications students could have implications for both the students and the instructors. In addition, for instructors specifically, results from this study could aid in understanding how to connect to students with different levels of CA and WA through instructional strategies within major courses. CA and WA have been studied in the communication studies, English, and business disciplines. Specifically, no studies have been found that explore CA or WA in agricultural communications students. Thus, the purpose of this study was to explore and understand the agricultural communications students' perceptions of communication apprehension and writing apprehension in the classroom. The objective was to identify characteristics students within agricultural communications possess at high, moderate and low levels of communication apprehension and writing apprehension.

Methods

A qualitative research design was used for this study in order to gain student perspectives about CA and WA. Stratified purposeful sampling was utilized to identify participants. Stratified purposeful sampling includes utilizing subjects at specific designated points of variation allowing the researcher to develop a better understanding of the characteristics present at each point (Gall, Gall, & Borg, 2007). This study utilized the designated points of variation including high, moderate, and low scores from the Personal Report of Communication Apprehension-24 (PRCA-24) and Writing Apprehension Test-20 (WAT-20) portions from previously collected data from Texas Tech University students who indicated they were willing to participate in a one-on-one interview following a questionnaire (Ahrens, 2014). Eleven participants were identified and agreed to participate in the study.

Semi-structured, one-on-one interviews were used with pre-established questions, but allowed the freedom to ask questions as they emerged during the course of the interview (Glesne, 2011). This type of interviewing also allows questions to be asked out-of-order, ask for clarification, and to ask new questions as deemed appropriate and necessary throughout the course of the interview. A panel of experts reviewed the moderator's guide with minor revisions made due to their feedback. Interviews were used instead of focus groups because students who have high CA typically do not participate well in small group settings. Thus, one-on-one interviews provided a more comfortable environment for the more apprehensive individuals.

Interviews were audio-recorded, and then transcribed from the one-on-one interviews, and pseudonyms were given to each interviewee. Transcripts were coded and analyzed using the constant comparative method (Glaser & Strauss, 1967) in NVivo 10.0 for Windows. The constant comparative method allows the researcher "to look for instances that represent the category and to continue looking (and interviewing) until the new information obtained does not provide further insight into the category" (Creswell, 2009, p. 195). To find these categories, we used the method of coding, more specifically open and axial coding. From these codes, we were able to identify themes. Themes "consist of several codes aggregated to form a common idea" (Creswell, 2013, p. 186). The themes were analyzed to explore what perceptions agricultural communications students have about CA and WA in the classroom.

To ensure trustworthiness of the study, credibility, transferability, dependability, and confirmability were the four criterion used (Lincoln & Guba, 1985). For transferability to occur, two strategies were utilized: thick, rich description and purposeful sampling. Credibility was ensured through two strategies: triangulation and member checks. Triangulation was established through the maintenance of a researcher's journal, field notes and interview transcriptions. Next, member checking was used to ensure themes were accurately portrayed. Creswell (2011) does not take participants transcripts of the interview. Instead, he recommends taking analyses of descriptions or themes from the interviews. Thus, once the data were analyzed, a visual diagram of our interpretations of the findings was created and emailed to participants that asked them to assess the accuracy and credibility of our interpretations. All responses from participants were positive and agreed with our interpretations of the findings and did not find anything missing.

To ensure dependability, we provided an audit trail. Our audit trail consists of raw data (audio-recordings of interviews and field notes), data reduction and analysis products (summaries of field notes in a researcher's journal), data reconstruction and synthesis products (structure of categories, findings and conclusions that make connections with existing literature), process notes (notes about methodology in the researcher's journal), materials relating to intentions and dispositions (researcher's journal), and instrument development information (moderator's guide) (Lincoln & Guba, 1985). Finally, to ensure confirmability, an audit trail, similar to the dependability audit trail, was established. Furthermore, Lincoln and Guba (1985) propose two other techniques to ensure confirmability, in which we used: triangulation and keeping a reflexive journal (researcher's journal).

Qualitative researchers should acknowledge their reflexivity and be cognizant of biases they bring to the study (Creswell, 2013). In order to minimize observer bias, the interviewer preserved a positive attitude toward the research and the participants. Notes were recorded during and immediately following the interviews in order to assure memory and judgment were not clouded. Procedural bias was ensured by allotting plenty of time for each interview and that the interview took place in an environment most comfortable for the interviewee and interviewer. Follow-up emails were sent to interview participants in order to guarantee correct interpretations from the interviews.

Findings

After analyzing the interview transcripts, five major themes emerged. Two of these themes were in vivo coded, which means the codes are "names that are the exact words used by participants" (Creswell, 2013, p. 185).

Students Enjoy Small Classes

Small classes are important to participants regardless of their apprehension level. Small classes allow for more one-on-one interaction with the instructor, students can gain a deeper understanding of the material, students can learn from others, and they are more hands-on. Katrina said:

> It's really just more of a chance for me to grow as a student and in my education whenever the classroom size is smaller. Also, I learn more from the other students in my class versus classes that I've had that aren't in this college that have lots of people. You don't really have a chance to hear what the other students have to say.

Similarly, Beth said: "I feel like I get more out of the class. If it's bigger, then they don't really care if you're there or not. It doesn't seem very important." Juliette said, "The smaller ones are more intimate and the professor seems to have a better relationship with the students." Also, Maggie said: "I prefer small lecture courses so we can do more hands-on things. It's not just a monotony of them talking; it's a little bit of everything."

Group Work is Problematic

There are good and bad things when it comes to group work, and it really depends as to whether students like group work or not, hence why group work is problematic. Group work can be good because other opinions and points-of-view can be showcased. Abbie said:

> It's good to have other opinions or other points-of-view. You might do something that you like a certain way and then that way might not always be right for a certain project and so it's good to have another viewpoint or another aspect to take on something.

On the opposite side, students like to be in control when it comes to their grade. Abbie said:

> I am the type of person that will get it done the week it's assigned and then do nothing for the whole rest of the semester. Just to make sure I've got it done and out of the way and to make sure that instead of having to make sure that everyone's on the same wavelength you can just know that this is the train of thought I'm thinking. You can just follow it and be done and not have to make sure that everyone's together.

Group work can be frustrating too. Emily said:

> I think it's just one of those things that depends. If you have a good group team and you feel like you can get something done, but a lot of times when it's in school, kids rely on each other and that's frustrating.

More Speaking Opportunities

Students realized that in the agricultural communications degree program at Texas Tech University, they get a lot of practice writing but not a lot of practice speaking. Thus, offering more speaking opportunities emerged as a theme. Practice and agricultural communications public speaking course emerged as subthemes, and within the practice subtheme, several other subthemes emerged: confidence boosters, be silly, conversational, and smaller groups.

Furthermore, students recommended that an agricultural communications specific public speaking course be offered and that they can learn from others to become better speakers.

Katrina said:

> I feel with ag comm there hasn't been a whole lot of opportunities to talk and give presentations. I can think of my communication, speech class, and technical writing we had to give a presentation in and a few other classes, and in campaigns, we had to give presentations. But, if more of them had more where we got up and explained ourselves would help. Just more practice.

Scarlett, Maggie, Juliette, and Beth all said that it is important for instructors to give confidence boosters to help students feel empowered before students are required to give a speech. Juliette said:

> I never felt like my [speech] professor was listening or that he thought the message was very important. So, I would say that definitely give the students an emotional boost rather just follow these guidelines. In high school, I had a teacher, and I would definitely give this advice to any professor if they had a student that was anxious about it [giving a speech]. He would tell me this quote. And it's more, you know, sentimental to me, but it is "Our greatest fear is not that we are inadequate. Our greatest fear is that we are powerful beyond our measure." And that has been something that when you make a student feel powerful, feel motivational like they hold the power, I think it really helps.

Students' believed that learning from others could be another way to gain confidence. Emily and Emma talked about different techniques of learning from others. Emily said:

> I love watching videos. I think videos are just more and more popular and we get into that and we relate more with videos or seeing other people get up and speak or even to make it funny. When people look stupid up there you're like, "Oh my gosh, I don't want to look like that," so then I think you try harder. Like, I just need to relax.

Emma said:

> I think it's important you just go and listen to other speakers. Once you hear them and you can see the kinds of techniques they use. They might use something like humor to overcome why they're scared. You just got to find where you're little bubble is. I think it's important that you just go watch other people.

One way professors could help give confidence boosts while practicing speaking is to have students be silly. Maggie talked about a previous speech class she was in:

> You had to come up with this speech based on some stuff you pulled out of a box, and I think something like that would be really beneficial for someone like in an intro to speaking class, intro to public speaking. I mean just to be able to be kind of silly with it and come up with something off the top of your head cause I feel like a lot of people's fear of public speaking comes from like I'm not going to remember what I'm going to have to say or they're going to think that something that I prepared sounds dumb, whereas if you're having to come up with what you want to say off the top of your head very quickly you're not thinking about being scared necessarily. You're thinking about what you have to say.

Furthermore, Claire and Maggie said there should be more conversational type of speaking available because eventually students will be in interviews and even in the jobs they have, being able to have a conversation with someone will be important. Claire said:

> You're going to have to do interviews. That's one thing that I've struggled with is not saying "um" every two seconds or "like" every two seconds. Being able to talk about myself and know exactly what to say which sounds weird, but at the same time your nerves get to you.

Maggie said:

> In high school we did these, like it was just a conversation. You'd have a contest where somebody would sit down and you would have to start the conversation. They would give you a topic you kind of had to follow, but the conversation could branch off from that. I feel like that's mostly the kind of stuff I'm going to have to know in a future career. Not necessarily giving a formal speech over something because that's not what I'm really interested in. But, you have to be able to go with the flow and hold a conversation and hold the attention of someone.

Lastly, small groups are another idea to help students get a confidence boost while practicing or giving speeches. Abbie talked about a class she was enrolled in:

> Doing it, like if you have a large group of like maybe 25 or 30, if you do it in cycles. Have like one person do their presentation in front of a group of five and then add another person from another group and not having the whole audience and then gradually maybe making it bigger throughout the semester isn't quite as bad.

Claire and Daryl both mentioned the idea of having a public speaking course offered in agricultural communications in order to get more public speaking opportunities. Claire said:

> Part of the public speaking class should be learning how to advocate for agriculture. I definitely feel like part of learning how to communicate is learning how to exactly know what to say to people in certain situations. So, we're taught to write about agriculture, we're taught to design for agriculture and all this stuff, but we're not taught to speak for agriculture.

Grade Them Suckers Hard

When analyzing the transcripts, grade them suckers hard emerged as an in vivo coded theme. This theme name was selected from something Daryl said when talking about what professors could do to help him overcome any apprehension he had about writing. He said: "Honestly, some of the best advice I've gotten is very critical advice. Be very critical of writings. Grade them suckers hard. That's going to sound bad, but just something like that. Just be very critical of the writings."

Even if instructors grade papers hard, it is important for them to give constructive criticism in order for the student to learn and grow. Jess suggested constructive criticism should be given with everything that is turned in. Beth said constructive criticism is important because it is not tearing the student down. Emma said it was important to give reinforcement whether it is positive or negative.

Several mentioned that writing workshops should be offered, especially for grammar, spelling, and punctuation (GSP) to help with their writing. Jess said, “The biggest thing for my writing is commas and grammar. Worse thing ever. And it’s always been a problem.” On the same token, students who are not as apprehensive about writing also thought workshops could be helpful. Emily said:

> I’m sure a workshop day type to make writing easier [could be beneficial]. Writing, it’s not hard for me, but I don’t enjoy it cause it takes me forever to do. So, I think little workshops to say don’t stress about writing and break it down so it makes it easier for you to write your piece [could help].

Students in agricultural communications are also required to use Associate Press (AP) Style. Daryl said, “I know AP Style comes out with new updates every year. I mean, I don’t know if maybe a workshop for that, like what’s new to AP [could be beneficial].”

Also, several mentioned the importance of peer reviews and discussions. Emma said:

> I think it’s important that someone looks over it [paper]. Cause you might read something 50 times and someone might read something once and find five mistakes you didn’t see. I just think it’s important that somebody goes over what you were writing.

Abbie said:

> Peer reviews and peer discussions are helpful because then you’re not quite as freaking out as when you hand it straight in to a professor. If you have someone else look over it first and maybe get their thoughts and processes maybe it’ll be easier to write on your own and then turn it in to a higher person.

I’m my Worst Enemy

When asked what professors could do to help them overcome their apprehension of speaking and/or writing, several mentioned that it was not necessarily something their professors could help them overcome, but something they had to overcome themselves. Once again, I’m my worst enemy was an in vivo coded theme that emerged from something Daryl said. He said, “With my anxiety of writing, I think I’m my worst enemy because I’m so critical of my writing. I don’t know if my professors could [help]; it’s more of an internal [struggle]. I have to be more confident in myself.”

Scarlett was the one student who had high CA. She labeled herself as shy. She said: “Even though I’m shy, I know that’s something I can work on. I can get over it. I will get over it someday.” She too felt that overcoming her apprehension was something she just had to do on her own. She said, “I feel like that’s just something I have to get over. I feel like I have gotten better over the years, but I think it’s more a personal thing.” She also mentioned that “getting out of your comfort zone definitely helps a lot.”

Maggie reiterated this concept and said, “I think at some point you just kind of like suck it up [and give a speech] and your professor has to tell you it’s OK, your fine, but you still have to perform.” She also said:

> You just have to push yourself. I know it’s uncomfortable to speak sometimes and it’s uncomfortable for somebody to critique your writing, but you’re not going to become a better speaker or a better writer unless you have somebody that knows what they’re doing show you how to become better. If that makes sense, and it may be scary and it may be uncomfortable, but you can’t expect to get any better at what you want to do in life if you’re not taking the advice of people that have been there, done that already.

Conclusions and Recommendations

Understanding CA and WA in agricultural communications students is important for faculty so they can tailor instructional techniques as necessary and to help students grow in their oral and written communications skill sets. Overall, agricultural communications students recognize the importance of developing verbal and written communication skills, which have been found to be of importance for graduates to possess (Crawford et al., 2011; Irlbeck & Akers, 2009; Morgan 2010; Morgan, 2012; Terry et al., 1994). Five themes arose from this study: students enjoy small classes, group work is problematic, more speaking opportunities, grade them suckers hard, and I’m my worst enemy. When classes are smaller, instructors can give students more one-on-one attention. Because of this attention, students are also able to gain a deeper understanding of the course material and feel more comfortable asking questions. This connects to instructors needing to possess high teacher immediacy for students to be more motivated to learn (Christophel, 1990; Frymier, 1993; Messman & Jones-Corley, 2001).

Everyone has different strengths and weakness and group work allows for everyone’s strengths to shine. These attributes allow for the group to divide and conquer the assignment or project, which may result in a better grade in the end. Regardless, students prefer to be in control of their grades and not rely on other people to earn or help earn a grade for them. Furthermore, the way in which the assignment or project gets done (method, date, and content) is also something most do not want to give up controlling. Finally, because people may not put forth their best effort, be available to meet, or have the work ethic that others do, group work can be very frustrating.

Students in agricultural communications at Texas Tech University are only required to take one speaking course; however, they are required to take several writing intensive courses. Because of this, students do not believe they get enough practice giving speeches and several proposed the idea of having an agricultural communications public speaking course. This course could not only give students the opportunity to practice more oral communications, but also could give them practice of how to verbally communicate about agriculture. Building confidence and empowering students to give a speech is very important. One way to help students build confidence is by learning from others whether it be through videos or simply listening to others give speeches. This concept of learning from others ties into self-efficacy and social cognitive theory. Several ways to reach efficacy expectations are through various forms of modeling (Bandura, 1977). By seeing others, students are gaining insight into how they could perform and give a speech; therefore, modeling the behavior they witnessed.

It is important that students learn their mistakes and grow from them instead of an instructor simply telling them that they are right or wrong (Mascle, 2013). "Social cognitive theorists argue that one important source of students' self-confidence lies in the feedback that students receive from their teachers" (Pajares & Johnson, 1994, p. 327). One major finding that could help increase students' self-efficacy is to grade students' work rigorously while also providing constructive criticism. It is one thing to grade a paper and mark it up without leaving comments, but another to mark it up and explain why it is marked up. Furthermore, having in-class peer reviews and discussions is a way for another set of eyes to see a student's paper before it gets turned in to the instructor. Peers can also be a springboard to bounce ideas and concepts off of to help with conceptualization. Regardless, having others read over papers is helpful because they may find mistakes that the writer did not find even if it was self-proofread several times. Feedback allows for students to become more efficacious (Bandura, 1977).

Rather than viewing apprehension as something someone can help them overcome, participants viewed apprehension as something they had to overcome themselves. The participants believed it was a personal, internal struggle and in order to overcome apprehension they had to "suck it up" and get out of their comfort zone. Most people must deal with some nervousness in order to get through their apprehension. As students take more control over their life, they are able to shape their environment through cognitive processes (Bandura, 2012). Behavior can be shaped by environmental influences (Bandura, 2012); therefore, it is important that students are in an environment that can help shape their behavior, ultimately helping to reduce their apprehension. Participants said agricultural communications instructors set up an environment that is conducive to changing behavior especially due to the small class size, one-on-one instructor/student relationships, and hands-on activities in the classroom.

These findings provide many recommendations for future practice. Programs should evaluate the courses they offer. Participants in this study said they get a lot of practice writing but not speaking. If a public speaking course is not being offered, it should be considered or at least incorporate more oral communications practice into existing courses. It is imperative agricultural communications students be well-rounded and possess both oral and written communication skills, especially since they are important soft skills for graduates to possess (Crawford et al., 2011). When talking about writing assignments, instructors should spend time explaining why students were correct or incorrect in their work. Furthermore, the instructors should also encourage peer review and discussion as another way for students to receive feedback before turning in a final version to the instructor.

Small classes are imperative to agricultural communications students' success because they allow for more one-on-one conversations with the instructor, students can gain a deeper understanding of the material, students can learn from each other, and more hands-on activities can occur. Students in smaller classes also feel more comfortable asking questions and speaking up during class. Finally, it is vital that instructors give positive reinforcements especially when they are grading. Students are their own worst enemy and often struggle internally with the apprehension they have toward speaking and/or writing. When instructors provide positive reinforcement, students believe they can write – have higher self-efficacy – and will perform better, in turn, submitting higher quality work.

CA and WA are nascent areas of research in the field of agricultural communications. More research should be conducted to better understand CA and WA in agricultural communications students.

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Exploring Math and Literacy Integration among Secondary Agriculture Teachers

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Abstract

Core academic skills are essential for success in our society. However, an abundance of research has identified a large proportion of secondary students are underperforming in core academic areas such as literacy and math. Researchers have suggested integrating core academic content throughout all secondary coursework as a potential solution to students' underperformance in core academics. This study focused on core academic integration in secondary agricultural education classrooms and explored a conceptual model for teachers' core academic integration competence in the areas of math and literacy. Results indicated pedagogical competence and technical knowledge were significant predictors of teachers' reading integration competence. Pedagogical competence was also a significant predictor of respondents' writing and math integration competence. These findings highlight the importance of agriculture teachers' ability to engage students through effective pedagogical strategies as a potential precursor to competence integrating reading, writing, and math. Implications and strategies for utilizing the proposed model and the findings from this research are discussed.

Introduction

In order to meet the demands of an ever-changing society, students must be empowered with knowledge in a broad range of disciplines including science, engineering, mathematics, and literacy. With numerous studies reporting American students underperforming in these critical disciplines (ACT 2005; OECD, 2012), the search is on for solutions. The contextualized learning potential within agricultural education, in which core academic "principles become more real and understandable for students" (Phipps, Osborne, Dyer, & Ball, 2008, p. 4), provides a possible springboard for student understanding of core academics. This solution requires agriculture teachers competent in the integration of core academics. This study sought to test a model of teachers' perceived competence integrating two core academic subjects, literacy and math. In the following sections, we explore the integration of these core academic topics and their relevance in agricultural education.

Content Area Literacy

An individual's ability to read and write is an essential component to their potential for success in academics and life (Biancarosa & Snow, 2006; Graham & Perin, 2007). The role of education is to develop a skillset necessary to be competitive in a global marketplace; one of the most important features of this skillset is literacy (Biancarosa & Snow, 2006). In fact, research conducted by the National Association of Colleges and Employers indicates literacy skills are one of the most sought after attributes among potential employees (NACE, 2014). Speaking specifically about the literacy skill of writing, Graham and Perin stated it "is not just an option for young people – it is a necessity" (2007, p. 3).

Research into the development of literacy skills among high school students has been spurred by the overwhelming evidence indicating secondary students are underperforming in literacy. Specifically, studies report 32% of high school graduates are unprepared for college level literacy coursework (ACT, 2005), 40% of high school graduates do not have the literacy skills employers are looking for (Achieve, 2005), and a total of eight million students in grades eight through 12 struggle in reading (Biancarosa & Snow, 2006; Graham & Perin, 2007). The outcomes of this underperformance are numerous, including a higher susceptibility for dropout (Graham & Perin, 2007; Snow & Biancarosa, 2003). In a search for potential solutions to this literacy epidemic, researchers have proposed content area literacy as a method for increasing secondary students' literacy (Biancarosa & Snow, 2006; Graham & Perin, 2007).

Content area literacy refers to "the ability to use reading and writing to learn subject matter in a given discipline" (Vacca & Vacca, 2002, p. 5). The concept of infusing literacy into courses offered outside the English department is widely supported throughout education (Hall, 2005; Shanahan & Shanahan, 2012). Research supports the notion that content area literacy improves students' academic achievement both in literacy and in the subject area in which literacy is being integrated (Bangert-Drowns, Hurley, & Wilkinson, 2004; McConachie & Petrosky, 2010). Specific areas of improvement among students include increased student engagement, increased persistence, and increased achievement on standardized testing (McConachie & Petrosky, 2010). At the crux of content area literacy is a teacher's decision to incorporate reading and writing into their practice (Biancarosa & Snow, 2006). Therefore, it is important to explore the teacher's role as a potential gatekeeper to content area literacy.

Previous research suggests teachers generally have a positive perception toward teaching literacy; however, this positive perception often fails to translate into changes in classroom instruction (Hall, 2005). Research has identified a number of potential reasons behind this disconnect. McConachie and Petrosky (2010) cite content area teachers' obligation to teach their own curricula as a potential barrier between perception and action. Park and Osborne (2005) identified perceived inadequacy to teach literacy, infringement on time spent teaching their content, and a lack of identified importance regarding teaching literacy as potential barriers to literacy integration. Furthermore, content area teachers may have never been trained in the specifics of integrating literacy in their discipline (Hall, 2005). For both preservice and inservice teachers, professional development regarding literacy integration is traditionally presented "as a decontextualized process that contains a set of skills/strategies that can be generically applied across the content areas" (Hall, 2005, p. 404). However, research suggests effective professional development entails empowering content area teachers to integrate literacy strategies tailored to their unique content area (Moje, 2007).

Content area literacy exemplifies the notion that literacy is truly an interdisciplinary subject that should be included in all secondary classrooms (D'Arcangelo, 2002). However, the majority of research in content area literacy has focused on literacy integration within math, history, science, and English language arts classrooms (Moje 2007; Shanahan & Shanahan, 2012). With the onus of literacy development being on all teachers, the breadth of research on literacy integration must grow (Park & Osborne, 2005, 2006a). Agricultural education is one content area with very little research exploring literacy integration.

Within agricultural education, research has identified agriculture teachers often neglect literacy integration in favor of the hands-on learning opportunities prevalent in agricultural education (Park & Osborne, 2006b). However, agriculture teachers still perceive teaching literacy concepts as a positive endeavor with the potential to benefit their students (Park & Osborne, 2006b). The research in agricultural education exemplifies the disconnect identified previously; teachers perceive literacy integration as positive yet fail to continually reinforce literacy skills and concepts within their classrooms. A potential factor between perceived importance and literacy implementation is teachers' competence regarding literacy integration. This exploratory study sought to analyze Oregon agriculture teachers' perceived competence regarding content area literacy integration.

Math Integration

Like literacy, individuals' competence in mathematics is directly related to their potential for academic and professional success (Mullis, Martin, Foy, & Arora, 2012). Unfortunately, as was the case with literacy, secondary students in the Unites States are underperforming in mathematics (OECD, 2012; Stone, 2011). The level of underperformance is alarming, as Schmidt stated, "roughly three quarters of American high school students graduate with a relatively poor grasp of mathematics" (2011, p. 2). Again, content area integration of core academics has been lauded as a method for improving student performance in mathematics (National Research Council, 2011; Stone 2011).

Career and technical education (CTE) has been distinguished as an applicable context for integrating mathematics (Pearson et al., 2010). The nature of CTE provides a valuable model for math development; as Stone stated, "rigor resides in combining CTE and academic skills as applied to real-world problems" (2011, p. 10). The applied nature of CTE differs from the isolated nature of math education traditionally found in math classrooms. An integrated approach provides students with a relevant context, making math concepts less abstract and more tangible. In 2008, a research team tested the efficacy of math integration through a project called Math-in-CTE (Stone, Alfeld, & Pearson, 2008). Using experimental research methods, researchers tested math-enhanced CTE courses. The results showed students taught in the math integrated courses scored better on two standardized math assessments without any detrimental effect to their knowledge gain of CTE content (Stone et al., 2008).

Unlike content area literacy, a number of research studies in agricultural education have addressed math integration. Some of the earliest work (Loadman, 1986) established the foundational premise of agricultural education as an applicable context for integrating math. More recent research (Parr, Edwards, & Leising, 2006; Young, Edwards, & Leising, 2009) has explored the relationship between math integrated agricultural education classes and student performance in mathematics. These studies found students taught in math integrated agricultural education classrooms performed better in mathematics. Research in agricultural education, in combination with the Math-in-CTE study, illustrates the potential positive effects of a math integrated classroom.

While some research in agricultural education has highlighted the potential benefits of math integration, other studies have called into question agriculture teachers' capacity for such integration. Miller and Gliem (1994, 1996) identified agriculture teachers' knowledge of mathematics, or lack thereof, as a potential limiting factor to math integration in agricultural education. Jansen and Thompson (2008) supported this finding, as they suggested a teacher's content knowledge strongly influenced their self-efficacy toward mathematics integration. More recent research suggests preservice agricultural education teachers lack the level of mathematics ability necessary for integrating mathematics (Stripling & Roberts, 2012a, 2012b; Stripling, Roberts, & Stephens, 2014). In an attempt to improve preservice teachers' capacity for math integration, Stripling and Roberts (2013a, 2013b) tested a math integrated agricultural education teaching methods course and found a significant increase in preservice teachers' personal mathematics ability. However, this research also identified insignificant increases in math teaching self-efficacy (Stripling and Roberts 2013a) and insignificant decreases in math teaching self-efficacy (Stripling and Roberts, 2013b) after the math integrated preservice experience.

Research in agricultural education has established secondary agriculture classrooms as an applicable context for the integration of math content as well as the positive benefits of integrating math. However, research has also established the teacher as a critical factor in math integration. Based on the imperative role of the teacher in math integration, this study explored practicing agriculture teachers' perceived competence toward math integration. Additionally, we developed and tested a model of unexplored predictive variables for math integration competence. By analyzing this model, our study provides valuable insight into factors potentially influencing agriculture teachers' ability to integrate math.

Theoretical Foundation and Conceptual Framework

It is critical to consider both perceived competence and task value when examining the motivational components of core academic integration. In other words, teachers need to feel *competent* integrating core academics and also *value* integrating core academics in their curricula. Our theoretical foundation, based on the expectancy-value motivational theory (EVT) espoused by Wigfield and Eccles (2002), is grounded in the integral importance of both expectancies for success (competence) and value. As we consider integration, the EVT is foundational as it, ". . . suggests that teachers' willingness to change their teaching practices is related to teachers' expectations that they will be able to implement new practices effectively [competence], and that they will be rewarded for making the changes in their classroom practices, and that they will value the rewards they receive" (Tollefson, 2000, p. 74).

The EVT is based on two components, expectancies for success—an individual's beliefs about how well they will do on upcoming tasks, and task value—the value placed in a given task (Wigfield & Eccles, 2000, 2002). Wigfield and Eccles (2002) postulate the presence of both is necessary for an individual to undertake a task and they are key determinants of choice. Wigfield and Eccles (2002) stated, "Expectancies and values are assumed to directly influence performance, persistence, and task choice." (p. 118). As we consider the topic of academic integration, it is vital to consider both expectancies for success and the value teachers place on integration.

The concept of expectancy for success has been operationally defined as both competence and self-efficacy (Pajaras, 1996; Wigfield & Eccles, 2000). In highlighting the similarities, Pajares (1997) stated, "Self-efficacy and other expectancy beliefs are similar in that they are each beliefs about one's perceived capability…" (p. 19). While theoretical purists might argue the unique and subtle differences between expectancy for success, competence, and self-efficacy, we have chosen to focus on the overwhelming similarities as we situate our research. Prior research highlights the importance of competence and self-efficacy as they have been linked with teacher persistence, motivation, and resilience (Labone, 2004; Wheatley, 2005).

Merely feeling competent or efficacious is not enough to spur a teacher to action; rather, they must have a reason or incentive to act, defined as their task value (Wentzel & Wigfield, 1998). From a theory standpoint, task value can be further divided into attainment value—the importance of doing well, intrinsic value—personal enjoyment from doing a task, utility value—how it fits into future plans, and cost value—what one may need to give up to complete the task (Eccles, 2005; Wigfield & Eccles, 2002). For the purpose of this study, we assessed value but did not distinguish the four sub-components. However, it is important to recognize the existence of these components as they may play a role in the value judgments of teachers. For instance, cost value directly relates to academic integration in that teachers may weigh and assess the value of core academic integration in light of the potential loss of instructional time specific to agriculture. Task value has been linked to increased persistence, greater student outcomes, and higher overall satisfaction with teaching (Ashton & Webb, 1986; Wigfield & Eccles, 2002).

Our intent was to extend the expectancy value motivational theory to a conceptual model for core academic integration in agricultural education (see Figure 1). In addition to task value, research highlights a number of potential factors influencing academic integration; in this study we will focus on two of these factors, pedagogical competence and technical knowledge. We operationalized technical knowledge as a teacher's understanding of the content in which core academics will be integrated. Research supports the notion that teachers must first be knowledgeable in their content before being able to integrate core academics (National Research Council, 2011). In agricultural education, this requires teachers knowledgeable in the variety of course offerings they teach. In addition to technical knowledge, research highlights pedagogical competence as a requirement for core academic integration. Teachers use their "pedagogical knowledge to convey that content to the students in an intelligible fashion and in such a way that it creates meaningful learning experiences for students" (Schmidt, 2011, p. 15). Teachers lacking competence in pedagogy will struggle to integrate core academics due to their inability to engage students.

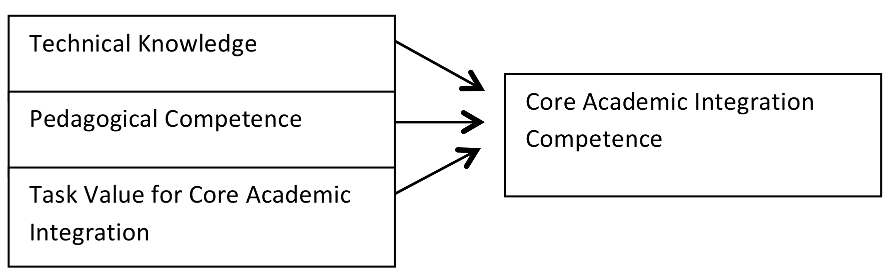

Figure 1. Conceptual model of core academic integration competence.

Purpose and Objectives

The purpose of this research was to gain a deeper understanding of the teacher's role in core academic integration by testing a conceptual model for reading, writing, and math integration in agricultural education. In accomplishing this purpose, our research addressed National Research Agenda priority number five, efficient and effective agricultural education programs (Doerfert, 2011). This priority area identifies effective programs as those meeting the academic needs of learners. Given the overwhelming need for literacy and math skills for success in academics and life, research addressing agriculture teachers' competence in integrating core academic concepts is relevant. The following research objectives were established to guide the development and execution of this study:

1.) Describe the sample of agriculture teachers.
2.) Describe agriculture teachers' task value and perceived competence in reading, writing, and math integration.
3.) Determine the relationship between agriculture teachers' reading integration competence and their task value toward reading integration, pedagogical competence, and technical knowledge.
4.) Determine the relationship between agriculture teachers' writing integration competence and their task value toward writing integration, pedagogical competence, and technical knowledge.
5.) Determine the relationship between agriculture teachers' math integration competence and their task value toward math integration, pedagogical competence, and technical knowledge.

Methods

The population for this study included all school-based agriculture teachers in Oregon (N = 111) during the 2013-2014 school year. Contact information was obtained from the Oregon Agriculture Teacher Directory and was vetted for accuracy by experts in the field of agricultural education in Oregon. The data collected through this study were part of a larger research project.

We attempted a census of all secondary agriculture teachers in the state. Data were collected in December of 2013 using the online survey program Qualtrics. We utilized five points of contact to elicit and gather responses from participants (Dillman, 2007). The first four points of contact were made through e-mail. The final point of contact was a phone-call to individuals who had not yet responded. A total of 80 useable responses were completed, yielding a 72% response rate. We checked for non-response error by comparing participants who responded after the final two points of contact (late respondents; n = 31) to those who responded prior to the final two points of contact (on-time respondents; n = 49) (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). We found late respondents to be statistically similar to on-time respondents for the eight variables of interest: agriculture teachers' task value and perceived competence toward reading integration, writing integration, and math integration as well as pedagogical and technical competence. Therefore, we did not consider non-response error to be significant (Lindner et al., 2001; Miller & Smith, 1983). In this study, we treated non-responders as a sample of the total population of agriculture teachers in Oregon and we generalized our findings to this population.

The survey instrument contained demographic information and eight different constructs measuring agriculture teachers' task value and perceived competence toward the integration of reading, writing, and math as well as pedagogical competence and technical knowledge. The task value and competence constructs of reading, writing, and math integration were developed as part of a larger study. Individual items were developed using the Common Core standards in reading and writing for science and technical subjects (Common Core State Standards Initiative, 2010a) as well as the eight Common Core standards for mathematical practice (Common Core State Standards Initiative, 2010b). Both the reading and writing components of the Common Core included ten standards grouped into four larger themes. We analyzed these larger themes, and one item was developed based on the combination of standards within the different theme. For example, one theme within the writing Common Core is *Research to Build and Present Knowledge*, and the item we created from this theme stated: "Develop students' ability to present knowledge through research projects in agricultural science and technology (AST)." Similarly, the eight standards for mathematical practice were combined into three themes by the researchers. From these three themes, individual instrument items were developed to measure task value and competence for math integration. We then developed an individual item that reflected the purpose of the standards in each of the three themes. For example, the following item was developed from the problem solving theme: "Develop students' ability to correctly solve AST related math problems." A total of 11 individual items were utilized to measure reading (four items), writing (four items), and math (three items) integration for both task value and competence. Teachers' task value and perceived competence for each of the 11 items were measured using a five-point Likert-type scale ranging from 1 "Very Low" to 5 "Very High," with higher scores indicating higher task value or perceived competence.

Items used to measure agriculture teachers' pedagogical competence and technical knowledge were derived from previous literature (Boone & Boone, 2007; Duncan, Ricketts, Peake, & Uesseler, 2006; Garton & Chung, 1996; Layfield & Dobbins, 2002; Mundt & Connors, 1999; Myers, Dyer, & Washburn, 2005; Sorensen, Tarpley, & Warnick, 2010). Pedagogical competence and technical knowledge were measured on a five-point scale, ranging from 1 "Very Low" to 5 "Very High," with higher scores indicating higher perceived pedagogical competence or technical knowledge. The pedagogical competence construct consisted of eleven items pertaining to classroom teaching methods and pedagogy. Sample items included teachers' ability "teaching with experiments," "evaluating student performance," and "managing student behavior." The technical knowledge construct consisted of twelve items relating to agriculture teachers' ability to teach different technical areas of agriculture. Sample items included agriculture teachers' perceived ability "teaching food science" and "teaching about public issues regarding agriculture."

A panel of experts in the field of agricultural education examined the instrument and established content and face validity for the eight different constructs used in this study. The reliabilities for each construct were analyzed using Cronbach's alpha and are reported in Table 1.

Table 1

Reliability Coefficients of Constructs for the Current Study

Construct	*α*
Task Value	
Reading Integration	.91
Writing Integration	.95
Math Integration	.94
Competence	
Reading Integration	.85
Writing Integration	.85
Math Integration	.94
Pedagogy	.82
Technical Knowledge	.77

We analyzed the data using the Statistical Package for the Social Sciences (SPSS) version 20. The first objective was demographic in nature; therefore, we reported the results as frequencies and percentages. Research objective two was descriptive in nature; consequently, we reported the results using means and standard deviations. To accomplish the final three research objectives, three different multiple linear regressions were performed in order to determine predictors of reading, writing, and math integration competence. Reading, writing, and math integration task value, pedagogical competence, and technical knowledge were simultaneously entered into the regression models as independent variables. Standardized betas for each entered variable and an overall R^2 for the model were calculated and reported.

Findings

Demographic information was collected from respondents (n = 80) to accomplish research objective one. The average age of responding teachers was 38 (SD = 11.22) years old, with a range of ages from 23 to 65. Respondents ranged from first year teachers to teachers with 33 years of experience, with an average of 11 years of teaching experience (SD = 9.07). The majority of respondents were male (f = 44; 55.70%). The most common courses respondents indicated teaching were Introduction to Agriculture, Plant Science, Animal Science, and Agricultural Mechanics.

The second objective of this study was to describe agriculture teachers' task value and perceived competence in reading, writing, and math integration (see Table 2). Overall, respondents' task value toward reading, writing, and math integration exceeded their perceived competence. In comparing the task value ascribed to the three core integration constructs, math integration was valued highest (M = 3.87; SD = 0.75). In analyzing perceived competence, responding teachers perceived the highest level of competence in their reading integration (M = 3.34; SD = 0.55). The differences between task value and perceived competence were equal for writing and math integration (Δ = 0.62), and exceeded what was observed within reading integration (Δ = 0.40).

Table 2

Agriculture Teachers' Task Value and Perceived Competence in Content Area Literacy

	Task Value		Perceived Competence	
Variable	*M*	*SD*	*M*	*SD*
Reading Integration	3.74	0.66	3.34	0.55
Writing Integration	3.78	0.55	3.16	0.55
Math Integration	3.87	0.75	3.25	0.79

Note. Task value and perceived competence items scaled from 1 "Very Low" to 5 "Very High."

The third objective was to determine the relationship between agriculture teachers' reading integration competence and their task value toward reading integration, pedagogical competence, and technical knowledge (see Table 3). Using our conceptual model for core academic integration, we ran a multiple linear regression with reading integration competence as the dependent variable and reading integration value, pedagogical competence, and technical knowledge as independent variables. The three independent variables, in combination, comprised a significant model (F = 15.83; p-value < .001) and predicted 39% (R^2 = .39) of the variance in reading integration competence.

Two of the independent variables were significant in their prediction of reading integration competence; pedagogical competence and technical knowledge. Using the standardized coefficients (β) to determine the strength of the relationship between independent and dependent variables, we found pedagogical competence to be the strongest predictor of reading integration competence (β = .37; p-value = .004). Additionally, technical knowledge was identified as a significant predictor of reading integration competence (β = .28; p-value = .030). The task value teachers attributed to reading integration was the only insignificant predictor in the model (β = .08; p-value = .377).

Table 3

Predictive Model of Reading Integration Competence

	Dependent Variable: Reading Integration Competence					
Variable	Zero-order correlation (r)	p-value	B	SEB	β	p-value
Reading Integration Value	.23	.039	.07	.08	.08	.377
Pedagogical Competence	.58	<.001	.46	.15	.37	.004
Technical Knowledge	.56	<.001	.32	.14	.28	.030

Note. R = .63, R^2 = .39, F = 15.83, p-value < .001. Task value and perceived competence items scaled from 1 "Very Low" to 5 "Very High."

The fourth objective was to determine the relationship between agriculture teachers' writing integration competence and their task value toward writing integration, pedagogical competence, and technical knowledge (see Table 4). Our conceptual model for core academic integration was used to design a multiple linear regression model predicting writing integration competence using writing integration value, pedagogical competence, and technical knowledge as predictor variables. The model was significant in predicting writing integration competence (F = 12.79; p-value < .001) and predicted 34% (R^2 = .34) of the variance in teachers' perceived competence toward writing. One of the independent variables, pedagogical competence, was significant in predicting writing integration competence (β = .47; p-value = .001). The two remaining independent variables, writing integration value (β = .07; p-value = .488) and technical knowledge (β = .12; p-value = .356), were not statistically significant in the prediction of writing integration competence.

Table 4
Predictive Model of Writing Integration Competence

	Dependent Variable: Writing Integration Competence					
Variable	Zero-order correlation (r)	p-value	B	SEB	β	p-value
Writing Integration Value	.26	.023	.05	.08	.07	.488
Pedagogical Competence	.57	<.001	.57	.16	.47	.001
Technical Knowledge	.46	<.001	.14	.15	.12	.356

Note. R = .58, R^2 = .34, F = 12.79, p-value < .001. Task value and perceived competence items scaled from 1 "Very Low" to 5 "Very High."

The fifth and final objective was to determine the relationship between agriculture teachers' math integration competence and their task value toward math integration, pedagogical competence, and technical knowledge (see Table 5). The conceptual model for core academic integration was used to design a multiple linear regression model of agriculture teachers' perceived math integration competence. The model was significant (F = 7.22; p – value < .001) and the three independent variables, in combination, explained 22% (R^2 = .22) of the variance in teachers' perceived math integration competence. One of the independent variables, pedagogical competence (β = .30; p-value = .037), was a significant predicator of math integration competence. The remaining independent variables, math integration value (β = .04; p-value = .685) and technical knowledge (β = .20; p-value = .170), were not statistically significant in the prediction of math integration competence.

Table 5
Predictive Model of Math Integration Competence

Variable	Zero-order correlation (r)	p-value	B	SEB	β	p-value
	Dependent Variable: Math Integration Competence					
Math Integration Value	.20	.080	.05	.11	.04	.685
Pedagogical Competence	.48	<.001	.53	.25	.30	.037
Technical Knowledge	.42	<.001	.32	.30	.20	.170

Note. R = .47, R^2 = .22, F = 7.22, p-value < .001. Task value and perceived competence items scaled from 1 "Very Low" to 5 "Very High."

Conclusions, Recommendations, and Implications

Integrating reading, writing, and math within all secondary classrooms has been proposed as a solution for student underperformance in these core subject areas. Research suggests career and technical education, including agricultural education, is an applicable context for integrating these core subjects (Park & Osborne, 2005; Parr et al., 2006; Young et al., 2009). However, integrating core academics requires teachers competent in this endeavor. The purpose of our research was to explore a conceptual model for agriculture teachers' competence toward integrating reading, writing, and math. Using expectancy-value motivational theory (Wigfield & Eccles, 2002), our proposed model included three variables influencing agriculture teachers' competence: technical knowledge, pedagogical competence, and task value.

The first objective of this study was to describe the respondents. The population for this analysis was limited to teachers in one state due to the exploratory nature of our research. We encourage readers to use the information reported for the first objective when considering the transferability of our findings to the population(s) of their interest. Additionally, we recommend future research using the proposed model for core academic integration with larger populations.

The second objective of our study was to describe agriculture teachers' task value and perceived competence in reading, writing, and math integration. Across the three academic areas, agriculture teachers' task value exceeded their perceived competence. Expectancy-value motivational theory suggests an individual must have high expectancy for success (competence) as well as high perceived value in order for them to accomplish a given task (Wigfield & Eccles, 2002). While our research did not measure the amount of competence required to successfully integrate core academics, our comparison of competence and task value suggests resources allocated to increasing core academic integration should focus on teachers' academic integration competence rather than their task value.

The third objective of this study was to operationalize the conceptual model for core academic integration into an analysis of teachers' reading integration competence. Using multiple linear regression, we found our conceptual model to be a significant predictor of reading integration competence. Two of the independent variables, pedagogical competence and technical knowledge, were statistically significant in their prediction of reading integration competence. This indicates teachers with higher competence in their pedagogy and increased technical knowledge in agriculture subjects have a higher competence toward reading integration. We suggest these findings imply reading integration is a higher level teaching skill, requiring teachers competent in their ability to engage students (pedagogical competence) and knowledgeable about the subject(s) they are teaching (technical knowledge). It is unreasonable to suggest an agriculture teacher should be integrating reading in their classroom if they do not fully understand agriculture content and are unable to engage their students. In practice, this suggests teacher educators ensure teachers are competent in the areas of pedagogy and technical knowledge before attending to core academic integration. Failure to do so may overload a struggling teacher and reduce their confidence as a teacher.

The fourth objective was to operationalize our conceptual model in an analysis of teachers' writing integration competence. The conceptual model was found to be a significant predictor of writing integration competence. Only one independent variable, pedagogical competence, was found to be a significant predictor of writing integration competence. We suggest these findings indicate pedagogical competence as a foundational skill and writing integration as a higher order skill in agricultural education. In comparing the findings from objective four to the findings from objective three, we note technical knowledge as being an insignificant predictor of writing integration competence yet a significant predictor of reading integration competence. Potentially, this implies a looser connection between writing and technical knowledge than was observed between reading and technical knowledge. We recommend future research exploring the relationship comparing reading and writing integration and their connection to agriculture teachers' technical knowledge.

The final objective of this study was to apply our conceptual model to an analysis of teachers' math integration competence. Our model again proved to be significant, this time for teachers' math integration. Furthermore, pedagogical competence was again identified as the only significant predictor, this time for math integration competence. These findings support the extension of our position that sound pedagogy is a prerequisite to math integration in agricultural education. Furthermore, these findings may explain why interventions during preservice teaching have been inconsistent in increasing math integration self-efficacy (Stripling & Roberts, 2013a, 2013b); preservice teachers are still developing their pedagogy competence and asking them to integrate mathematics may overload their development process as a teacher.

While the conceptual model was found to be significant in the prediction of teachers' reading, writing, and math integration competence, we noted task value was an insignificant predictor throughout our findings. This supports previous research in core academic integration which has found a disconnect between the value teachers ascribe to core academic integration and their integration of core academics (Hall, 2005; McConachie & Petrosky, 2010; Park & Osborne, 2005). Our research indicates pedagogical competence and technical knowledge as mediating variables between perceived value and competence in reading integration and pedagogical competence as a mediating variable between value and competence for writing and math integration. However, we also acknowledge the potential for additional variables influencing the relationship between value and competence. One variable not included in our analysis but recommended for continuing research exploring teachers' competence in core academic integration is teachers' knowledge of the core academics they are integrating.

Agricultural education holds the potential to positively influence students' understanding of reading, writing, and math (Park & Osborne, 2005; Parr et al., 2006; Young et al., 2009). However, this positive influence can only be realized through agriculture teachers competent in core academic integration. A greater understanding of agriculture teachers' competence in core academic integration will empower teacher educators to increase teachers' ability to integrate these core subjects. We believe our study provides a conceptual model as well as empirical data useful toward understanding core academic integration. However, we also acknowledge the need for continued research exploring influential factors to teachers' core academic integration competence in order to fully understand this phenomenon. Continuing in this effort will enhance teacher development in core academic integration and better position agricultural education as a powerful tool for student learning across academic boundaries.

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A Measure of Students' Motivation to Learn Science through Agricultural STEM Emphasis

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Abstract

There is an increased demand for motivated high school students to enter postsecondary STEM fields. Agriscience education is an innovative curriculum that can motivate students and spark interest in STEM. To recruit students to such programs, we must understand what motivates them. The purpose of this study was to determine how the secondary agriculture students conceptualized their motivation to learn agriscience. A descriptive-correlational research design was utilized with a modified version of the Science Motivation Questionnaire II (SMQ II) used as the survey instrument. Overall, students were found to have moderate levels of motivation in agriscience courses. Grade motivation and self-efficacy were found to be the motivational constructs that meant the most to students. Students were least motivated by self-determination. Getting an A and the chance to receive higher grades in their agriculture science courses were found to be the highest motivators. Researchers found that there were no significant correlations between gender or grade level and motivation to learn science. Females generally had higher motivation within self-determination and grade motivation than males. Additional research is needed in this area to determine what factors may exist that are preventing highly efficacious females from choosing STEM careers.

Introduction

America's ability to maintain competiveness on a global scale within science, technology, engineering and mathematics (STEM) is an issue of utmost importance (Carnevale, Smith, & Melton, 2011), but STEM education achievement still needs improvement (National Research Council, 2012). STEM as a career choice still lags demand in the U. S. and recent increases (2010) trail international increases (U.S. Department of Labor, 2007; Rothwell, 2014). The demand for motivated high school graduates to enter postsecondary STEM fields is at its highest, but student interest and readiness has been declining (ACT, 2006, Carnevale, Smith & Melton, 2011). In addition, motivation to learn science benefits all students by fostering scientific literacy, including learning science knowledge, how to identify important scientific questions, and how to draw evidence-based conclusions (Bryan, Glynn & Kittleson, 2011). The need for general scientific literacy is continually increasing (McLure & McLure, 2000; Miller, 2010). Given the pressing concerns facing STEM education, there should be academic programs and support systems that prepare students to enter these challenging and important programs.

The National Center for Education and Economy (2007), National Academy of Science (2007), and National Research Council (2012) are among many who have acknowledged the need for new and innovative approaches to education, specifically in science education. Research has suggested that this lack of scientific literacy could be due to the science in our schools being too abstract and lacking relevant context for students to apply learned skills (Conroy, Trumbull

& Johnson, 1999; Shelley-Tolbert, Conroy & Dailey, 2000). Project-based learning, which increases conceptual understanding of science and promotes positive attitudes towards learning science (Yasar, 2002), and specifically, contextualized science education (Rivet & Krajcik, 2008), presents a promising innovative approach.

Agricultural education and agriscience should be considered as one of these project-based, contextualized approaches. Courses in agriculture have historically been shown to motivate students (Campbell, 1983). As an integral part of agricultural education, the FFA student leadership organization is an integral component in motivating students to learn a variety of skills at many different levels (Phipps & Osborne, 1988; Gruis, 2006). Agriculture science programs offer opportunities to use agriculture as a context for teaching and learning scientific principles (Israel, Myers, Lamm & Galindo-Gonzalez, 2012). This leaves agricultural science programs with the opportunity to offer and positively motivate students to pursue STEM based education.

The agriscience curriculum has shown to greatly impact students due to the holistic nature of the courses (Bailey, 1998), and agriscience education can be incorporated into the framework for science achievement (Connors & Elliot, 1995; Scales, et. al., 2009). Agriscience is a robust and appealing curriculum that employs both formal and informal learning opportunities for students (Conroy, et. al., 1999; Wooten, Rayfield & Moore, 2013). Agriscience has shown to be beneficial in students' learning of STEM concepts and in helping students to transfer these skills to practical applications (Mabie & Baker, 1996; Chiasson & Burnett, 2001; Myers, Thoron & Thompson, 2009). Students in agriscience programs demonstrated higher achievement than students who were taught by traditional approaches (Enderlin & Osborn, 1992; Ricketts, Duncan & Peake, 2006).

While research has shown the benefits of agriscience in the learning of STEM concepts, there is a lack of research in what factors motivate students to be successful in agriscience courses. By high school, students' motivation to learn science is one of the highest predictors of science course success (Britner & Pajares, 2006). Agriscience draws a diverse population of students (Shelley-Tolbert, et.al., 2000), but there has been little research into the factors of motivation in STEM coursework and entrance into STEM fields. There is, however, a record of gender disparities within STEM attitudes and program completion (Adelman, 2006). Nationally, males, people who spoke a language other than English, and people who had stronger academic preparation were also more likely to engage in a career within the STEM field are more likely to enter STEM fields (Chen and Weko, 2009). Freeman (2004) found that females were less likely to enjoy advanced science courses in high school. Some of the reasons for this may include the curriculum offerings as well as the types of experiences and opportunities students receive (Elliot et. al., 1996; Ellington, 2006; Seymour & Hewitt, 1997).

Existing research reveals that the choices to pursue STEM fields are affected by math and science related interest, self-assessment (Halpern et. al., 2007) and science based courses completed during high school (Ethington & Wolfe, 1988; Maple & Stage, 1991). While this information is important, we must seek to understand the perceived barriers to students choosing a career in the STEM field. To understand this better, research must be done on what motivates students to take science-influenced courses, like those found in the agriscience curriculum.

Furthermore, this study addresses Research Priority Three of the American Association for Agricultural Education (AAAE) National Research Agenda – Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century (Doerfert, 2011).

There are several motivation and motivation-related components that have been linked to learning science: intrinsic motivation, which involves learning science for its own sake (Pintrich, 2004); extrinsic motivation, which is the learning of science as a means to an end, usually for some type of competition or reward (Mazlo,et. al., 2002); personal relevance, the relevance of learning science to an individual's goals; self-determination, the control students felt over their learning of science; and self-efficacy, or students' confidence that they can achieve science. Motivational factors also play an important role in students' learning and transfer of problem solving skills (Bereby-Meyer & Kaplan, 2005).

Theoretical Framework

The theoretical framework for this study starts with Bandura's (1986) social cognitive theory, particularly using motivation and self-efficacy as necessary for ability. Motivation is defined in social cognitive theory as an internal state that arouses, directs and sustains goal-oriented behavior. To be motivated to learn students must participate in activities and courses that are personally meaningful and worthwhile (Glynn and Koballa, 2006). Motivated students achieve academically by engaging in behavior such as asking questions, participating in labs and working in groups (Schunk, et. al., 2008). Bandura also described the concept of self-efficacy, a person's beliefs about their capabilities (Bandura, 1997). Self-efficacy is closely related to ability. If a person has low efficacy or confidence in a task, then their performance in that task is expected to be low, and conversely, higher ability levels would tend to increase their motivation levels and as a result, their level of performance (Bandura, 1997).

Often linked with social cognitive theory is the theory of planned behavior (Azjen, 1985), which is an extension of the theory of reasoned action (Fishbein & Azjen, 1975; Azjen & Fishbein, 1980). Both were designed to exhibit the relationship between informational and motivational influences on behavior (Connor & Armitage, 1998). The theory of reasoned action depicts the psychological process by which attitudes cause behavior (Fishbein, 1963). 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. Taken together, this study examines demographic variables and knowledge as they relate to attitudes, motivation, and self-efficacy for learning science as influences on agriscience students' success in learning STEM concepts.

Purpose/Objectives

The purpose of this study was to determine who secondary agriculture students are and how they conceptualized their motivation to learn agriscience, particularly whether gender correlated with motivational factors. Specific objectives of this study were to:

1. Describe the demographic characteristics of New Mexico students enrolled in agriscience courses.

2. Measure factors that motivated [STATE] students in agriscience courses

3. Identify relationships between student motivation and demographic characteristics.

Methods/Procedures

This non-experimental, descriptive study focused on secondary students enrolled in an agriculture science course in New Mexico. A list of all teachers who were offering an agriscience course was obtained from the New Mexico department of education. Participants were selected based upon the criteria that they were enrolled in at least one agriscience course where they were receiving core science credit. Dillman's method of tailored design (2007) guided data collection. After IRB approval, the researcher contacted all of the 55 teachers identified as teaching an agriscience course and offering science credit to their students. Following an agreement from students to participate, teachers received a packet via mail with the number of surveys for each student enrolled in their agriscience course. These packets also included a postage-paid envelope to return the completed surveys. All surveys sent to teachers were returned. A total of 539 students participated in this study. Collected data was entered and analyzed using SPSS version 19 on measures of central tendency and correlations where appropriate. Magnitudes of the correlations were reported using Davis's convention (1971). Caution should be used when making inferences beyond the census population.

This study used a descriptive-correlational research design (Gall, Gall, and Borg, 2007), "to discover the direction and magnitude of the relationship among variables through the use of correlational statistics" (Gall, Gall, and Borg, 2007, p. 636). Specifically, a point-biserial correlational statistical method, a special case of the pearson product-moment correlation, was utilized (Creswell, 2008), a point-biserial correlational method is used ". . . when one variable is measured as an interval or ratio scale and the other has two different values [a dichotomous scale]" (p. 644) to correlate interval scale data with a dichotomous variable. Additionally, this study is descriptive, as it also employs a methodology that allowed secondary agriscience students to describe factors that motivate them and correlated these findings with student demographic characteristics.

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), following guidelines by DeVellis (2003) and Bradburn et al. (2004), developed the Science Motivation Questionnaire to assess the motivation to learn science. The 25-question instrument included the following five-item scales: *intrinsic motivation, self-determination, self-efficacy, career motivation,* and *grade motivation.* Students respond to each item on a Likert-type rating scale: never (1), rarely (2), sometimes (3), often (4), or always (5). 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 (i.e., median, mode, and frequencies), where Likert-type data that contributes to a composite score (i.e., Likert-scale) is reported using means and standard deviations for variability (Boone & Boone, 2012).

An advantage of this questionnaire is that it does not distinguish among different science subjects, but focuses on a general motivation 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, creating a Biology Motivation Questionnaire, Chemistry Motivation Questionnaire, or Agriscience Motivation Questionnaire, respectively (Taasoobshirazi & Glynn, 2009). It has been emphasized by Glynn and Koballa (2006) that the instrument can easily be used in all of science. For this study, the version used replaced the term "science" with "agriculture science."

In earlier studies (Glynn, Taasoobshirazi, & Brickman, 2007, 2009), the Science Motivation Questionnaire II was found to have good content validity and criterion-related validity. Face and content validity was confirmed for this study through the use of a panel of experts comprised of agriscience teachers and 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 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 agriculture 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 statements were easy to read. The Flesch-Kincaid formula indicates readability at the sixth-grade level. The items were focused on the motivation to learn science in courses rather than a multitude of contexts, such as hobbies. Because of this focus, the scales were not long, and the entire questionnaire could be completed efficiently in about 15 minutes. Reliability of the Science Motivation Questionnaire II resulted in Cronbach's Alpha Coefficient of 0.92 (Glynn, et al., 2011). The reliability of the individual scales assessed by Cronbach's alphas for the modified instrument was: career motivation (0.92), intrinsic motivation (0.89), self-determination (0.88), self-efficacy (0.83), and grade motivation (0.81).

Findings

The first objective of this study was to describe the demographic characteristics of New Mexico students enrolled in agriscience courses. This included information about participants' genders and grade levels. The population was predominantly male, and largely freshman and sophomore students. Table 1 describes these findings.

Table 1
Demographic Characteristics

	F	%
Gender*		
Male	322	62.2
Female	196	37.8
Grade Level**		
9	153	29.6
10	154	29.8
11	125	24.2
12	85	16.4

Note * n = 518, ** n = 517

The second objective of this study sought to determine how the secondary New Mexico agriculture students conceptualized their motivation to learn agriscience. Tables 2 and 3 describe these findings.

Table 2

Conceptual Factors Motivating Students to Learn Agriscience (n = 539)

Components/Statements	*M*	*SD*
Intrinsic Motivation		
Learning agriculture science is interesting	3.96	0.95
I enjoy learning agriculture science	3.92	1.00
The agriculture science I learn is relevant to my life	3.80	0.93
I am curious about discoveries in agriculture science	3.63	1.07
Learning agriculture science makes my life more meaningful	3.39	1.10
Self-Efficacy		
I believe I can earn a grade of "A" in agriculture science courses	4.15	1.02
I am sure I can understand agriculture science	4.07	0.95
I am confident I will do well on agriculture science labs	3.81	1.01
I believe I can master agriculture science knowledge and skills	3.80	1.06
I am confident I will do well on agriculture science tests	3.74	1.01
Self-Determination		
I put enough effort into learning agriculture science	3.93	0.96
I use strategies to learn agriculture science well	3.64	1.04
I spend a lot of time learning agriculture science	3.46	1.10
I study hard to learn agriculture science	3.41	1.14
I prepare well for agriculture science tests and labs	3.38	1.10
Grade Motivation		
It is important that I get an "A" in agriculture science courses	4.16	1.06
Getting a good agriculture science grade is important to me	4.07	1.08
Scoring high on agriculture science tests and labs matters to me	3.99	1.07
I like to do better than other students on agriculture science tests	3.87	1.13
I think about the grade I will get in agriculture science courses	3.82	1.13
Career Motivation		
Learning agriculture science will help me get a good job	3.93	1.11
Knowing agriculture science will give me a career advantage	3.94	1.16
Understanding agriculture science will benefit me in my career	3.76	1.26
My career will involve agriculture science	3.33	1.39
Summated Scores	90.96	25.83

Students were found to have a moderate level of motivation in agricultural science with a summated average of 90.96 out of a possible 120 score. It was found the largest motivators for students were grade motivation, specifically, the importance of getting an A in their agriculture science class (*M* = 4.16), and self-efficacy, believing they could get an A in the course (*M* = 4.15) and that they can understand agricultural science (*M* = 4.07). The least common motivators were career, students' belief that their career would involve agriculture science (*M* = 3.33), self-determination, spending time to prepare for class (M = 3.38), and intrinsic, that learning agriculture science makes their life more meaningful (*M* = 3.39). The highest motivational constructs were found in the areas of grade motivation with an average mean for the five items of 3.98. Following in importance were self-efficacy (*M* = 3.91), intrinsic motivation (*M* = 3.74), career motivation (*M* = 3.73) and self-determination (*M* = 3.56).

Table 3
Measurement of Individual Factors Motivating Student Learning

Statements	*Median*	*Mode*
It is important that I get an "A" in agriculture science courses	5.0	5.0
The agriculture science I learn is relevant to my life	4.0	4.0
Learning agriculture science is interesting	4.0	4.0
I am curious about discoveries in agriculture science	4.0	4.0
I enjoy learning agriculture science	4.0	4.0
I am confident I will do well on agriculture science tests	4.0	4.0
I am confident I will do well on agriculture science labs	4.0	4.0
I believe I can master agriculture science knowledge and skills	4.0	4.0
I believe I can earn a grade of "A" in agriculture science courses	4.0	5.0
I am sure I can understand agriculture science	4.0	4.0
I put enough effort into learning agriculture science	4.0	4.0
I use strategies to learn agriculture science well	4.0	4.0
I like to do better than other students on agriculture science tests	4.0	5.0
Getting a good agriculture science grade is important to me	4.0	5.0
I think about the grade I will get in agriculture science courses	4.0	5.0
Scoring high on agriculture science tests and labs matters to me	4.0	5.0
Learning agriculture science will help me get a good job	4.0	5.0
Knowing agriculture science will give me a career advantage	4.0	5.0
Understanding agriculture science will benefit me in my career	4.0	5.0
I spend a lot of time learning agriculture science	3.0	3.0
I prepare well for agriculture science tests and labs	3.0	3.0
I study hard to learn agriculture science	3.0	3.0
Learning agriculture science makes my life more meaningful	3.0	3.0
My career will involve agriculture science	3.0	5.0

When looked at individually we find that the lowest median scores (3.0) were related to how meaningful agriculture science classes were to students' overall life and how much preparation/studying they had to go through when preparing for class. The highest median score (5.0) was found within students' motivation to get the highest grade in their agriculture science courses.

Table 4 displays the differences among the five motivational constructs' mean scores.

Table 4
Motivational Construct Means

Construct	*M*	*SD*
Grade Motivation	3.98	1.09
Self-Efficacy	3.91	1.01
Career Motivation	3.74	1.23
Intrinsic Motivation	3.74	1.01
Self-Determination	3.56	1.07

Grade motivation and self-efficacy were the highest motivational factors for student success in agriscience courses, consistent with the individual item scores. This is also consistent with previous research into science motivation which found that self-efficacy was a strong prediction of science motivation and performance (Britner & Pajares, 2006). Self-determination was the lowest motivator for students to succeed in agriscience courses.

The third objective was to identify relationships between student motivation and demographic characteristics. Means scores between each of the motivational constructs and participants' gender is presented in Table 5, while mean and summated mean scores by grade level are presented in Table 6.

Table 5
Comparing Motivation Factors by Gender

Component Scale	Measure	Male (n = 322)	Female (n = 196)
Intrinsic Motivation	*M*	3.69	3.84
	SD	1.06	0.92
Self-Efficacy	*M*	3.89	3.95
	SD	1.07	0.90
Self-Determination	*M*	3.53	3.84
	SD	1.15	0.99
Grade Motivation	*M*	3.86	4.19
	SD	1.15	0.96
Career Motivation	*M*	3.70	3.79
	SD	1.24	1.22

Table 6
Comparing Motivational Factors by Grade Level

Component Scale	Measure	9^{th} a	10^{th} b	11^{th} c	12^{th} d
Intrinsic Motivation	*M*	3.60	3.73	3.86	3.86
	SD	1.08	1.05	0.95	0.88
	Summated Total	17.99	18.63	19.30	19.32
Self-Efficacy	*M*	3.71	3.91	4.06	4.09
	SD	1.08	1.03	0.94	0.89
	Summated Total	18.55	19.55	20.28	20.47
Self-Determination	*M*	3.41	3.55	3.70	3.69
	SD	1.09	1.03	1.05	0.99
	Summated Total	17.06	17.73	18.31	18.47
Grade Motivation	*M*	3.85	3.95	4.11	4.09
	SD	1.21	1.12	0.98	0.99
	Summated Total	19.27	19.73	20.51	20.43
Career Motivation	*M*	3.64	3.72	3.75	3.94
	SD	1.26	1.12	0.98	1.07
	Summated Total	14.54	14.89	14.98	15.77

Note: a ($n = 153$); b ($n = 154$); c ($n = 125$); d ($n = 85$); e - Intrinsic motivation, self-efficacy, self-determination and grade motivation summated scores could range from 5-25. Career motivation scores could range from 4-20.

Motivation to learn agricultural science was found to go up as students advanced in grade level. There was found to be little differences between junior and seniors motivation to learn agricultural science. Summated scores increased with each grade level except for grade motivation, which dropped by 0.08 points between the 11^{th} and 12^{th} grade. Variance was found to go down between scores as students grade level advanced from 9^{th}-12^{th} grade. Construct mean scores for self-efficacy and grade motivation for males was (M = 3.89; 3.86) respectively with female mean scores being (M = 3.95; 4.19). All of the motivational statements were found to have weak correlations with gender and grade level. Thus, there was not found to be any significant correlations between students' gender or grade level and their specific motivational factors in agriscience courses (Table 7).

Table 7
Correlations Between Gender and Grade Level

Motivational Statement	Gender r_s	Grade Level r_s
The agriculture science I learn is relevant to my life	.10	.11
Learning agriculture science is interesting	-.01	.13
Learning agriculture science makes my life more meaningful	.11	.12
I am curious about discoveries in agriculture science	.10	.09
I enjoy learning agriculture science	.07	.061
I am confident I will do well on agriculture science tests	-.04	.16
I am confident I will do well on agriculture science labs and projects	-.01	.16
I believe I can master agriculture science knowledge and skills	-.01	.14
I believe I can earn a grade of "A" in agriculture science courses	.12	.10
I am sure I can understand agriculture science	.08	.16
I put enough effort into learning agriculture science	.08	.09
I use strategies to learn agriculture science well	.01	.12
I spend a lot of time learning agriculture science	.04	.14
I prepare well for agriculture science tests and labs	.01	.12
I study hard to learn agriculture science	.10	.06
I like to do better than other students on agriculture science tests	.09	.10
Getting a good agriculture science grade is important to me	.20	.06
It is important that I get an "A" in agriculture science courses	.19	.12
I think about the grade I will get in agriculture science courses	.13	.09
Scoring high on agriculture science tests and labs matters to me	.14	.08
Learning agriculture science will help me get a good job	.08	.08
Knowing agriculture science will give me a career advantage	.07	.11
Understanding agriculture science will benefit me in my career	.02	.05
My career will involve agriculture science	-.01	.06

The researchers next sought to determine any perceived relationships between each motivational statement and the participant's gender or grade level. The point-biserial coefficient correlation revealed that the top two ranking motivational statements correlations for gender were: Getting a good agriculture science grade is important to me ($r_s = .200$); and It is important that I get an "A" in agriculture science courses ($r_s = .192$), with the bottom two ranking motivational statements correlations for gender being: I am confident I will do well on agriculture science labs and projects ($r_s = -.002$); and I believe I can master agriculture science knowledge and skills ($r_s = -.005$); which was tied with the statement: I prepare well for agriculture science tests and labs ($r_s = .005$). Regarding the top two ranking motivational statements correlations for grade level: I am confident I will do well on agriculture science labs and projects ($r_s = .162$); and I am confident I will do well on agriculture science tests ($r_s = .159$), with the bottom two ranking motivational statements correlations for grade level being:

Understanding agriculture science will benefit me in my career ($r_s = .052$), and I study hard to learn agriculture science ($r_s = .056$).

Conclusions

The purpose of this study was to determine who secondary agriculture students are and how they conceptualized their motivation to learn agriscience, particularly whether gender correlated with motivational factors, given traditional gender imbalance in STEM programs. Almost two-thirds of the population of the study were male. This finding supports the findings concerning gender disparity regarding STEM (Science, Technology, Engineering, and Mathematics) as posited by Adelman (2006). Participants existed across all grade levels, with a majority representing the freshman and sophomore class.

When analyzing the conceptual factors that motivate students to learn agriscience, the highest motivational construct existed in grade motivation, with the largest student motivator reflecting the importance of getting an "A" in their agricultural science class. This finding supports the research of Mazlo, et. al. (2002), who identified those extrinsic motivations such as learning science as a "means to an end" (i.e., competition, rewards, good grades, etc.) can serve as a motivator to learn science. It is important to note that there was only a .07 difference between grade motivation and the next highest motivational construct, self-efficacy, corroborating with previous research into science motivation, which found that self-efficacy, student's perceived capability to achieve specific results, was a strong prediction of science motivation and performance (Britner, 2008; Kupermintz, 2002; Lodewyk & Winne, 2005).

However, differences existed between males and females in their motivation to learn agricultural science. Both the constructs regarding grade motivation and self-determination had the highest difference in mean score between genders. However, these two constructs also had the highest mean scores for both genders. Construct mean scores for self-efficacy and grade motivation for males was (M = 3.89; 3.86) respectively with female mean scores being (M = 3.95; 4.19). The increased mean of self-efficacy in females over males corroborates with research on other physical and life science courses (Britner, 2008; Britner and Pajares, 2006).

Recommendations for Research

This study did not uncover a statistically significant correlation between motivational statements and student gender, but did show gender differences in motivational constructs, specifically grade motivation and self-efficacy. The higher self-efficacy of females in their motivation to learn agricultural "science" should be an indicator of future success in STEM related fields, more specifically, science. However, male STEM graduates still outnumber female STEM graduates, despite a higher number of women overall enrolling in undergraduate study in the United States (Adelman, 2006). Additional research is needed in this area to determine what factors may exist that are preventing highly efficacious females from choosing STEM careers. Moreover, what additional courses and activities have the potential to provide personal meaning and relevance to further motivate females to enter these career areas?

The high scores for external motivation factors, particularly motivation to earn good grade, should also be further examined. Grades are not necessarily indicative of long-term learning, nor ability to generalize and transfer knowledge and skills. Intrinsic motivation is also more strongly linked to long-term persistence than extrinsic motivators.

As a census study, generalization is limited, and caution should be taken when applying the findings beyond this population. Further studies replicating this research should be conducted in other states as well as nationally to further support the conclusions from this body of work. Additionally, the inclusion of additional measures of self-efficacy and motivation should be employed to reinforce those findings.

Recommendations for Practice

Democracy demands a scientifically-literate public (Feinstein, 2011; Miller, 2010), and economic competitive demands a STEM-prepared workforce (Carnevale et al., 2011). Agricultural science can provide a contextualized, problem-based curriculum for students. With self-efficacy being highly correlated with academic success, it stands to reason that teachers must find new and innovative ways to support the increase of self-efficacy in their students, and take advantage of the research that has indicated that agriculture courses have been found to provide that motivation in students (Campbell, 1983). Agricultural educators should design their curricula and supporting curricular activities around experiences that provide meaningful sustained learning and motivational opportunities. Teachers should focus on exercises and labs that require real-world application of science skills in the agriculture classroom.

Further, all STEM teacher educators can motivate and enhance student learning through contextualized agricultural science education. Agricultural and science teacher educators in university preparatory programs can support emphasis of these connections by themselves connecting what have recently been separated certification and preparation processes. Development of agriscience standards at the state and national level can support these connections. In schools, shared planning and even shared teaching when possible between agricultural and STEM teachers can lead to lessons that mutually reinforce each other, providing context to the STEM content and providing STEM skills to the agricultural courses (Chiasson & Burnett, 2001).

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The Infusion of Inquiry-based Learning into School-based Agricultural Education: A Review of Literature

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Abstract

Demands for increases in student achievement have led education professionals to incorporate various and rigorous teaching strategies into classrooms across the United States. Within school-based agricultural education (SBAE), agriculture teachers have responded to these challenges quite well. SBAE incorporates a wide variety of teaching and learning strategies, theories, and ideas into its conceptual framework. One such teaching and learning strategy is referred to as inquiry-based learning, commonly known in SBAE as problem-based learning. This method emphasizes cognitive development, critical thinking, and intellectual growth in students. The purpose of this study was to develop an understanding of the emergence and current utilization of inquiry-based learning in SBAE. The researchers found that inquiry-based learning has been a long-standing staple in SBAE, particularly in terms of increasing the achievement of agricultural students. As a result, a model of the use of inquiry-based learning in SBAE programs was developed. Recommendations, discussion, and implications for research and classroom practice were included in this study.

Introduction

In recent years, calls for increases in student achievement have paved the way for innovative and challenging teaching and learning methods within all classrooms, including those within career and technical education (CTE) (Pearson et al., 2010; Stone, Alfeld, & Pearson, 2008). Innovative methods are desired to help address student deficiencies in critical thought, cognitive abilities, and real-world skill development (Stone et al., 2008; Stone, Alfeld, Pearson, Lewis, & Jensen, 2006). Further, these teaching methods should emphasize pragmatism and high-quality learning through hands-on applications that reinforce academic content, all the while grasping toward students' natural inclinations and abilities to learn useful content (Phipps, Osborne, Dyer, & Ball, 2008; Stone et al., 2008).

In order to help further enhance students' interests in various content areas, many educators have incorporated the use of inquiry-based learning into their curricula. As supported by educational philosopher John Dewey (1910, as cited in Thoron & Myers, 2011), inquiry-based learning aids in students' processes of discovery about selected topics, particularly those of interest to individual students. As a result, higher-order thinking skills (HOTS) and more cognitively-rooted ideas are more apt to occur (Thoron & Myers, 2011). Interestingly, inquiry-based learning and teaching has historically occupied a very prominent role in agricultural education classrooms across the United States in the form of problem-based learning (PBL) (Parr

& Edwards, 2004). As found by Parr and Edwards (2004), PBL and inquiry-based learning are congruent in their structure, methodology, and implementation. As described by Phipps et al. (2008),

> "Problem-based learning… is a teaching strategy that includes problem solving, inquiry learning, project-based teaching, and case studies. These four approaches use problems as the focal point for student investigation and learning." (p. 237).

It is apparent that inquiry-based learning has existed as a fundamental fixture of agricultural education, and it appears that this will remain the case for years to come. However, since the work of Parr and Edwards (2004) comparing the congruency between inquiry- and problem-based learning and teaching styles, much advancement has been made regarding the use of inquiry-based learning in SBAE. As a result, there exists the need to further address this new knowledge and develop additional dialogue concerning the forthcoming place of inquiry-based learning within agricultural education curricula. Perhaps a literature review of this area of inquiry will shed greater light on the subject.

Review of Literature

Edwards (2004) described the need for SBAE programs to move beyond curricula that emphasize simple rote memorization and toward challenging and advanced concepts that require knowledge in academic subjects. More specifically, Edwards (2004) concluded that SBAE programs are in a prime position in which to incorporate teaching and learning strategies that emphasize the development of the individuals as a whole, particularly in the areas of critical thinking and applied learning. As Phipps et al. (2008) noted, SBAE curricula offer a wide variety of learning experiences that suit a broad spectrum of student interest and learning styles. Further, such research has indicated that SBAE programs are capable of accomplishing a wide variety of tasks essential to the development of agricultural students as a whole, such as: 1) enhanced understanding of academic content when applied and understood in agriculture-based contexts (Parr, Edwards, & Leising, 2006, 2008, 2009; Young, Edwards, & Leising, 2009); 2) increased leadership education capacities through involvement in FFA activities (Phipps et al., 2008); and 3) increases in the variety of potential career area choices (Phipps et al., 2008). As each of these elements is essential to the growth and sustainability of SBAE programs as an educational entity, it is reasonable to postulate that high-quality teaching methods (such as inquiry-based learning) may play a role in these increased pursuits.

As described by Parr and Edwards (2004) and Phipps et al. (2008), problem-based learning (i.e., inquiry-based learning) is designed to expand students' cognitive capacities through exposure to ill-structured agricultural issues that require complex thought. Further, these agricultural issues often require students to develop action plans that demand articulated and flexible responses. Numerous examples of these concepts abound in SBAE, particularly in laboratory settings. For example, students participating in agricultural mechanics activities are exposed to a wide range of problems that require pragmatic, structured, and logical thought to adequately solve (Parr et al., 2008; Wells & Parr, 2011). Many of these issues require utilizing applied academic and technical knowledge to adequately address and solve. As a result, higher levels of cognition are needed to analyze such practices appropriately (Parr et al., 2009).

In order to facilitate such increased cognition, agriculture teachers can select and structure classroom- and laboratory-based problems around technical issues that may exist in the real world (Parr, 2004; Parr et al., 2006), such as the framing of a barn for the school farm, etc. However, of vital necessity is the deep engagement of the students in the process, such as the use of questioning to draw answers (and even additional questions out of students) and the use of in-class research to solve a practical problem. As such, students become more thoroughly engaged in the complete process of research and solving technical issues via inquiry-based learning. This serves as an interesting and thought-provoking example of the use of inquiry-based learning in classroom and laboratory settings. However, a question remains: How can such strategies best be incorporated into out-of-classroom experiences?

As originally conceived by Stimson (1919), supervised agricultural experiences (SAE) serve as student-led projects that are to be conducted outside of typical class time and classroom/laboratory settings (Phipps et al., 2008). As traditionally directed, students select SAE projects based upon individual interests that appeal to them, such as future career choices, interests in agricultural topics, enterprises conducted at home, etc. The SAE decision-making process is guided by the agriculture teacher, who helps students identify such areas and develop a plan for implementation. Additionally, the agriculture teacher supervises the student through his/her progression within the SAE, allowing for experienced oversight that guides the process appropriately (Phipps et al., 2008).

SAE projects allow for a multitude of teaching and learning interests to be explored, particularly in the pursuit of high-quality SBAE program development (Phipps et al., 2008; Wells & Retallick, 2013). As described by Wells and Retallick (2013), SAE emphasizes much in terms of developing students for and through academically-rigorous work through the use of a practical, hands-on context. This was particularly true for mathematics and science content integration. As SAEs are naturally rooted within classroom- and laboratory-based content areas (Ramsey & Edwards, 2012), this area exhibits much potential for academic content education and emphasis (Wells & Retallick, 2013), and are designed to be based upon student interests (Phipps et al., 2008), it stands to reason that perhaps inquiry-based instruction is paramount to the long-term durability of SAEs. Further, as SBAE seeks to incorporate academic content, such as reading, science, and mathematics curricula, alongside teaching methods that emphasize higher levels of cognition within students, the entire model of SBAE should be crafted to fit into the necessary mold of rigor and relevance (Edwards, 2004; Parr & Edwards, 2004; Parr et al., 2006, 2008, 2009; Phipps et al., 2008; Young, 2006; Young et al., 2009).

Conceptual Framework

The framework of the current study was rooted in the National Research Agenda (NRA) of the American Association for Agricultural Education (AAAE) (Doerfert, 2011). In particular, this study was aligned with both Priority 4 and Priority 5 of the document. Priority 4, "Meaningful, Engaged Learning in All Environments" described how,

> "[m]eaningful learning occurs when learners go beyond rote memorization of facts to the ability to interpret the interconnectedness of facts or material, regulate their

understanding, transfer the understanding of concepts to new situations, and think creatively" (Doerfert, 2011, p. 21).

As described by the researchers of the present study, Priority 4 emphasized the basic tenets and purposes of inquiry-based learning in SBAE. Further, as "[t]he role of the teacher… is to move from being the sole source of knowledge to becoming a facilitator of a… engaged learning process (p. 21)

Moving to Priority 5 of the NRA, "Efficient and Effective Agricultural Education Programs", this notion has underscored the need for advancing agricultural education into a model that emphasizes pragmatic, high-quality, and academically-rigorous curricula. As inquiry-based learning is designed to create relevant and problem-based learning environments (Parr & Edwards, 2004; Thoron & Myers, 2011), the creation and sustainment of high-quality SBAE through this teaching and learning theory is well-supported.

Purpose of this Study & Objectives

The purpose of this study was to describe the historical use of inquiry-based learning in the field of SBAE. This purpose was supported by the following objectives:

1) Describe the role that inquiry-based learning has historically played in SBAE.

2) Describe the incorporation of inquiry-based learning into the three-circle model of SBAE.

Methods & Procedures

To accomplish the purpose of this study, the researchers conducted a review of various studies pertinent to agricultural education, inquiry-based learning theory, and student achievement, particularly literature that focused upon the use of inquiry-based learning strategies. The reviewed literature was gathered from Internet resources and search engines, agricultural education magazines and textbooks, peer-reviewed journal articles, doctoral dissertations, and conference proceedings. Each article was determined by the researchers to be significant to the research body of inquiry-based learning in SBAE. In total, 45 ($N = 45$) resources were identified and used as a part of this study.

Findings

A forever changing society with a constantly expanding knowledge base requires frequent evaluation about what is considered effective teaching and learning. By definition, agriculture is an applied science that combines principles of physical, chemical and biological sciences in the production of food, and fiber (Merriam-Webster, 1988). Agricultural education in the United States has a long history of integration with science, mathematics and other academic content (Dailey, Conroy, & Shelley-Tolbert, 2001). Similarly, a history of legislation has stressed the importance of students being able to meet ever increasing achievement standards. However it is not just historical or legislative expectations that see the melding of science, math and agriculture but the history of inquiry-based learning in agriculture that lends itself to success in science and math. This success is even more critical as CTE funding is partially based on standardized assessment as required in the "Core Indicators of Performance for Career and Technical Education Students at the Secondary Level" (Washburn & Myers, 2010).

Inquiry-based instruction is a method that encourages the curiosity of students while developing critical thinking skills. Subject matter, such as science and math, are given meaning, and made less abstract, by using a natural process of learning (Warner & Myers, 2011). Students are taught in a manner that nurtures the desire in them to seek information even after class is done for the day (Newcomb & Trefz, 1987). This progression of developing questions, exploring problems, observing and applying new information lends itself perfectly to the scientific method. Agriculture teachers have the unique ability to develop science and math skills through teaching agriculture in a way that goes beyond the memorization of facts (Warner & Myers, 2011) lending itself to a higher-order of learning.

Research has found that scientific reasoning ability is higher in classrooms that use inquiry-based learning (Chiasson & Burnett, 2001; Gerber, Cavallo, & Marek, 2001; Von Secker & Lissitz, 1999) and that students fail to develop a deep understanding of science and mathematics in traditional classrooms (Bailey & Meritt, 1997). Inquiry-based instruction has been promoted as a best practice for educating students in and about scientific principles (National Research Council, 1988). Agriculture teachers believe melding science in the agriculture curriculum aids students in connecting agriculture and scientific principles as well as increasing program enrollment and stakeholder support of the program (Washburn & Myers, 2010).

Students' perceptions of agricultural courses have shown to be positive when instructed through inquiry-based instruction. In a study conducted by Thoron and Burleson (2014), 170 secondary agriscience students perceived their agriscience course with much enthusiasm when taught through inquiry-based instruction. Even though a quarter of the students found inquiry-based learning confusing, almost half of the students within the study preferred the inquiry-taught instruction and would welcome inquiry-based instruction within other classes (Thoron & Burleson, 2014). In a quasi-experimental study conducted by Thoron & Myers (2011), inquiry-based instruction was measured against the subject matter approach on student content knowledge achievement in 15 agriscience education classes in 7 different secondary schools throughout the United States. The students were divided into two groups; one utilized inquiry-based instruction and the second group utilized the subject matter approach. A pretest and posttest were administered to both groups. Research concluded that the inquiry-based learning group had a higher content knowledge achievement than the subject matter approach group.

In regard to the incorporation of inquiry-based learning in each of the three components of the comprehensive and complete SBAE program (i.e., classroom-/laboratory-based instruction, SAE, and FFA participation) (National FFA Organization, 2014; Phipps et al., 2008), it appeared that the vast majority of the literature dealt strictly with the explicit instruction element. This finding was troubling, as researchers (Wells & Parr, 2011; Wells & Retallick, 2013) have reported that both the FFA and SAE components have exhibited much potential for alignment with academic content standards. Based upon the previous literature that emphasized academic enhancement through inquiry-based methods (Thoron & Burleson, 2014; Thoron & Myers, 2011), it would seem that these areas could, due to their embedded academic curricula, hold significant potential for the incorporation of inquiry-based instructional strategies. Interestingly, Rogers (1969, as cited in Roberts, 2006) noted that inquiry-based learning can be used heavily in the experiential learning portion of SAE. As SAE emphasizes the application of classroom and laboratory content into real-world settings (Roberts, 2006), numerous potential exists for further incorporation of inquiry-based learning to solve practical problems. Perhaps such work is currently occurring in agricultural classrooms, particularly in preparation for Career Development Event (CDE) and SAE selection activities.

Such results indicate that inquiry-based instruction positively influences student achievement in the context of SBAE. As Edwards (2004) indicated, further establishing the relevance of SBAE is vital to the long-term survival of such programs in schools. Parr et al. (2006) declared that academic enhancement (such as the use of scientific, inquiry-based learning) and contextualized learning must be established and maintained. Further, as secondary students perceive such advancements in a positive light (Conroy & Walker, 2000; Thoron & Burleson, 2014), such transitions to academically-rigorous coursework can be eased.

Based upon these findings, the researchers developed the following model that described the incorporation of inquiry-based learning into the comprehensive SBAE program. The model depicted is based upon the three-circle model as presented by the National FFA Organization (2014). To describe this model, the literature has indicated a need for increased academic achievement and increased program relevance (Edwards, 2004; Parr et al., 2006, 2008, 2009; Stone et al., 2008). To accomplish this purpose, academically-rooted inquiry-based learning strategies have been utilized within SBAE programs; as a result, student achievement improved (Thoron & Myers, 2011). Each component is vital to the comprehensive SBAE program and thus could accommodate inquiry-based teaching (Roberts, 2006; Rogers, 1969). Moving further into the model, positive student and teacher perceptions and performances when utilizing academically-enhanced, inquiry-based curricula are vital to the sustainability of such an approach; both populations seemed to indicate positive reception with the use of such an approach (Conroy & Walker, 2000; Thoron & Burleson, 2014; Ulmer et al., 2013). As a result, it would stand to reason that the continued use of inquiry-based instruction would only result if such a strategy and its aligned efforts are effective.

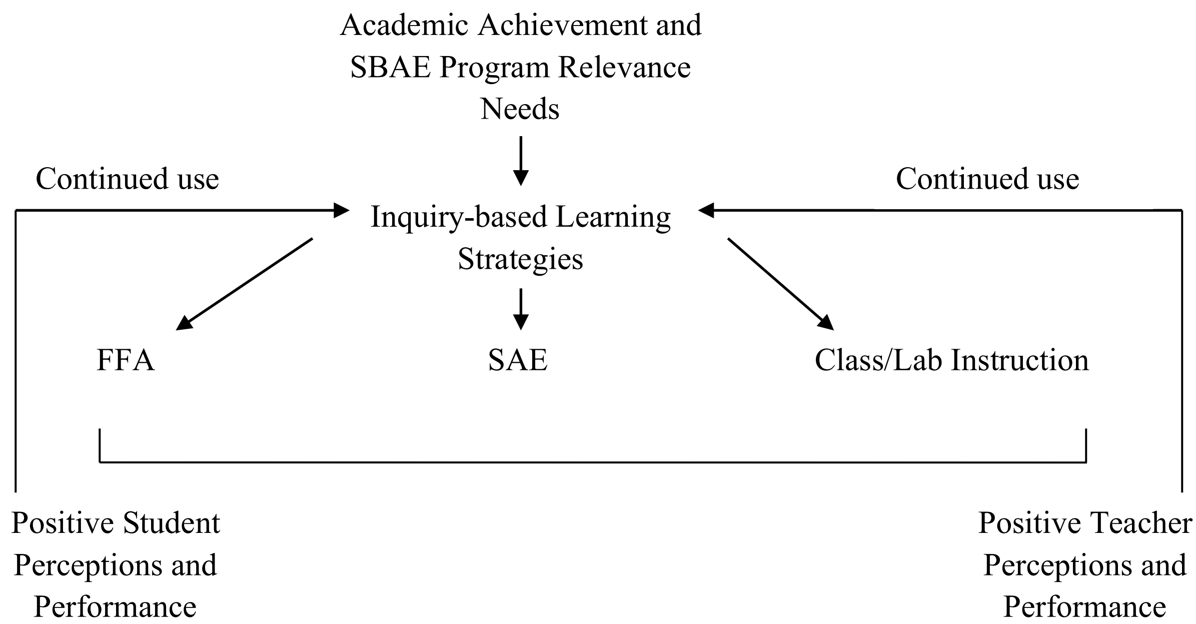

Figure 1. Inquiry-based learning in the comprehensive SBAE program.

Conclusions

For agriculture teachers, one of the discipline's primary goals is to foster student interest in agricultural content. Inquiry-based learning is a primary pedagogical method that poses questions, problems, or scenarios to students and incorporates problem-based learning to help foster that interest in learning and higher level thinking (Parr & Edwards, 2004; Phipps et al., 2008). As teacher accountability in school settings is increasingly important and emphasized with the passage of new legislation, it is vital that students are meeting increased achievement standards (Edwards, 2004). The research body presented here has illustrated that inquiry-based instruction in SBAE classrooms not only encourages the curiosity of students, but also helps them to develop the higher-order critical thinking skills that students need to master the new skills and problems that they will face with in the 21st century (Phipps et al., 2008) Such rigorous instruction should be prevalent and demanded across all areas of CTE (Stone et al., 2008).

With the integration of science and math skills through teaching agriculture, inquiry-based instruction has been determined to be one of the best practices for educating students in scientific principles, while connecting them to agriculture (Bailey & Meritt, 1997; Gerber et al., 2001; National Research Council, 1988; Von Secker & Lissitz, 1999; Washburn & Myers, 2010). The literature reviewed in this study revealed an interesting pedagogical correlation between the concept of inquiry-based learning and increased student achievement (Thoron & Burleson, 2014; Thoron & Meyers, 2011).

Regarding the AAAE's National Research Agenda, this study provided an interesting look into how agriculture teachers are working to address Priority 4 and Priority 5 (Doerfert, 2011). Further, as inquiry-based learning emphasizes higher-order thinking (Phipps et al., 2008; Thoron & Myers, 2011), more engaged learning can occur within agricultural coursework. This engagement could occur through increasing the rigor as well as relevance of SBAE, a need well-documented (Edwards, 2004). The use of this instructional strategy also addressed Priority 5's description of the need for more "Efficient and Effective Agricultural Education Programs" (Doerfert, 2011). Based upon previous research (Thoron & Burleson, Thoron & Myers, 2011; Ulmer et al., 2013), inquiry-based learning has helped to positively influence student achievement and perceptions of the utility of the modern SBAE program. As a result, the use of this valuable teaching method appears to pay dividends toward the rigor, relevance, and utility of SBAE.

Discussion & Implications

In an ever changing society and workplace, students need to build upon the skills that they are learning in today's classroom and master the new sills that they are going to be faced with in the 21st century (Doerfert, 2011; Stone et al., 2008). Students in today's society must receive the best education possible in order to meet the increasing achievement standards set forth by legislation. The success of the use of inquiry-based learning in SBAE programs ultimately rests upon the agricultural teachers who teach and effectively incorporate this type of instruction into their curriculum. Many researches although doubt that all teachers have the ability to do so properly though (Boone, 1990; Moore & Moore, 1984; Osborne, 1999; Warmbrod, 1969). As the profession of SBAE looks forward, we need to make sure that agriculture education programs get attention to ensure consistently high-quality programs.

In order for inquiry-based learning in SBAE programs to be effective, things such as continual teacher retraining, comprehensive, rigorous and relevant curriculum, and professional development must occur (Virginia Department of Education, 2013). In addition, Priority Four of the AAAE National Research Agenda calls for additional research and practice to achieve the goal of having all learners in *all* agricultural education learning environments actively and emotionally engaged in learning that results in high levels of achievement. More specifically, the focus for such learning should be upon deepened understanding of the effective teaching and learning process, the development of meaningful, engaged learning experiences, the increased use of problem-solving, and the transfer of learning and higher order thinking skills (Doerfert, 2011).

It should be noted that as SBAE programs are increasingly focused upon the increase of student achievement, there exist some significant ramifications for agriculture teachers. As it stands, significant gains must be made for current students to become better prepared for the workforce of the 21st century (Stone et al., 2008). This is particularly true for students entering into the agricultural sciences. As university-level agricultural science programs advance toward the teaching of scientific research and inquiry to its undergraduate populace, its future clientele (current SBAE students) must be prepared to assimilate into this model of education (Doerfert, 2011). As a result, agriculture teachers must be prepared to implement scientifically- and inquiry-based learning strategies within their classrooms. As Thoron and Myers (2011) found, student comprehension of scientific content is increased through inquiry-based learning.

Additional ramifications include new curriculum types to help address inquiry-based learning and student achievement needs. Recently, the National Council for Agricultural

Education developed the Curriculum for Agricultural Science Education (CASE) (CASE, 2013). The objective of this program was to provide agriculture teachers with a method of enhancing the rigor and relevance of SBAE content. Additionally, consistent professional development is paramount to the long-term sustainability of this educational resource and method, as expressed by CASE (2013). In regard to teacher efficacy, Ulmer et al. (2013) found that agriculture teachers who underwent CASE curriculum training "experienced gains during the institute on both their personal science teaching efficacy and their science teaching outcome efficacy" (p. 121). It was interesting to note that "after nine months… the CASE Institute had a lasting impact on the participants' personal efficacy, but not their outcome expectancy beliefs." (Ulmer et al., 2013, p. 121). Perhaps this is relative to concerns regarding students' abilities to grasp the tenets of inquiry-based learning. Anecdotal evidence suggests that many secondary students lack independence to guide their own learning (B. Cox, personal communication, April 18, 2014). This could spell trouble for agriculture teachers who intend to implement practices such as CASE into their classrooms.

In regard to inquiry-based learning through CASE, it was interesting to note that Ulmer et al. (2013) illustrated that many CASE Institute attendees were present due to administrator requests. Perhaps this is indicative of administrators' perceptions of the value of agricultural education as a context for improving student achievement (Ulmer et al., 2013). As Paulsen and Martin (2013) indicated, administrator perceptions can hold ramifications for SBAE programs, particularly in terms of the value and activities of programs. As student achievement increases (such as the gains that can be made through inquiry-based learning) are paramount for the profession of agricultural education (Edwards, 2004), closely involving school administrators in the process of planning agricultural curricula and activities may create in administrators a greater regard for the work of the agriculture teacher. Further, decisions such as funding, program growth, and student selection often remain in the hands of administrators; thus, it is vital that administrators understand the work of a high-quality SBAE program and its teacher(s) (Paulsen & Martin, 2013). Such positive perceptions can help to advance the work and ultimate goals of SBAE.

Recommendations & Possibilities for Future Research and Practice

The current study illustrated previous instances of the use of inquiry-based learning in SBAE programs. However, additional possibilities remain. As demonstrated by Thoron and Myers (2011), inquiry-based learning holds much promise for increasing students' retention of content knowledge while increasing their overall academic achievement. Such work can highlight the potential value of SBAE for overall student development. However, little empirical evidence has been added to the agricultural education literature base since the prior study. Additional research should follow suit and work to establish a more solid body of knowledge regarding inquiry-based learning in SBAE. New literature should also emphasize methods that specialized teaching strategies (such as inquiry-based learning) can utilize to increase students' retention of both academic and technical content knowledge, as described by Doerfert (2011). Such methods could hold much promise for furthering the utility and value of SBAE in modern school settings (Parr et al., 2006).

The researchers recognize that inquiry-based learning can be integrated into SBAE in multiple ways and content areas, such as agricultural mechanics, horticulture, animal science, biotechnology, and more. As a result, perhaps additional research should be conducted to analyze current agriculture teachers' use of inquiry-based learning within their curricula, such as the content analysis of lesson plans. Washburn and Myers (2010) found that agriculture teachers believed that science integration and inquiry-based teaching were important to SBAE as an entity; however, this population also indicated limited use of inquiry-based learning within classrooms. Perhaps this is tied to selected barriers regarding science integration, as described by past researchers (Myers & Washburn, 2007; Thompson, 1998; Washburn & Myers, 2010). These barriers included "insufficient planning time, lack of requisite materials, and insufficient funding" (Washburn & Myers, 2010, p. 89). Further research should look to address this potential correlation between such factors and the adoption of inquiry-based learning in SBAE.

The lack of literature regarding the use of inquiry-based learning in the FFA and SAE components of SBAE programs is alarming to the researchers. While other researchers (Roberts, 2006; Rogers, 1969) have emphasized how the experiential model of learning with SBAE is ripe for the use of problem-based learning and inquiry-based learning, the quest for literature pertaining to the process's use within the SAE and FFA elements was quite fruitless. However, this does not mean that the process is not occurring with SBAE programs across the nation. On the contrary, perhaps there exists a dearth of productive research in these areas. Perhaps studies should be launched to address perceptual, adoption, and incorporation of inquiry-based learning in *all* aspects of comprehensive SBAE programs.

Regarding the practice of integrating inquiry-based learning, agriculture teachers should continuously look for methods to integrate this historic practice into their coursework (Parr & Edwards, 2004; Phipps et al., 2008; Washburn & Myers, 2010). As this practice is more commonly known as problem-based learning within the SBAE community (Parr & Edwards, 2004), many teachers currently utilize this method effectively (Phipps et al., 2008). Interestingly, as science curricula are often taught through an inquiry-based approach, and as science is inherently tied within agricultural coursework, many agriculture teachers report that pressure to practice science integration has come from a top-down approach (e.g., state mandates, administrator requests, etc.) (Washburn & Myers, 2010). Perhaps teachers feel more inclined to teach through inquiry-based learning only when science integration pressures are a factor. Agriculture teacher in-service meetings may serve as a valuable medium for opening the dialogue concerning these issues.

As developing and instilling the practice of effective teaching is achieved at the pre-service level (Phipps et al., 2008), teacher education coursework should include instruction in inquiry-based learning (Washburn & Myers, 2010). Further, this coursework should emphasize the use of such instruction in all facets of the SBAE model (i.e., classroom/laboratory instruction, SAE, and FFA). Phipps et al. (2008) and Thoron and Myers (2011) described how this method of teaching can positively influence students' classroom performance, while Wells and Retallick (2013) found that significant potential for academic instruction exists within the realm of SAE. As SAE serves as the natural outlet of classroom/laboratory-based teaching and learning (Ramsey & Edwards, 2012), inquiry-based instruction may hold significant possibilities for increasing student understanding of real-world phenomena that may result in higher overall program experience quality. Wells, Perry, Anderson, Shultz, and Paulsen (2013) found that experiences at the secondary level can influence post-secondary educational pursuits. Thus, agriculture teachers should heed these calls to improve professional practice, as the eventual fate of the discipline (e.g., the recruitment and retention of future teachers) depends upon it.

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The Long-term Impact of Professional Development on Teachers Using a Math-enhanced Curriculum in Agricultural Power and Technology: A 10-Year Retrospect

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Abstract

Professional development (PD) on approaches to curriculum integration (CI) continues to be essential for agriculture teachers to stay abreast of developments to improve student performance in their courses while also supporting student learning and achievement in core subjects. This, however, necessitates ongoing evaluation of the long-term impact of such interventions. The phenomenological study reported on here aimed to explore and derive meaning from the shared lived experiences of six agricultural education teachers who participated in the Math-in-CTE Study conducted in Oklahoma from 2003 to 2005. Seven interpretive themes emerged from the teachers' experiences. Even though a period of 10 years had elapsed since participating in the PD, participants reported still using aspects of the 7-element pedagogical approach learned and teaching all or portions of the math-enhanced lessons they developed. Participants also perceived their use of the lessons and pedagogical approach improved students' understanding and application of math concepts in real-world contexts. The need existed to continue to provide agriculture teachers with PD on CI but challenges to maximizing its impact were evident at the school level. Teachers of core subjects are needed to serve as long-term collaborators and school leaders should strive to support communities of practice focused on CI.

Introduction

Professional development (PD) is critical in ensuring teachers stay abreast of current developments in their subjects, enhance their competency, and increase the likelihood of effective instruction (Blank, Alas, & Smith, 2008; Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001). Yoon, Duncan, Lee, Scarloss, and Shapley (2007) argued that PD equips teachers with improved pedagogical skills, which leads to better teaching and ultimately enhances student academic achievement. Further, PD also provides opportunities for networking, collaboration, feedback, and fosters teamwork among teachers (Harwell, 2003; Quick, Holtzman, Chaney, 2009).

Teacher PD often takes place in a number of ways and may include inservice trainings or workshops (Desimone et al., 2002). Hunzicker (2010) posited "[e]ffective professional development engages teachers in learning opportunities that are supportive, job-embedded, instructionally-focused, collaborative, and ongoing" (p. 2). For PD to be effective, however, it is important to extend it over long periods of time, to make it coherent, content-focused, and learner-centered, to encourage collective participation, and to actively engage the teachers (Garet et al., 2001; Quick et al., 2009). Efficacious PD, therefore, is not a one-time phenomenon but rather should be a continual and even *organic* process (Harwell, 2003; Tate, 2009) that involves ongoing assessment to evaluate long-term impacts (Lewis & Pearson, 2007).

Many education scholars have advocated for CI (Barefield, 2005; Bean, 1995, 1996; Etim, 2005; Pearson et al., 2010; Stone III, Alfred, & Pearson, 2008). John Dewey urged educators to integrate "needs of [the] learner[s], demands of society . . . and the subject content" (as cited in Etim, 2005, p. 4) during curriculum development. CI is based on the need for learners to solve challenges they encounter in real-life situations while, at the same time, identifying the relationships between different subjects (Bean, 1996; Vars, 1991, 2001). Good posited that CI "cuts across subject matter lines to focus upon comprehensive life problems or broad areas of study that bring together the various segments of the curriculum into meaningful association" (as cited in Shoemaker, 1989, p. 5). Shoemaker (1989) asserted that Good's approach to CI was interdisciplinary by which teaching and learning occurred holistically around common themes or concepts. Bean (1995) concluded that "[c]urriculum integration, in theory and practice, transcends subject-area and disciplinary identifications" (p. 618). Unfortunately, because of the segmented nature of teacher preparation and some teachers perceiving the need to *protect their subjects,* many experience challenges with CI (Barefield, 2005). CI necessitates teamwork and collaboration with other teachers, which not all educators are eager to embrace (Barefield, 2005).

The essence of CI is for teachers and students to develop multiple perspectives or lenses through which they seek to find solutions to real-world problems using the knowledge and concepts learned in school (Bean, 1995, 1996; Jacobs, 1989). To that end, the Association for Career and Technical Education [ACTE] (2006) in its report, *Reinventing the American High School for the 21st Century*, recommended teachers work together across all subjects in the delivery of academic concepts to ensure learners are made aware of the applicability of the content learned to the real-world. Therefore, rather than students and teachers looking at each subject as a separate entity to solve a problem, CI promotes the transfer of learning from one subject to another to find solutions to challenges encountered in everyday life (Jacobs, 1989; Lake, 1994; Pearson et al., 2010). Further, CI stands to motivate learners, create positive attitudes toward learning, and leads to increased academic achievement (Barefield, 2005; Kain, 1993).

Further, ACTE (2006) urged for the integration of mathematics "into science and career/ technical classrooms" (p. 7) to ensure student success both in "academic and career/technical studies" (p. 7). But to increase students' motivation to understand math concepts, teachers need to develop math content around themes that interest the learners (Choike, 2000), which implies the salient need for PD to support achieving that end. ACTE (2006) also reported:

> [T]he National Research Center for Career and Technical Education discovered that when combining professional development with a pedagogic framework to identify and teach the mathematics that is inherent in CTE curricula, students who received enhanced instruction scored significantly higher on standardized math tests than students who received their regular curriculum. (p. 14)

This phenomenological study aimed to assess teachers' views of the long-term impact of PD on their efforts at CI, i.e., using an integrated curriculum and complementary pedagogical approach to teach agricultural power and technology [APT] (Parr, Edwards, & Leising, 2006, 2008, 2009; Young, Edwards, & Leising, 2008, 2009) to improve students' math performance. This work was part of a larger investigation and intervention conducted from 2003 to 2005, the *Math-in-CTE Study* (Lewis & Pearson, 2007; Pearson et al., 2010; Stone III et al., 2008). Of the 16 experimental group, agricultural education teachers who participated in the earlier study, five were still teaching and one had recently retired at the end of 2013-2014 school year. The six teachers served as the study's population approximately 10 years after their having received intensive PD (15 days during two years) on how to integrate curriculum involving APT and math. During the intervention, the teachers created 17 math-enhanced lessons for teaching APT.

Purpose of the Study

This study's purpose was to explore, and derive meaning from, the shared lived experiences of agricultural education teachers who participated in the Math-in-CTE study conducted in the state of Oklahoma from 2003 to 2005. The study also sought to determine the extent to which teachers were still using the 7-element pedagogical approach to CI they learned and practiced as participants in the Math-in-CTE study, including their collaboration with math teachers. This inquiry aligns with priority five of the *National Research Agenda for Agricultural Education* (Doerfert, 2011), i.e., "[e]fficient and effective agricultural education programs" (p.10), and its bullet two: "[d]emonstrate the effective integration of STEM (science, technology, engineering and math) into agricultural education programs" (p. 10). Two main questions guided the inquiry: (a) What had been the teachers' experiences with regard to the integration of a math-enhanced curriculum in their teaching of APT? (b) Had the relationships established between the agricultural education teachers and their collaborating math teachers been sustained long-term? Many other questions were also asked as teachers shared their experiences during the interviews.

Emergent Theoretical Lens

To ensure transparency and validity in a phenomenological study, Lester (1999) urged researchers "to work through from the findings to the theories" (p. 2). Further, Guba (1981) asserted that "[a]dherents of the *naturalistic paradigm* [emphasis added] prefer to have the theory emerge from the data themselves" (p. 78). In this study, two theories i.e., human capital theory [HCT] (Becker, 1993, 1994; Mincer, 1981; Schultz, 1972) and the theory of planned behavior [TPB] (Ajzen 1987, 1991; Ajzen & Madden, 1986) emerged from the data on the participants' experiences with regard to using a math-enhanced curriculum in APT. HCT posits that when individuals and societies invest in their human resources, e.g., through education and on-the-job training, such investments yield economic returns to both (Sweetland, 1996; Zula & Chermack, 2007). Further, if society is to keep pace with the current trends in a globalized economy, it needs to ensure its human resources stay abreast of the latest developments in technologies and professional practices (Gao, 2008; Margolis, Plug, Simonnet, & Vilhuber, 2004; Mincer, 1989; Woodhall, 1987).

The TPB posits that a person's intent to execute a given behavior is influenced by three attributes, i.e., attitudes, subjective norms, and perceived control of the behavior in question (Ajzen 1987, 1991; Ajzen & Madden, 1986). The attitude an individual has toward implementing a given behavior will determine if he or she puts it to use (Ajzen 1987, 1991; Ajzen & Madden, 1986). The social pressures and expectations, i.e., the subjective norms, experienced by individuals from society and peers to execute given behaviors also affects their enactment. And the way individuals perceive to be in control of said behaviors, which may be dependent on their previous experiences and anticipated challenges, also plays an important role (Ajzen 1987, 1991; Ajzen & Madden, 1986). The researchers integrated these theories to ground the study and derive meaning about the participants' lived experiences regarding the phenomenon.

Methodology

A phenomenological approach was used in this qualitative inquiry (Creswell, 2013; Husserl, 1989; Moustakas, 1994) with the aim of finding a "common meaning for several individuals of their lived experiences of a concept or phenomenon" (Creswell, 2013, p. 76) and to distill its *essence* (Merriam, 2009; Moustakas, 1994). Phenomenology is a flexible approach to inquiry (Carl, 2001; Lowder, 2009), which accords researchers the opportunity to examine in detail any themes or ideas that may emerge during the course of participants' interviews. Researchers' "prior beliefs about a phenomenon of interest are temporarily put aside, or bracketed, so as not to interfere with seeing or intuiting the elements or structure of the phenomenon" (Merriam, 1998, p. 16). Bracketing also helps to mitigate any pre-existing biases that may impact the quality or outcomes of the research (Tufford & Newman, 2012). A phenomenology study involves both description and interpretation of the findings to acquire a "deeper understanding of the nature or meaning of our everyday experiences" (Van Manen, 1990, p. 9) or of the individuals' *related experiences.* Callison (2001), however, asserted that any two individuals are unlikely to have exactly the same experiences, but their experiences may be related and, therefore, reinforce a comprehensive understanding of the overarching phenomenon.

The researchers submitted an application for research on human subjects to Oklahoma State University's Institutional Review Board [IRB] (Creswell, 2012) which approved the study. Thereafter, the lead researcher sent electronic recruitment messages to six teachers who participated in the Math-in-CTE Study for APT and its PD from 2003 to 2005, requesting them to participate in the research reported on here. They were selected purposefully (Groenewald, 2004; Patton, 1990). According to Polkinghorne (1989) and Creswell (2013), interviewing five to 25 individuals who have experienced a phenomenon is appropriate to explore their shared lived experiences. All six teachers agreed to participate, i.e., one female and five male agriculture teachers from high schools in Oklahoma. The face-to-face interviews were conducted over two days of the teachers' annual state professional conference during August of 2014.

A semi-structured interview protocol was used by the lead researcher, including two main guiding questions, but most of the questions emerged during the course of the interviews (Groenewald, 2004; Lincoln & Guba, 1985; Yin, 2011). The interviews were audio recorded (Lincoln & Guba, 1985). The length of interviews varied from 45 minutes to one hour until no new information surfaced, i.e., *data saturation* was reached (Groenewald, 2004). During the interviews, the lead researcher memoed key points and themes that arose (Groenewald, 2004, 2008; Lincoln & Guba, 1985). Memoing includes "field notes recording what the researcher hears, sees, experiences and thinks in the course of collecting and reflecting on the process" (Groenewald, 2004, p. 13). Lincoln and Guba (1985) posited that field notes "can be flagged for important items to which the interviewer wishes to return" (p. 272).

The interviews were transcribed verbatim (Yin, 2011). During transcription, the participants' identifying information was removed and replaced with pseudo names to protect their identities. The participants were sent transcribed copies of the interviews via electronic mail to verify their responses and to make clarifications as needed, i.e., *member checking* (Groenewald, 2004;

Lincoln & Guba, 1985). Member checking helps verify the authenticity of the transcription and ensures trustworthiness/credibility of the data (Harper & Cole, 2012; Lincoln & Guba, 1985; Moustakas, 1994). Having received no response from the participants to the first message, a follow-up message was sent. Two participants replied confirming that the transcription was correct. Thereafter, the lead researcher made follow-up telephone calls to the remaining four participants to verify if they had received their messages with the transcribed interviews. He spoke with two participants who confirmed receiving the transcriptions and agreed that what had been transcribed was correct. The other two participants did not provide any feedback.

During data analysis, equal weight was placed on all statements made by the participants, i.e., *horizonalization* of the data was done (Merriam, 2009; Moustakas, 1994), before reducing it to significant statements. The significant statements were highlighted and data were organized and categorized into codes using the qualitative software program ATLAS/ti. "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2009, p. 3). The codes were aggregated into themes based on the lead researcher's judgments (Moustakas, 1994; Ryan & Bernard, 2003). Focus was placed on two categories of codes, i.e., *WHAT* the participants experienced and *HOW* they experienced the phenomenon (Creswell, 2013). The themes that emerged from the different codes were analyzed to develop the *essence of the phenomenon*. An *essence* is described as a "common or universal condition or quality without which a thing would not be what it is" (Husserl, 1989, p. 43).

Ensuring Quality and Ethics in the Study

In qualitative research, the researcher is the instrument (Guba, 1981; Lincoln & Guba, 1985; Merriam, 1998). It is prudent, therefore, that the researcher maintains high ethical standards throughout the research process to ensure the participants' rights are respected and protected (Lincoln, 1995; Lincoln & Guba, 1985; Orb, Eisenhauer, & Wynaden, 2000; Tracy, 2010; Yin, 2011). The researchers followed the eight procedural guidelines espoused by Tracy (2010) to ensure quality in the study: "(a) worthy topic, (b) rich rigor, (c) sincerity, (d) credibility, (e) resonance, (f) significant contribution, (g) ethics, and (h) meaningful coherence" (p. 839).
The lead researcher bracketed his perceived knowledge or opinions (Merriam, 1998; Moran, 2000; Tufford & Newman, 2012) about the study to analyze the data objectively without any preconceived bias. To ensure credibility and trust, member checking of the participants' interview transcriptions was done to verify accuracy of the information and make changes if needed (Guba, 1981; Harper & Cole, 2012; Lincoln & Guba, 1985; Moustakas, 1994). In addition, triangulation of the data was addressed by comparing the findings with related studies (Lewis & Pearson, 2007; Parr et al., 2006, 2008, 2009; Young et al., 2008, 2009). Rich rigor was obtained through careful collection and analysis of the data (Tracy, 2010). Tracy (2010) posited that "sincerity as an end goal can be achieved through self-reflexivity, vulnerability, honesty, transparency, and data auditing" (p. 841). The lead researcher kept a journal where he recorded his introspections during the study (Guba, 1981; Tracy, 2010). Further, the other researcher acknowledges having been part of the study in which the teachers received PD. To avoid his potential biases impacting the study's credibility, he did not participate in the collection and analysis of data. Although findings from a phenomenological study are not generalizable, they may be transferable to others who experienced a similar phenomenon (Lincoln & Guba, 1985).

"*Transferability* is achieved when readers feel as though the story of the research overlaps with their own situation and they intuitively transfer the research to their own action" (Tracy, 2010, p. 845). By describing a study's participants, readers are given a better understanding of who provided the data and, therefore, a basis on which make judgments about how similar they are to individuals to whom readers may wish to relate the findings (De Lay & Swan, 2014).

Description of the Study's Participants

Six agriculture teachers took part in the study, including five males and one female. Their ages ranged from 37 to 59 years, and years of professional service varied from 13 to 33 years.
Participant #1 (Jason): A male teacher, age 59, with almost 33 years of teaching experience; he holds a bachelor's degree and a master's degree in agricultural education.
Participant #2 (Mark): A male teacher, age 50, with 25 years of teaching experience; he holds a bachelor's degree in agriculture and a master's degree in educational administration.
Participant #3 (Ann): A female teacher, age 37, with 16 years of teaching experience; she holds a bachelor's degree in agricultural education and a master's degree in educational administration.
Participant #4 (Frank): A male teacher, age 49, with 26 years of teaching experience; he holds a bachelor's degree in agricultural education.
Participant #5 (Peter): A male teacher, age 47, with almost 25 years of teaching experience; he holds a bachelor's degree in agricultural education and a master's degree in education (option in educational leadership).
Participant #6 (Brian): A male teacher, age 38, with 13 years of teaching experience; he holds a bachelor's degree in animal science and a master's degree in education.

Findings

The data were organized by various codes; the codes were later sorted into seven interpretive themes with sub themes (Moustakas, 1994). Lester (1999) and Moran (2000) asserted that a phenomenology is more about description than explanation. Lester (1999) added that "[t]he findings can be reported robustly, and my usual preference is to include direct quotes - both 'soundbites' and more extensive quotes - from participants to illustrate points" (p. 3).

Theme #1: Trainers of teachers

Sharing knowledge with other teachers: All participants interviewed indicated they had shared the benefits of CI with their teacher peers. "I have shared information [on CI] with my fellow agriculture teachers that teach in surrounding towns and through our agriculture teachers groups" (Ann). Ann added: "we have a professional development every Wednesday and I have shared with my local school teachers and in fact [we] developed some lessons." Mark said that he had shared the knowledge he acquired about CI with about 20 to 25 teachers. Jason explained that together with his math teacher partner, they had provided PD on CI to nearly 190 teachers through various workshops.

> I was asked to share at the national agriculture teachers' workshop in St. Louis, Missouri and I have shared it in Minneapolis-St. Paul, where we did a workshop for teachers . . . and [at] a high school in Florida. My math teacher and I went to those places to share our experiences [on CI] and how that works.

Because Brian was paired with math teachers who had no background in CTE, he used that opportunity to explain some of the concepts of CI. Frank maintained that, although he had had the opportunity to share his knowledge about CI with about 15 to 20 teachers, he was not sure how many used it. “Some of them have actually implemented what we shared with them. Others have showed no interest” (Frank). Peter said he had trained about 90 teachers through various workshops: “[W]e have had three of them and we had approximately 30 [teachers] in each one.”

Mentorship of aspiring teachers: All participants acknowledged having mentored aspiring teachers, i.e., student teachers, in various aspects of CI by using the lessons they developed during the Math-in-CTE PD and its benefits. Jason stated that many of the aspiring teachers were actually surprised by how much math they had to teach in agriculture. Jason stated that “when I first used curriculum integration, the question I received was, why are we doing math? And they [, i.e., the student teachers,] later realized that we did more [math] than they thought.” Further,

> [s]ome of them would say, I don’t want to do too much work, and I would say, well this is the kind of work we did for you. It just makes it easier for you to use and they go okay.

Mark noted that training student teachers in CI had equipped them with new ideas and concepts to incorporate in their classrooms, especially because some lessons were already made. Ann had encouraged most of her student teachers to “think outside the box” in regard to CI and she had mentored what she called “three-day teachers,” i.e., preservice students who came for three days of early field-based teaching experience. Peter said that “definitely I have shared the lessons we developed with my student teachers.” Frank and Brian also confirmed they had shown their student teachers various ways of integrating math in their teaching.

Theme #2: Teamwork and collaboration with other educators

All participants indicated that because of the PD they forged strong relationships with their math teacher partners. (During the Math-in-CTE study, agriculture teachers were paired with math teachers for the purposes of a) interrogating the APT curriculum for math content that could be enhanced, (b) developing math-enhanced APT lessons that used the 7-element approach, (c) critiquing the math content of the lessons, and (d) math teachers serving as school-based math resources for the agriculture teachers.) According to Brian, the cooperating math teacher had helped recruit students for his program. “I have helped convey some of my lessons in her class and she has been able to earmark some kids that would be excellent agriculture students for me” (Brian). Frank asserted that he had an excellent relationship with his math teacher until he left his school a year after the PD: “[F]or him to see that we are kind of teaching the same thing, teaching it in a more practical way than he was teaching it, really kind of opened his eyes.”

Ann explained that she still had a vibrant working relationship with her math teacher: “We still try to tie agriculture to her [math] classes and math to mine so that students link and learn concepts better.” Jason indicated that because of the teamwork and collaboration with his math teacher, she realized how much higher math he was already teaching in agriculture:

> I remember during one of the lesson plans we did, we were talking about differences in slopes, rise over run, talked about roof angles . . . [and] my math teachers understood how numbers worked but they didn’t know how to apply the numbers in real life . . . . I had to explain to them . . . they learned and we learned; it was a good situation . . . .

Theme #3: Increased respect for agriculture teachers from academic teacher peers and students

Because of their collaboration, many of the academic teachers came to appreciate how much work agriculture teachers do, including teaching content that cuts across several subjects. This findings supports a related study by Lewis and Pearson (2007) who reported that "[w]orking together to develop the lessons had given both the CTE and math teachers increased respect for what their colleagues were teaching" (p. 40). Ann stated that working with other teachers had helped them build rapport and enabled "the regular teachers to get away from the idea that the agriculture teachers never teach . . . [and] other teachers realize that we really do teach stuff and it is usable stuff." "I think it [, i.e., the PD,] helped the math teacher I was working with to understand our program better, helped bridge the gap and [with] administration as well" (Peter). In addition, Frank reported: "It helped a great deal for him [, i.e., the math teacher,] to understand what we are doing in agriculture. Too many of the regular teachers think that we are not teaching anything."

Some participants also reported *aha moments* among students when teaching certain concepts they had ostensibly learned in other courses but may be not have understood well until the agriculture teacher taught similar math content using real-world examples derived from agriculture. Jason indicated: "I see aha moments and the kid goes oh, now I understand what you are saying. So that's what the science teacher was trying to tell me. That has helped a lot." According to Brian, because of CI, students realize that math is one of his strong areas: "[T]hey realize that math is probably one of my stronger suits . . . when you look at what I teach and how I teach it in relation to the core concept . . . ."

Theme #4: Increased student motivation and academic achievement

The participants perceived that because of teaching their curriculum in an integrated way most of the students were more motivated and eager to learn, which they suspected meant higher academic achievement by those pupils. The students experience the same concepts in their core courses and in agriculture and they say "we saw that in math yesterday" (Ann). "That was on the plant test, I never knew what they were talking about. Now, I know how to work the problem and I know I got it right [on the science test]" (Jason). "I think students understand concepts better when it is taught in both classrooms in two different ways" (Frank). And Mark stated:

> I have had them in class; they are passing their tests, their biology and their math. And for the others if they don't have me, their chances of passing are minimal. This is because . . . the more repetition that they have, whether its genetics or Pythagorean Theorem, or math as a whole, the more that they do it, the more proficient they are going to become.

According to Jason, integration of math in his agriculture course has helped reinforce some of the concepts students learned in their math courses, thus students are able to transfer concepts from one subject to solve a problem in another. On one occasion, for example, Jason was teaching about land judging, the students were supposed to calculate the slope, and the math teacher visited the class:

> [S]he kept saying rise over run. The kids looked at her and asked rise over run? Can we use it here? She said yes . . . . [The math teacher] had already taught the concept but it

> had not been reinforced in real-life and the kids couldn't realize that they could use it in agriculture.

The use of real-world examples and more practical terms when teaching math concepts in agriculture helped students stay focused and motivated (Barefield, 2005; Choike, 2000; Kain, 1993). "I think that one of the biggest problems is when you start using math terms, it shuts the kids off" (Brian). Peter asserted that CI had helped to reduce test anxiety among students as they prepared for the American College Testing [ACT] examination. "The ease of knowing real-life situations . . . [in which] you can put math to use has helped them . . . with math on [the] ACT test" (Peter). Ann added:

> I think definitely it is less stress on them . . . and may be this teacher is teaching it differently than the other teacher. Students learn differently although it's the same thing being taught . . . they learn concepts in core classes that we can put to hands-on [, i.e., practical use,] and they catch on to those concepts faster.

Theme #5: Use of the 7-element pedagogical approach

All participants interviewed agreed they were still using some of the 7-element pedagogical approach to CI (Lewis & Pearson, 2007; Young et al., 2008, 2009), as developed during the Math-in-CTE-sponsored PD 10 years before. Two participants acknowledged using all of the seven elements that were developed as the teaching approach. "I try to use them with the majority of my lessons; agriculture mechanics is the easiest class to use the seven elements with mathematics" (Ann). "I have integrated those lesson plans [using the 7-element pedagogical approach] into my regular classroom all the time. Every time I get new kids, they go through that" (Mark). However, the other participants explained they used only two to five of the 7-elements depending on the content they were teaching. Brian indicated that he uses about one-half of the 7-element pedagogical approach developed. "I am just using pieces and parts as needed. I would say I am using 50%." Frank said he taught two to three aspects of the lessons developed each year depending on the content. His favorite lessons were "calculating perimeter to build a fence, [and the lesson on] cost of harvesting wheat."

Theme #6: Challenges encountered with CI and teacher collaboration

The participants elaborated on a number of challenges encountered with other teachers and students regarding their use of an integrated curriculum approach.

Unreceptive teachers: The participants indicated that some of their peers were not receptive to using CI. They wanted to maintain the *independence* of their subjects and thought the idea of integration diminished their curriculum's integrity and uniqueness (Barefield, 2005). Further, they asserted that CI needed more class time to implement. Lewis and Pearson (2007) reported *lack of enough time* as one of the factors limiting the ability of teachers to use the 7-element pedagogical approach to curriculum integration. Jason explained that some math teachers never appreciate the work of agriculture teachers claiming that agriculture teachers do not do as much work as math teachers. Further, Frank argued that some teachers are more concerned with the content they need to teach in a given semester than taking on an extra load. Teachers "are worried about teaching what is on the test." "[A] couple of them are not interested" (Jason).

Further, Mark opined that some math teachers insist on using math terms which are hard for some students to comprehend. In support, Brian stated:

> [Y]ou know math teachers want to use math terms and math terms only . . . you know terminology is the biggest barrier. I think that one of the biggest problems is when you start using math terms, it shuts the kids off.

High turnover among math teachers: Another challenge many participants experienced was the high turnover among their math teachers. Some explained that most of the math teachers they were paired with during the PD workshops left the profession or joined other schools, and the new teachers hired as replacements did not stay for long. Frank stated that in the last 10 years he had worked with about seven different math teachers, and also noted not every teacher was interested in CI. The math teacher with who he worked during the PD left his school a year later.

Negative attitudes of students toward mathematics: Three of the six participants indicated some students have a very negative attitude toward math and mentioning any term related to math shut them down (Bates, Latham, & Kim, 2011; Pearson et al., 2010). Ann stated: "Generally speaking, kids have a negative attitude towards math . . . [and ask] why are we doing it here [in agriculture] again?" Frank maintained that, although most of the "students understand high level math; they do not understand the practical uses of math." Peter indicated he always had challenges with students regarding math depending on their math ability.

Theme #7: Solutions suggested for the challenges encountered

The participants suggested a need to provide regular PD workshops for teachers; a recommendation also proposed by Harwell, 2003; Hunzicker, 2010; Tate, 2009; and Yoon et al., 2007. The participants recommended teachers other than math instructors also be trained to use CI, especially teachers of other core subjects. This they hoped would help create awareness among teachers about the benefits of using integrated curriculum, improve teamwork and collaboration among teachers of different subjects, and lead to improving students' academic achievement. In support, Jason shared: "I think if every [agriculture] teacher would have the opportunity to sit down with a math teacher, science, and English teachers . . . we can work together to show how much they do to support me in getting these kids educated."

According to Peter, because a lot of time had passed since the PD workshops, it would be appropriate to do it again with different teachers:

> I think it would be beneficial to do it all again, we got a lot out of it, I think with updates in technology 10 years down the line, it could be beneficial to try it again . . . we would do it with different teachers this time, may be a science one like we did with math.

Mark proposed that all aspiring agriculture teachers should have PD on approaches to CI because it would be very beneficial for them:

> I think this is something they need to do with the young teachers . . . go through a boot camp and show them how to utilize these math theories in their classroom[s] because every teacher would benefit from this who is teaching agriculture mechanics and agriculture as a whole.

To motivate students, Frank recommended that students learning math concepts through a math-enhanced curriculum in APT should receive math credit. He perceived this would help reduce the negative perceptions some students express when math concepts are taught in agriculture courses and motivate them to learn, knowing they would receive a credit. Further, Jason acknowledged the overlap between math and agriculture was more than he had thought: “The overlap in math was more than I ever dreamt of. [For example,] doing angles and measuring of distances, making sure something is square by measuring.”

Emergent Essence of the Phenomenon

The PD of teachers is important because it stands to yield positive and tangible results to schools, to teachers, and, most important, to students (Garet et al., 2001; Harwell, 2003; Quick et al., 2009; Yoon et al., 2007). As farmers fertilize and cultivate their fields to expand yields, PD enables teachers to stay abreast of developments in their subjects and equips them with better pedagogical skills and tools (Blank et al., 2008; Desimone et al., 2002; Garet et al., 2001), which increases the likelihood of improving student learning, i.e., their *yields.* Such was this study’s *essence* regarding the PD of agriculture teachers and its long-lasting impact on their use of CI.

Conclusions

The participants described positive experiences with and resulting from the PD experiences on using a math-enhanced curriculum to teach APT. All had continued to use some of the lessons that were developed during their training and aspects of the 7-element pedagogical approach. In a one-year follow-up study conducted after the 2005-2006 school year, Lewis and Pearson (2007) found that 73% of the experimental group teachers, including teachers of agriculture, were using “the method and materials from the study” (p. ix). Some of the relationships developed with their math teacher partners had continued and others ended because the math teachers retired, transferred to other schools, or left the profession. The use of CI enabled the participants to develop a spirit of teamwork and collaboration with math teachers and in some cases with instructors of other academic subjects (Barefield, 2005; Harwell, 2003; Quick, Holtzman, & Chaney, 2009). The interactions enabled their teacher peers, especially math teachers, to gain a better understanding of and appreciation for the work done by agriculture teachers. Most of the participants had provided PD on CI to teachers of agriculture, to teachers of other subjects, and to student teachers. Further, it was expressed that the participants’ math teacher partners gained a better understanding of how various math concepts can be applied to real-life situations in agriculture. They lamented, however, that math teacher turnover created a challenge to their attempts at CI and because some teachers resisted collaboration.

Most of the teachers perceived the use of a math-enhanced curriculum to teach APT improved their students’ understanding and application of math concepts in real-world contexts (Barefield, 2005; Bean, 1995, 1996; Etim, 2005; Jacobs, 1989; Vars, 1991), and through agriculture in particular (Parr et al., 2006, 2008, 2009; Young et al., 2008, 2009). They expressed that the CI approach learned through their PD experiences improved students’ motivation for learning and ultimately their math achievement (Barefield, 2005; Kain, 1993; Yoon et al., 2007). However, they did not have direct knowledge of students’ performance in their respective math courses.

Implications and Recommendations

Based on the participants' shared experiences, a need exists to continue to provide agriculture teachers with PD (Harwell, 2003; Hunzicker, 2010; Tate, 2009; Yoon et al., 2007), especially in regard to using integrated curricula to teach agriculture. Teachers other than instructors of math should be included to help them understand the benefits of CI that uses agriculture as a context, e.g., science teachers (Pearson, Young, & Richardson, 2013). Follow-up with the beneficiaries of such PD should be made regularly to mitigate the challenges teachers may experience in timely and ongoing ways. Addressing challenges early could help to counter some of the unintended and undesirable consequences of CI which may arise in the process of implementation and attempts to collaborate with other teachers (Bean, 1995; Loepp, 1999; Vars, 1991, 2001).

More effort is needed to mitigate the high attrition rates among teachers, if return-on-investments [ROIs] (Mincer, 1981, 1989; Schultz, 1972; Sweetland, 1996; Zula & Chermack, 2007) made in preparing and inservicing teachers on approaches to effective CI are to be fully realized. Teacher collaboration on CI and other curriculum-based approaches to improving student learning implies teacher relationships and collegiality, which is unlikely to occur without time *and* opportunities to share, discuss, and learn from one another. School leaders should consider ways to foment and support communities of practice (Wenger, 1998; Yamagata-Lynch, 2001; Young, 2006) formed around approaches to CI (Lewis & Pearson, 2007; Pearson et al., 2010) and lesson study (Alvine, Judson, Schein, & Yoshida, 2007) as well as other interventions calibrated to enhance student learning. Again, time and other resources must be allocated to this end, including opportunities for relationship-building among teachers, which implies the maintenance of stable, campus-based teacher cohorts over time.

Agriculture and math teachers should strive to use terms their students can understand. Pearson et al. (2010) posited that "[c]onnecting occupational vocabulary to the language of math can open students['] and teachers['] eyes to the math they already know" (p. 21). If both teachers use similar, familiar, and proper terminology in their classrooms, the likelihood of students comprehending the concepts taught stands to increase. Further, teamwork and collaboration among stakeholders, especially teachers and administrators, is critical in ensuring application of the knowledge and skills acquired by teachers from PD (Garet et al., 2001). If stakeholders are supportive of CI, i.e., an enabling *subjective norm* is established and nurtured (Ajzen 1987, 1991; Ajzen & Madden, 1986), the aims of teacher PD are more likely to be achieved, which should improve student learning. Because differences existed among participants in their intensity and frequency of using the 7-element teaching approach and related lessons, more research is needed to identify subjective norms and planned behaviors (Ajzen 1987, 1991; Ajzen & Madden, 1986) that may increase teachers' persistence in executing principles of PD long after a training ends.

The participants perceived their attempts to integrate curriculum had improved students' academic achievement and motivation (Barefield, 2005; Kain, 1993), i.e., a positive ROI in human capital (Mincer, 1981, 1989; Schultz, 1972; Sweetland, 1996; Zula & Chermack, 2007) may have been derived from the teachers' PD. They, however, had no idea how much impact CI contributed to the students' performance. To that end, we recommend more studies be conducted to evaluate the impact of CI approaches on student learning behaviors and outcomes.

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Perceptions and Educational Strategies of Louisiana Agriculture Education Teachers when Working with Students with Special Needs

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Abstract

A teacher's willingness to accept inclusion has been identified as an indicator of the quality of experience that a student with special needs will have in the classroom The purpose of this exploratory study was twofold: (1) to describe the overall perceptions of working with students with special needs and (2) to determine how teachers in Louisiana are currently working with students with special needs. A total of 152 teachers attended the Louisiana agricultural education teacher's summer conference with 43% completing a three part survey instrument. The data revealed teachers are confident in their ability to work with students with special needs and they agree that they can incorporate various areas of inclusion within their programs. However, they disagreed that they have received adequate in-service opportunities related to special education. Regarding educational strategies, teachers in this study identified all of the given inclusion strategies as being used regularly in their programs with the exception of tutoring after school. They also identified these educational practices as being highly effective within their programs. Due to the exploratory nature of this study, additional research is recommended to further investigate the in-service and training needs of teachers in Louisiana.

Introduction and Conceptual Framework

The Individuals with Disabilities in Education Act (IDEA) in 1990 included provisions for inclusion, or the stipulation that all students with disabilities or students with special needs should have access to a general education curriculum. Since IDEA's implementation, there have been an additional three million students in the United States who require special services in general education classrooms (United States Department of Education, 2007). IDEA (1990) directs that students with special needs be given the right to be taught in the least restrictive environment possible to ensure a successful educational experience. In order to qualify for services, a child must fall under at least one of 14 recognized disability categories (e.g., (a) autism, (b) deaf-blindness, (c) deafness, (d) developmental delay, (e) emotional disturbance, (f) hearing impairment, (g) intellectual disability, (h) multiple disabilities, (i) orthopedic impairments, (j) other health impairments, (k) specific learning disability, (l) speech or language impairments, (m) traumatic brain injury, and (n) visual impairments). Additionally, the child must also have demonstrated that their disability negatively impacts their educational achievement (National Dissemination Center for Children with Disabilities, 2014). While the practice of inclusion has been designed to provide specific opportunities that positively impact the classroom experience for students, teachers often identify inclusion as a significant concern in their classrooms (Elbert & Baggett, 2003; Kessell, 2005; Salend & Garrick-Duhaney, 1999; Stair, Warner, & Moore, 2012).

A teacher's willingness to accept inclusion has been identified as an indicator of the quality of experience that a student with special needs will have in the classroom (Soodak, et. al, 1998). Teachers who have developed a higher sense of teacher self-efficacy are more likely to take responsibility for ensuring students with special needs succeed (Soodak & Podell, 1994). Similarly, teachers' attitudes toward inclusion direct their beliefs that they can impact learning outcomes for students with special needs within their programs (Buell, Hallam, Gamel-McCormick, & Scheer (1999). Self-efficacy is defined by Bandura (1977) as the impact that one's beliefs have on the successful implementation of goals. Self-efficacy allows for the identification of links between behaviors, allowing for better understanding of how behaviors impact the achievement of a goal. In order for someone to achieve a desired outcome, specific behaviors should be reinforced that align with the targeted goal. Therefore, a person must not only support the effectiveness of specific strategies in their practice, but they must also be confident in their own abilities to use these strategies effectively (Buell et al., 1999).

The study of self-efficacy through the lens of teacher performance is not a new educational development. This information has advanced primarily through the widely known social cognitive theory developed by Bandura. More recently, self-efficacy has established itself through educational research in terms of both student self-efficacy and teacher self-efficacy (Tschannen-Moran & Hoy, 2001). These beliefs influence several psychological factors, including thoughts, beliefs systems and emotions that stimulate action. Individuals who are identified as having a high self-efficacy invest time and energy to attain their goals, exhibit persistence in the face of obstacles, cope with setbacks, and exert a higher degree of control over situations that have a direct effect on their lives (Bandura, 1986; 1993; 1997). Teachers with high self-efficacy have a desire to succeed and expect that they will achieve success in teaching and managing their programs. This high expectation for achievement influences their interpretation of successes and disappointments as well as influences standards they set for themselves and their programs (Bandura, 1997; Ross, 1992). The benefit of a strong sense of self-efficacy is also linked to less stress and burnout among teachers and increased retention and job satisfaction. Teachers with a higher self-efficacy are also more likely to use a variety of instructional practices and a higher rate of student achievement (Ashton and Webb, 1986; Ross, 1998).

Based on the theory of self-efficacy, teacher perceptions may impact how students with special needs are engaged in agricultural education programs. While support for teachers has been more forthcoming since the required implementation of inclusion, teachers still identify working with students with special needs as being a significant concern (Kessell, 2005; Elbert & Baggett, 2003; Stair, et al., 2010; Stair, Warner, & Moore, 2012). Center and Ward (1987) found that teachers are supportive of inclusion, but are often fail to support inclusion within their own classroom environments (as cited in Campbell, Gilmore & Cuskelly, 2003).

Regarding overall perceptions of inclusion, Dormody, Seevers, Andreason and VanLeeuwen (2006) studied the perceptions of agricultural education teachers working with students with special needs and found that all types of students with special needs were rated as being a challenge to teach within the total agricultural education program. The authors reported that a statistically significant relationship existed between teaching experience and acceptance of inclusion. Teachers with the most experience were more comfortable teaching inclusive classes. Even more detrimental to educators is the feeling of being unprepared, which impacts the particular class and the total perception of teaching as a career (Andreasen, Seevers, Dormody & VanLeeuwen, 2007). Lobosco and Newman (1992) found that teachers felt they were unprepared to teach students with special needs, and they had an overall negative perception of job satisfaction when working with students with disabilities. Thus, there is a need to better understand teachers' confidence when working with this student population.

A wide variety of strategies exist for working with students with special needs. However, classrooms that allow for differentiation are often seen as being more successful for inclusion (Soodak, Podell & Lehman, 1998). Richardson and Washburn (2006) employed the Delphi technique to identify specific strategies employed by agricultural education teachers when working with students with special needs. The expert panel identified several strategies as being the most beneficial for their students with disabilities. Techniques that were most commonly identified were (a) *modified notes (fill in the blank or outline),* (b*) IEP modifications*, (c) *video or media related to the topic*, (d) *notes to copy*, (d) *vocabulary exercises*, (e) *PowerPoint presentations, handouts, and study guides*, and (f) *read-aloud tests and assignments*. Similarly, Stair et al., (2010), found most activities used to work with inclusive classrooms are strategies that, typically, are completed at a larger whole class level, rather than strategies specifically geared toward the development of students with special needs. It is imperative to understand how inclusive strategies impact the overall classroom environment.

Escalating emphasis on preparing all students for post-high school careers has increased the number of students with disabilities completing coursework to become more workforce ready (Harvey, 2001). The agricultural education environment provides fertile learning ground for these students. However, making these environments available to all learners requires additional training and resources. According to Andreasen, Seevers, Dormody and VanLeeuwen (2007), agriculture teachers identified several topics needed for additional training and education including: (a) *modifying IEP's* , (b) *evaluating learning*, and (c) *making classroom modifications*. Phillips and Dormody (1993) reported that teachers needed more information on how to make classrooms and laboratory learning environments more accessible to students with special needs. Additionally, this study highlighted that one of the biggest advantages for agriculture teachers is their extensive use of hands-on learning techniques. These strategies make agriculture programs appealing for students with disabilities. Therefore, the principle research question that arose after the review of the literature was: what are the perceptions of Louisiana agriculture teachers to working with students with special needs?

This research study aligns with Research Priority Area 4: Meaningful, Engaged Learning in All Environments (Doerfert, 2011). This research relates, specifically, to sub-bullet three, "examine the role of diversity and multiple perspectives in meaningful learning across all agricultural education contexts" (Doerfert, 2011, p. 9). Deepening the understanding of how teachers perceive and employ strategies for working with students with special-needs is vital to addressing this particular research priority area.

Purpose and Objectives

While the identification of strategies and perceptions has been documented in various research studies (Stair, et al., 2010; Elbert & Baggett, 2003; Boone, Watts, Boone & Gartin, 2008), there is need for additional research to determine, specifically, how teachers provide resources to students with special needs (Stair et al., 2010). Therefore, the purpose of this study was twofold: (1) to describe the overall perceptions of working with students with special needs and (2) determine how teachers in Louisiana are currently working with students with special needs.

The following research objectives guided this research study:

1. Identify the perceptions of Louisiana Agricultural Education teachers when working with students with special needs.
2. Identify confidence levels of Agricultural Education teachers when working with students with special needs.
3. Determine Louisiana agriculture teachers' frequency of use of specific strategies when working with students with special needs.
4. Identify Louisiana agriculture teachers' perceptions of the effectiveness of specific strategies when working with students with special needs.

Methods

Population and sampling

The population for this exploratory research study consisted of secondary agriculture teachers in Louisiana who were in attendance of the Louisiana Agriculture Teachers Association Summer in-service workshop during the summer of 2014. A total of 152 teachers attended the conference with 65 completing the survey instrument which yielded a 43% response rate. Because there has been relatively little research conducted on the inclusion needs of teachers in Louisiana, this study serves as a beginning point for better understanding the perceptions and needs of teachers, and it should not be considered representative of all teachers in the state.

Within this study, 73% of the agriculture teachers surveyed were male and the average age of these teachers was 40 years old. The average years of teaching experience was 10 years and 84% of these teachers were traditionally certified. Over 55% of the teachers held a bachelor's degree as their highest degree completed. Of the participants, 63% indicated they had completed at least one course specifically related to teaching students with special needs.

Instrumentation

The instrument for this study was adapted from Stair et al., (2010). To establish face and content validity, a panel of experts consisting of two university agricultural educators and one secondary agricultural education teacher reviewed the questionnaire. The panel of reviewers deemed the instrument to be valid and did not suggest that any changes be made to the survey. Stair (2009) reported reliability coefficients ranging from .77 to .86 for the confidence portion of the instrument; therefore, a pilot study was not conducted. Reliability analysis for the present study was conducted, *post hoc*, yielding a Cronbach's alpha of 0.87. It should be noted that three items in this section were negatively worded and required recoding prior to calculating reliability.

The instrument was divided into three sections. Section I of the instrument consisted of a 12 statement Likert scale to determine the perceptions of teachers on statements related to inclusion in agricultural education. Because the data were ordinal in nature because the "intervals between the values cannot be presumed equal" (Jamieson, 2004, p. 1217) the mode was used to represent the average score for this study. Teachers were asked to choose a response based on a 4-point scale of *Strongly Disagree* to *Strongly Agree*. Teachers also ranked their total confidence when working with students with special needs on a scale of 1-10 with 1 being *Not Confident* and 10 being *Very Confident.* Part II of the instrument consisted of instructional strategies developed through earlier research by Richardson and Washburn (2006) who identified instructional strategies of agricultural education teachers in North Carolina when working with students with special needs. A total of 26 strategies were included and for each strategy, the teachers identified how often they use that strategy as part of their regular class instruction with one of the following choices: "Never" (I have never used this strategy), "Rarely" (this strategy is used, but only a few times each semester), "Occasionally" (this strategy is used only once or twice per month), Often (the strategy is used several times a month), "Regularly" (the strategy is used as often as possible as part of my method of teaching). Teachers were also asked to rate the effectiveness of each strategy on a scale of 1-10.

Section III of the instrument collected basic demographic information. Information collected included (a) gender, (b) age, (c) years of teaching experience, (d) acquired level of education, (e) teacher licensure information, (f) the number of previous courses taken related to students with disabilities, (g) hours of in–service opportunities related to inclusion, and (h) whether the responded has a close friends or family members with a disability.

Data analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 22 for Macintosh. Measures of variability, including frequency, percentage, minimum, maximum, and mode, were calculated to meet the objectives of the study.

Findings

Research objective one sought to identify state agriculture teachers' perceptions of working with special needs students (see Table 1). Modal responses indicated that the teachers agreed with the following items: (a) *I can provide a positive classroom atmosphere for students with special needs*, (b) *I am capable of following the requirements found in special education legislation*, (c) *I can modify assignments or activities according to a student's IEP*, (d) *I am confident that my teacher training program prepared me to work with students with special needs*, (e) *I can provide physical accommodations for students with special needs if needed*, (f) *I am comfortable working with students with any type of disability*, (g) *I am confident in my ability to involve students with special needs in the local FFA chapter*, and (h) *I provide Supervised Agricultural Experience (SAE) projects for students with special needs that are comparable to*

SAE programs for students without special needs. Mode scores for the remaining items indicated the agriculture teachers disagreed with the items. It should be noted that the items the agriculture teachers were in disagreement with were negatively worded.

Table 1
Louisiana Agriculture Teachers' Perceptions of Working with Students with Special Needs (n = 65)

Item	*Min.*	*Max.*	*Mode*
I can provide a positive classroom atmosphere for students with special needs.	2	4	3
I am capable of following the requirements found in special education legislation.	2	4	3
I can modify assignments or activities according to a student's IEP.	2	4	3
I am confident that my teacher training program prepared me to work with students with special needs.	1	4	3
I can provide physical accommodations for students with special needs if needed.	1	4	3
I am comfortable working with students with any type of disability.	1	4	3
I am confident in my ability to involve students with special needs in the local FFA chapter.	1	4	3
I provide Supervised Agricultural Experience (SAE) projects for students with special needs that are comparable to SAE programs for students without special needs.	1	4	3
I have difficulty evaluating students who have special needs.	1	4	2
I am concerned that I do not provide adequate instruction for students with special needs.	1	4	2
I do not think that I can manage behavior of students with special needs.	1	4	2
I have received adequate education and training for working with students with special needs through in-service opportunities.	1	4	2

Note. 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree.

The second research objective was to determine Louisiana agriculture teachers overall confidence in working with students with special needs. The mode for this data was an eight. Responses ranged from a low of one to a high of 10. For analysis purposes, 1–2 was considered *not at all confident*, 3–4 was considered *lacking confidence*, 5–6 was considered *unsure of confidence*, 7– 8 was considered *confident* and 9–10 was considered *very confident* (see Table 2).

Table 2
Louisiana Agriculture Teachers' Confidence in Working with Students with Special Needs (N = 65)

Variable	*Minimum*	*Maximum*	*Mode*
Confidence Working with Students with Special Needs	1	10	8

Note. 1–2 = *not at all confident*, 3–4 = *lacking confidence*, 5–6 = *unsure of confidence*, 7–8 = *confident* and 9–10 = *very confident*

The third research objective was to determine how frequently Louisiana agriculture teachers employed specific strategies for working with students with special needs (see Table 3). The teachers indicated regular used of (a) *Read a student's IEP and provide those modifications*, (b) *Show videos and other visual media that relate to topics*, (c) *Use of Power Points in class for notes or visuals*, (d) *Spend more time with them or watching them more closely during hands-on activities*, (e) *Give students handouts that coordinate with lessons*, (f) *Give study guides for tests*, (g) *Modify testing*, (h) *Emphasize hands-on skills or activities*, (i) *Strategically assign partners or groups for work/projects*, (j) *Not penalizing spelling errors*, (k) *Require student to keep a notebook that is graded and checked for accuracy*, and (l) *Use a different rubric/scoring guide for students with special needs on the same assignment other students complete*. The least utilized strategy was *tutor students after school* receiving a mode score of two.

Table 3
Louisiana Agriculture Teachers' Use of Strategies for Working with Students with Special Needs (n = 65)

Item	*Min.*	*Max.*	*Mode*
Read a student's IEP and provide those modifications	1	4	5
Show videos and other visual media that relate to topics	2	5	5
Use of Power Points in class for notes or visuals	1	5	5
Spend more time with them or watching them more closely during hands-on activities	1	5	5
Give students handouts that coordinate with lessons	1	5	5
Give study guides for tests	1	5	5
Modify testing (open notebook tests for learning disabled students. Separate location, more time, etc.)	1	5	5
Emphasize hands-on skills or activities	1	5	5
Strategically assign partners or groups for work/projects	1	5	5
Not penalizing spelling errors	1	5	5
Require student to keep a notebook that is graded and checked for accuracy	1	5	5
Use a different rubric/scoring guide for students with special needs on the same assignment other students complete	1	5	5
Slow down to give more individualized instruction	1	5	4
Keep Special Education teachers informed about what students should be learning in your class	1	5	4
Allow tests or assignments to be read aloud to the student	1	5	4
Allow students with special needs to use a word bank for difficult vocabulary on tests (Plant Id tests, Tool Id tests, etc.)	1	5	4
Assign them tasks that focus on active learning rather than passive learning	1	5	4
Provide shorter assignments	1	5	4
Use stories to illustrate a point in the lesson	1	5	4
Use oral exams or presentations	1	5	3
Give students fill in the blank note guides or note outlines	1	5	3
Focus on vocabulary that may be difficult for them to understand (creating a word wall, worksheet, etc)	1	5	3
Tutor students after school	1	5	2
Ask Special Education teachers to provide an overview of each student	1	5	4,5
Give students a rubric for the grading of performance items	1	5	3,5
Give students copies of notes from teacher or other student	1	5	3,4

Note. *1 = Never; 2 = Rarely; 3 = Occasionally; 4 = Often; 5 = Regularly.*

Research objective four sought to identify Louisiana agriculture teachers' perceptions of the effectiveness of specific strategies for working with students with special needs (see Table 4). Emphasize hands-on skills or activities and ask special education teachers to provide an overview of each student received mode scores of 10 denoting these strategies as being highly effective in working with students with special needs. The remaining items received mode scores of seven or greater. For analysis purposes, a mode score of 1–2 was considered "*very ineffective*", a 3–4 was considered "*ineffective*", 5–6 was considered "*average*", 7–8 was considered "*effective*" and 9–10 was considered to be "*very effective*".

Table 4
Louisiana Agriculture Teachers' Perceptions of the Effectiveness of Strategies for Working with Students with Special Needs (n = 65)

Item	*Min.*	*Max.*	*Mode*
Emphasize hands-on skills or activities	1	10	10
Ask Special Education teachers to provide an overview of each student	1	10	10
Give students fill in the blank note guides or note outlines	1	10	8
Read a student's IEP and provide those modifications	1	10	8
Show videos and other visual media that relate to topics	1	10	8
Give students copies of notes from teacher or other student	1	10	8
Use of Power Points in class for notes or visuals	1	10	8
Spend more time with them or watching them more closely during hands-on activities	1	10	8
Give students handouts that coordinate with lessons	1	10	8
Allow tests or assignments to be read aloud to the student	1	10	8
Use oral exams or presentations	1	10	8
Not penalizing spelling errors	1	10	8
Allow students with special needs to use a word bank for difficult vocabulary on tests (Plant Id tests, Tool Id tests, etc.)	1	10	8
Modify testing (open notebook tests for learning disabled students. Separate location, more time, etc.)	1	10	8
Assign them tasks that focus on active learning rather than passive learning	1	10	8
Provide shorter assignments	1	10	8
Use stories to illustrate a point in the lesson	1	10	8
Tutor students after school	1	10	8
Give students a rubric for the grading of performance items	1	10	8
Keep Special Education teachers informed about what students should be learning in your class	1	10	8
Require student to keep a notebook that is graded and checked for accuracy	1	10	8
Slow down to give more individualized instruction	1	10	8
Use a different rubric/scoring guide for students with special needs on the same assignment other students complete	1	10	8
Focus on vocabulary that may be difficult for them to understand (creating a word wall, worksheet, etc.)	1	10	7
Give study guides for tests	1	10	8,10
Strategically assign partners or groups for work/projects	1	10	8,9

Note. 1–2 = "*very ineffective*", 3–4 = "*ineffective*", 5–6 = "*average*", 7–8 = "*effective*", 9–10 = "*very effective*"

Discussion and Recommendations

Adequate training is often identified as a primary challenge for teachers when working with students with special needs (Sorenson, Tarpley, & Warnick, 2005; Dormody & Torres, 2002). The majority of teachers within this study "*agreed"* or "*strongly agreed*" with 11 of the 12 statements regarding their perceptions of inclusion ability. Overall, this indicates very positive perceptions of their ability to evaluate, supervise and provide instruction for students with special needs. This belief was further validated as teachers also expressed very high total confidence when working with students with special needs. While this finding is inconsistent with many other studies on regards to overall perceptions (Kessell, 2005; Elbert & Baggett, 2003; Boone, Boone, & Garton, 2008). Aschenbrener, Garton and Ross (2010) also found that early career agriculture teachers expressed some confidence in working with students with special needs. This overall confidence is a positive step, not only for successful inclusion, but for overall teacher career efficacy and satisfaction. Because teachers with a high self-efficacy have not only a desire to succeed, but also an expectation that they will succeed in teaching students and managing them effectively, teachers who identify themselves as being successful within these areas are often identified as being more successful in their programs (Buell et al., 1999).

Regarding the strategies that teachers use when working with students with special needs, teachers in this study used almost all of the recommended strategies "*often*" or "*regularly*" as part of their program. The only strategy that was not reported as being used regularly was "*tutoring after school*". This may be indicative of the complex needs of agricultural education teachers to balance the classroom along with other program demands**.** Teachers in this study showed a more frequent use of strategies overall then in previous research (Stair, et al., 2010). All strategies included in this study were identified as being "*effective*" or "*highly effective*".

Overall, teachers in this study report being confident in their ability to include students with special needs in their programs and to use a wide variety of strategies that support inclusion. The only statement that indicated disagreement was the perception of receiving adequate training through in-service opportunities. This is an area that should be strengthened. Special Education needs and resources are constantly changing and evolving (Gargiulo, 2011). Even though the majority of teachers in this study have taken coursework in special education, adequate in-service should be provided so that teachers can stay on top of the research within the special education field. Additionally, there is evidence that teacher who have experienced more in-service opportunities related to inclusion tend to be more willing to include students on other aspects of the agricultural education program, including participation in FFA and SAE (Johnson, Wilson, Flowers & Croom, 2012). This presents a need for additional training in all areas of the agricultural education program.

Because individual student needs and resources change over time, it may be helpful to encourage agriculture teachers to include special education teachers on advisory committees or in course planning. This would allow for teachers to be given guidance on a long term planning level rather than on a class by class basis. This could also benefit the working relationships between agriculture teachers and special education teachers.

Because this was an exploratory study with a relatively small number of teachers, additional research should be conducted to determine if all teachers in Louisiana share these same in-service needs. Additionally, teacher strategies and overall confidence should continue to be tracked over time to determine how trends in special education may affect teacher confidence. It is also recommended that qualitative research be used to determine what practices the most successful teachers are implementing within their programs.

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Getting to the Core: Agriculture Teachers' Attitudes, Implementation, and Professional Development Needs Related to the Common Core Standards

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Abstract

The Common Core standards represent a shift in the American education system. Included in the Common Core standards are opportunities for agriculture teachers to integrate math and English language arts content into their curriculum. Using the theory of planned behavior, we sought to identify agriculture teachers' attitudes, familiarity with, current level of integration, and professional development needs related to the Common Core standards. Our research identified the majority of Oregon teachers were somewhat familiar with the Common Core standards. Additionally, teachers had varying levels of agreement that the Common Core standards would help their teaching, yet the majority of agriculture teachers in our study reported they had somewhat implemented the Common Core standards. In an effort to identify the professional development needs of teachers concerning the Common Core, we used the common core standards to develop 11 needs assessment competencies related to math, reading, and writing. Respondents identified the highest professional development need areas in topics related to developing students' abilities to write and do mathematics problems in the context of agriculture. These findings are discussed using the theory of planned behavior; recommendations for practice and future research are also highlighted.

Introduction & Theoretical Framework

The American education system faces a monumental challenge; high school graduates have been labeled as unprepared for both postsecondary schooling and workforce employment (Eisen, Jasinowski, & Kleinert, 2005; Wirt et al., 2004). In an effort to remedy this dilemma, a collaborative team representing educators, researchers, community members, and national organizations worked to develop the Common Core standards (Kendall, 2011). The Common Core standards are a rigorous set of academic benchmarks for K-12 students in the areas of English language arts (ELA) and mathematics (Common Core State Standards Initiative, 2010a; Common Core State Standards Initiative, 2010b; Kendall, 2011; Rothman, 2011). The release of the Common Core standards in 2010 represented a significant shift in the landscape of American education (Porter, McMaken, Hwang, & Yang, 2011; Rothman, 2011). The establishment of the Common Core standards sought to accomplish three important criteria: homogenize academic standards across states, hold American students to the same high academic standards as students in academically exceptional countries, and prepare students to be successful in postsecondary education and a global workforce (Kendall, 2011).

As of 2013, 44 states have adopted the Common Core standards (Achieve, 2013). Those states that had not adopted the Common Core standards included Alaska, Nebraska, North Carolina, and Texas. Indiana had previously adopted the standards, but opted out in 2014.

Minnesota had adopted the English language arts standards, but had not adopted the mathematics standards (Achieve, 2013). Within each of the 44 adopting states a unique timeline for adoption was established, with some states fully implementing the Common Core standards as early as the 2011-2012 school year and other states fully implementing the standards during the 2014-2015 school year, with the latter group including Oregon, in which this research was conducted (Achieve, 2013).

One important consideration, especially for the agricultural education profession, is the implementation of the Common Core standards in subject areas other than math and ELA. The mathematics Common Core standards are written to guide the development of students' mathematics skills within typical math subject areas (Common Core State Standards Initiative, 2010b). However, included in the mathematics Common Core are standards for mathematical practice, which "describe varieties of expertise that mathematics educators at all levels should seek to develop in their students" (Common Core State Standards Initiative, 2010b, p. 6). Disciplines like agricultural education, which include mathematics principles in their curriculum (Stripling, Roberts, & Stephens, 2014), may consider the adoption of these standards to help inform their integrated teaching (Meeder & Suddreth, 2012; Pearson et al., 2010). The ELA Common Core standards take a more direct route to guide the teaching of ELA content outside of traditional ELA classrooms. Included in the ELA Common Core standards are specific reading and writing competencies for science and technical subjects (Common Core State Standards Initiative, 2010a).

Research has identified career and technical education as a viable context for increasing students' knowledge in math and ELA (Pearson et al., 2010). Furthermore, agricultural education has been identified as an applicable context for the integration of traditional core academic content (Edwards & Ramsey, 2004; Myers & Dyer, 2004; Nolin & Parr, 2013; Phipps, Osborne, Dyer, & Ball, 2008). The effectiveness of agricultural education as a method for developing students' math and ELA skills can be found in a 2013 study conducted by Nolin and Parr. This research identified a positive relationship between the number of agriculture courses students had taken and their mathematics and ELA scores on a standardized exam. Furthermore, a pair of studies identified career and technical education teachers who intentionally integrated core academic subject matter into their curriculum were more effective in developing the math (Pearson et al., 2010) and ELA (Park, 2012) skills of their students. These studies highlight the importance of the teacher's decision to integrate traditional core academic content in building the math and ELA skills of their students.

While research identifies the importance of the agriculture teacher in the success of their students learning math and ELA content, there exists a dearth of studies in agricultural education exploring agriculture teachers' perceptions of math and ELA integration, even outside the context of the Common Core standards (Park & Osborne, 2006). Although agricultural education teachers' attitudes toward the Common Core standards have not previously been explored, research outside of agricultural education has investigated the topic. A 2013 study conducted by the Editorial Projects in Education Research Center [EPE] sought to describe practicing teachers' familiarity with, attitudes toward, implementation of, and preparedness to teach the Common Core standards. This study identified that 78% of responding teachers were familiar with the mathematics standards and 92% of teachers were familiar with the ELA standards. Although teachers were familiar with the standards, they had not participated in an abundance of professional development experiences related to the Common Core standards. Nearly one-third of respondents in this study reported spending one day or less in professional development related to the implementation of the Common Core standards. Furthermore, the majority of responding teachers, 56%, identified the curriculum they were using was not aligned with the Common Core standards. Overall, teachers in the EPE study felt ill-prepared to teach the Common Core standards, especially to English-language learners and students with learning disabilities. However, 76% of teachers in the study remained optimistic that the implementation of the Common Core standards would improve their teaching strategies, and 87% of teachers reported they had already partially or fully implemented the Common Core into their teaching (EPE, 2013).

The goal of this study was to explore Oregon agriculture teachers' attitudes toward math and ELA integration through the Common Core standards. The theoretical foundation for this investigation was the theory of planned behavior (Ajzen, 1991). The theory of planned behavior is commonly used to understand human behavior or human's intention to behave a certain way. Within agricultural education, the theory of planned behavior has been used to explore the attitudes and beliefs of principals (Kalme & Dyer, 2000), counselors (Thompson Jr. & Russell, 1993), parents (Osborne & Dyer, 2000; Thompson Jr. & Russell, 1993) and students (Osborne & Dyer, 2000; Thompson Jr. & Russell, 1993) toward agricultural education. Additionally, researchers in agricultural education have used the theory of planned behavior to explore preservice teachers' perceptions of barriers to integrating science in their classroom (Thoron & Myers, 2010).

The theory of planned behavior was developed from the theory of reasoned action (Ajzen & Fishbein, 1980). One primary difference separates the two theories. The theory of planned behavior includes perceived behavioral controls as a predictor of behavior intention and behavior (Ajzen, 1991). In addition to perceived behavioral controls, this theory identifies two other determinants to an individual's intention to behave a certain way: attitude toward behavior and subjective norms (see Figure 1; Ajzen, 1991). Ajzen defines an individuals' attitude toward the behavior as "the degree to which a person has a favorable evaluation or appraisal of the behavior in question" (1991, p. 188). The second predictor of behavioral intention, subjective norms, refers to the pressure to behave a certain way established by members of society. The final predictor of behavioral intention, as identified by Ajzen, is perceived behavioral control. This is an individual's perception of the barriers to executing a certain behavior. Perceived behavioral control can reflect negative consequences of past behavior or roadblocks anticipated when considering new behaviors.

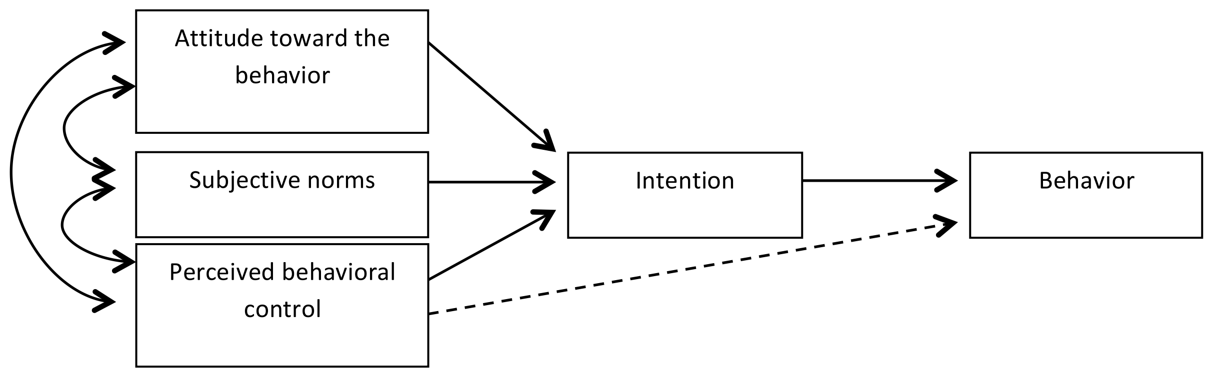

Figure 1. Theory of planned behavior (Ajzen, 1991).

Our study was conducted among agriculture teachers within a state implementing the Common Core standards during the 2014-2015 school year (Achieve, 2013). Our study sought to explore these agriculture teachers' attitudes toward the implementation of the Common Core standards in their curriculum. By exploring agriculture teachers' attitudes toward the Common Core standards, we sought to provide evidence of teachers' behavioral intentions concerning the implementation of the Common Core standards during the 2014-2015 school year. Additionally, we sought to describe teachers' current level of Common Core integration in their curriculum as well as the professional development needs agriculture teachers identified related to ensuring students' success in meeting rigorous mathematics and ELA standards.

Purpose & Objectives

The purpose of this research was to describe Oregon agriculture teachers' attitudes, familiarity, level of implementation, and professional development needs related to the Common Core standards. With the impetus of the Common Core standards being to develop high school graduates preparedness for postsecondary education and a global workforce (Kendall, 2011), research into agricultural education teachers' perceptions related to implementation of these standards addresses National Research Agenda priority 3, "Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century" (Doerfert, 2011, p. 9). In order to accomplish the purpose of this research, four objectives were developed. These research objectives were:

1. Describe agriculture teachers' familiarity with the Common Core standards,
2. Describe agriculture teachers' attitudes toward the Common Core standards,
3. Describe agriculture teachers' incorporation of the Common Core standards in their teaching, and
4. Describe agriculture teachers' perceived professional development needs related to teaching the reading, writing, and math Common Core standards.

Methods

The target population for this study included all school-based agriculture teachers in Oregon (N = 111) during the 2013-2014 school year, a year prior to statewide implementation of the Common Core standards. We obtained the names and contact information of agriculture teachers using the 2013-2014 Oregon Agriculture Teacher Directory. A panel of experts in the field of agricultural education vetted the information in the directory to insure its accuracy. Inasmuch as we attempted a census, we made no attempt to generalize the findings beyond the population of teachers in Oregon during the 2013-2014 school year.

The questionnaire was composed of three parts: perspectives about the Common Core standards; Common Core professional development needs; and teachers' demographic information. Perspectives about the Common Core standards were assessed by a modified version of the National Survey of Teacher Perspectives on the Common Core survey instrument (EPE, 2013). This instrument was designed to identify teachers' familiarity with, attitude toward, and current incorporation level of the Common Core standards. The second portion of the questionnaire, the Common Core needs assessment, was developed by the researchers. This needs assessment was developed based on the Borich (1980) needs assessment model to assess the perceived ability and importance for a total of 11 Common Core competencies. In order to accomplish this, the 28 Common Core standards relevant to agricultural educators were paired down to 11 succinctly written items. This step was critical to increase response rate by reducing respondent burden.

Individual needs assessment items for the ELA portion of the Common Core needs assessment were developed using the Common Core standards in writing and reading for science and technical subjects (Common Core State Standards Initiative, 2010a). Both the ELA reading and writing components of the Common Core include ten standards grouped into four larger themes. These larger themes were analyzed by the researchers, and one needs assessment item was developed based upon the combination of standards within the different theme. For example, one theme within the ELA reading Common Core is *Key Ideas and Details*, the Common Core needs assessment item we developed from this theme stated: "Develop students' ability to identify the central idea as well as details when reading Agricultural Science and Technology (AST) texts."

Individual items for the mathematics portion of the Common Core needs assessment were developed for agriculture teachers using the eight standards for mathematical practice found in the Common Core standards (Common Core State Standards Initiative, 2010b). The eight standards for mathematical practice were combined into three themes by the researchers. From these three themes, individual items were developed for the Common Core needs assessment. For example the theme "problem solving" was constructed from the following objectives: make sense of problems and persevere in solving them, use appropriate tools strategically, and attend to precision when solving problems. Once the eight mathematics standards were categorized into three groups, we developed an individual needs assessment item that reflected the purpose of the standards in each group. For the problem solving theme, the following item was developed: "Develop students' ability to correctly solve AST-related math problems."

The final Common Core needs assessment included 11 items that were categorized into three subscales: "Reading" (four items), "Writing" (four items), and "Mathematics" (three items). Teachers were asked to rate their perceived importance and perceived ability for each of the 11 competencies using a five-point Likert-type scale ranging from 1 "Very Low" to 5 "Very

High." A panel of experts in the field of agricultural education established face and content validity for the instrument. A post-hoc reliability analysis of the 11 Common Core competencies section of the instrument had acceptable reliability (Cronbach's alpha = .93). The individual subscale reliabilities for Reading (Cronbach's alpha = .84), Writing (Cronbach's alpha = .91), and Mathematics (Cronbach's alpha = .95) were also acceptable.

We administered the survey instrument and collected data in December of 2013, approximately nine months prior to full implementation in Oregon. The survey was administered through the online program Qualtrics. We made five points of contact with participants to elicit responses (Dillman, 2000). The first point of contact was a notification e-mail, the three subsequent points of contact were e-mails requesting participation in the research study. The final point of contact was a phone call to individuals who had not yet responded. A total of 80 useable responses were completed, yielding a 72% response rate. An independent samples *t*-test was used to check for non-response error by comparing participants who responded after the final two points of contact (late respondents; n = 31) and those who responded prior to the final two points of contact (on-time respondents; n = 49) (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). We found no statistical differences between on-time and late respondents for items within the perceptions of Common Core and the assessment of Common Core needs. Therefore, we considered non-response error to be insignificant to this study (Lindner et al., 2001; Miller & Smith, 1983).

We analyzed the data using the Statistical Package for the Social Sciences (SPSS) version 20. The first three objectives were descriptive in nature; therefore, we reported the results as frequencies and percentages. To accomplish research objective four, we calculated mean weighted discrepancy scores (MWDS) for each of the 11 Common Core competencies among responding teachers. First, a discrepancy score was calculated for each teacher by subtracting their perceived ability score from their perceived importance score for each item. Then, a weighted discrepancy score was calculated by multiplying their discrepancy score by the mean importance rating for each competency. Finally, the MWDS was calculated by taking the sum of the weighted discrepancy scores across respondents and dividing by the number of respondents. The MWDS were ranked in order to identify the top inservice need for the different Common Core areas.

Findings

Respondents to this questionnaire had, on average, 11 years of teaching experience. The largest proportion of teachers identified themselves as first year agriculture teachers (11%). A total of 27 teachers (36%) identified that they were in their first five years of teaching agriculture. Just over half the respondents (53%) were male. Eighty percent of the responding teachers identified attending a traditional agriculture teacher training program. The majority of respondents (52%) indicated they were certified to teach the CASE curriculum, with the most common CASE certifications being in Plant Science and Agriculture, Food and Natural Resources (AFNR). Respondents indicated teaching a wide variety of agricultural education content, with the most common classes taught being introductory classes in agricultural education, Plant Sciences, Animal Sciences, and Food Science.

The first objective of this study sought to describe agriculture teachers' familiarity with the Common Core standards (see Table 1). The majority of teachers reported being somewhat familiar with the Common Core standards for both ELA (63.29%) and Mathematics (60.76%). There were 10 (12.66%) teachers who indicated they were not familiar with the ELA Common Core standards and 16 (20.25%) teachers who indicated they were not familiar with the math standards. Alternatively, 19 (24.05%) teachers identified themselves as being very familiar with the ELA Common Core standards. A lower number of teachers (*f* = 15; 18.99%) identified being very familiar with the mathematics Common Core standards.

Table 1
Oregon Agriculture Teachers' Level of Familiarity with the Common Core Standards

	Not familiar		Somewhat familiar		Very familiar	
Item	*f*	%	*f*	%	*f*	%
Level of familiarity with CC – English Language Arts.	10	12.66	50	63.29	19	24.05
Level of familiarity with the CC – Mathematics.	16	20.25	48	60.76	15	18.99

Note. CC = Common Core.

For objective two, we sought to describe agriculture teachers' perceptions of the Common Core standards (see Table 2). Half of the responding teachers (*f* = 39; 50.00%) indicated they slightly agreed that the Common Core standards would help improve their instructional practices while another 25.64% (*f* = 20) indicated they strongly agreed with this statement. The last one-quarter of teachers disagreed with the statement that the Common Core would improve their teaching, or indicated they did not know.

When asked whether they had received adequate training around the Common Core, teachers were almost evenly split between slightly agree (*f* = 29) and slightly disagree (*f* = 27) with another 11 teachers indicating they strongly agreed and strongly disagreed they had received adequate training. A majority (62%) of teachers slightly (*f* = 30) or strongly (*f* = 19) agreed their curriculum materials were aligned with the Common Core. A majority also slightly (*f* = 31) or strongly agreed (*f* = 15) they were prepared to teach the Common Core standards in their classrooms, while more than a third of Oregon agriculture teachers disagreed slightly (29.11%) or strongly (12.65%) they were prepared to teach the Common Core standards.

Table 2
Oregon Agriculture Teachers Perceptions of the Common Core

	Strongly disagree		Slightly disagree		Slightly agree		Strongly agree		Don't know	
Question	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
In general, the CC standards will help me improve my own instruction and classroom practices.	3	3.84	10	12.82	39	50.00	20	25.64	6	7.69
I have received adequate training/ professional development related to the CC standards.	11	13.92	27	34.18	29	36.71	11	13.92	1	1.27
My curriculum materials are aligned with the CC.	4	5.06	21	26.58	30	37.97	19	24.05	5	6.33
I feel prepared to teach the CC standards to my students.	10	12.65	23	29.11	31	39.24	15	18.99	0	0.00

Note. CC = Common Core.

Objective three sought to describe agriculture teachers' incorporation of the Common Core standards into their teaching (see Table 3). A large majority (*f* = 65; 82.28%) of Oregon agriculture teachers reported they had incorporated the Common Core into some areas of their teaching, but not others. Six teachers (7.59%) reported no incorporation of the Common Core standards into their teaching and an equal number (*f* = 6; 7.59%) indicated they did not know to what extent the Common Core was incorporated into their practice. There were only two teachers (2.53%), at the point of data collection, who reported full incorporation of the Common Core standards in their teaching.

Table 3
Oregon Agriculture Teachers Incorporation for Common Core Standards ($n = 79$)

	Fully incorporated into all areas of my teaching		Incorporated into some areas of my teaching, but not others		Not at all incorporated into my teaching		I don't know	
Response	*f*	%	*f*	%	*f*	%	*f*	%
Incorporation of the CC into teaching practice.	2	2.53	65	82.28	6	7.59	6	7.59

Note. CC = Common Core.

Objective four sought to describe agriculture teachers' perceived professional development needs related to teaching the Common Core standards. The areas of highest need were identified through a combination of perceived importance and competence using mean weighted discrepancy scores (MWDS). We grouped the items into tables by Common Core areas, which we reported from highest need for professional development to the lowest.

As it relates to Common Core standards for reading, we found the highest perceived need for professional development was helping students identify the central idea and details when reading an Agricultural Science and Technology (AST) text. Even though this was the largest perceived need in reading, the MWDS was not high (MWDS = 1.86) when compared to the perceived needs in math and writing (see Table 4). The lowest need in the area of reading was developing students' ability to identify the relationships between commonly used AST terms (MWDS = 1.00).

Table 4
Agriculture Teachers' Perceived Professional Development Needs in Teaching Common Core Reading

Reading Standard	MWDS
Develop students' ability to...	
Identify the central idea as well as details when reading AST texts.	1.86
Critically analyze information from a variety of sources.	1.82
Comprehend grade specific AST texts.	1.41
Identify the relationships between commonly used AST terms.	1.00

Note. AST = Agricultural Science and Technology.

As it relates to training in Common Core writing standards, the highest need for teacher professional development was in developing students' ability to present knowledge through research projects (MWDS = 2.47) (see Table 5). The lowest need, related to the Common Core writing standards, was developing students' ability to write AST specific content in a variety of forms (MWDS = 2.19).

Table 5
Agriculture Teachers' Perceived Professional Development Needs in Teaching Common Core Writing

Writing Standard	MWDS
Develop students' ability to...	
Present knowledge through research projects in AST.	2.47
Engage in a variety of writing exercises in AST.	2.34
Produce quality writings related to AST.	2.20
Write AST specific content in a variety of forms.	2.19

Note. AST = Agricultural Science and Technology.

Lastly, teachers were asked about the competence and importance related to the Common Core mathematics standards (see Table 6). The highest need for professional development was in developing students' ability to identify the most efficient method for solving math problems in agriculture (MWDS = 2.64), this was also identified as the highest perceived need throughout the Common Core needs assessment. The lowest identified need in mathematics was in developing students' ability to correctly solve AST related math problems (MWDS = 2.01).

Table 6
Agriculture Teachers' Perceived Professional Development Needs in Teaching Common Core Mathematics

Mathematics Standard	MWDS
Develop students' ability to...	
Identify the most efficient method for solving math problems in agriculture.	2.64
Construct viable arguments using mathematics.	2.43
Correctly solve AST related math problems.	2.01

Note. AST = Agricultural Science and Technology.

Conclusions, Implications & Recommendations

The Common Core standards in ELA and mathematics represent an effort to increase the achievement of students throughout the American education system. Our research sought to explore Oregon agriculture teachers' attitudes, current integration level, and professional development needs related to the Common Core standards. Research objective one examined teachers' familiarity with the Common Core standards. Results revealed a majority of teachers were familiar with both the ELA and mathematics standards. However, 20% of the respondents indicated they were not familiar with the Common Core math standards and 13% indicated no familiarity with Common Core ELA standards. While the Common Core standards are new, it is nevertheless disconcerting there are agriculture teachers with no familiarity with these standards. As a discipline, agricultural education is often touted as a subject area that integrates traditional core subjects. If the goal of the Common Core is that all teachers integrate these standards in their classroom, the first step is all teachers must become familiar with the standards.

While objective one examined familiarity, objective two examined teachers' perceptions of the Common Core standards. Specifically, we sought to identify the extent to which agriculture teachers felt the Common Core standards would help improve their teaching. Overall, only 50% of respondents indicated they slightly agreed the Common Core would improve their teaching and 24% disagreed that the Common Core would improve their teaching. These results may be tied to the greater need our teachers have for adequate training in teaching the Common Core standards. Only 36% of responding agriculture teachers slightly agreed they had received adequate training, while 47% either slightly or strongly disagreed they had received adequate training in the Common Core.

As schools look to implement the Common Core standards, school-based trainings may only target teachers of core subject areas. This may create a void in training, leaving agriculture teachers with few opportunities to explore the implementation of the Common Core standards. We recommend agriculture teacher educators fill this potential void by becoming familiar with and incorporating the Common Core standards into teacher preparation programs and teacher in-services. This may help to address the current lack of Common Core professional development for practicing teachers. Based on the rate at which different states embrace the Common Core, future research should explore whether agricultural teachers are adequately trained to implement the Common Core standards and support the learning and testing in the Common Core subject areas.

Agriculture teachers indicated, in objective three, they do incorporate some areas of Common Core into their teaching practice. While this is encouraging, they identified specific professional development need areas in objective four. Agriculture teachers indicated having lesser need in the areas of integrating reading and greater needs in the areas of writing and math integration. Overall, the greatest need areas were in developing students' ability to identify the most efficient method for solving math problems in agriculture, developing students' ability to present knowledge through research projects in agriculture science and technology, and developing students' ability to construct viable arguments using mathematics.

Our research suggests consideration should be given to the development of initial professional development opportunities related to math and ELA integration to ensure all teachers have an adequate understanding of the Common Core standards. Additionally, research should be conducted to determine professional development experiences that relate to an increase in teachers' perceptions of mathematics and ELA integration through the Common Core standards. We also acknowledge the dearth of available research examining agriculture teachers' perceptions related to the integration of math and ELA concepts. We recommend future research exploring agriculture teachers' perceptions, perhaps outside of the context of the Common Core, especially given the links between attitude toward behavior, behavioral intention (Ajzen, 1991), level of academic integration, and student success (Nolin & Parr, 2013: Park, 2012).

Given that research supports agricultural education as an effective context for the integration of math and ELA skills (Nolin & Parr, 2013; Park, 2012; Pearson et al., 2010), professional development opportunities related to the integration of these subject areas is warranted. Teachers are indicating a need, which agricultural teacher educators can fill through targeted workshops and inservice opportunities on mathematics and ELA skill integration. The theory of planned behavior identifies a link between attitudes and behavior, therefore as Common Core is fully implemented in Oregon during the 2014-2015 school year, efforts must be made to provide professional development experiences that ensure all teachers understand the Common Core and how agricultural education can play a positive role in developing the mathematics and ELA knowledge of students. As a result of increased professional development, teachers may be better positioned to strengthen the skill sets of students and to advocate for the relevance of their program as a collaborating partner with the core academic subjects.

As this research indicates, agricultural teachers have a basic understanding, but may lack the tools and training to effectively teach to the Common Core standards. While the staying power of the Common Core standards has yet to be determined, it does present agricultural education with yet another opportunity to promote the relevance and importance of our discipline. As we look to the future and explore possibilities for enhancing agricultural education, the ability of our programs to support the curricular core subject areas and enhance test scores may be vital to our continued growth.

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Relationships within a High-Quality Teacher Professional Development Experience

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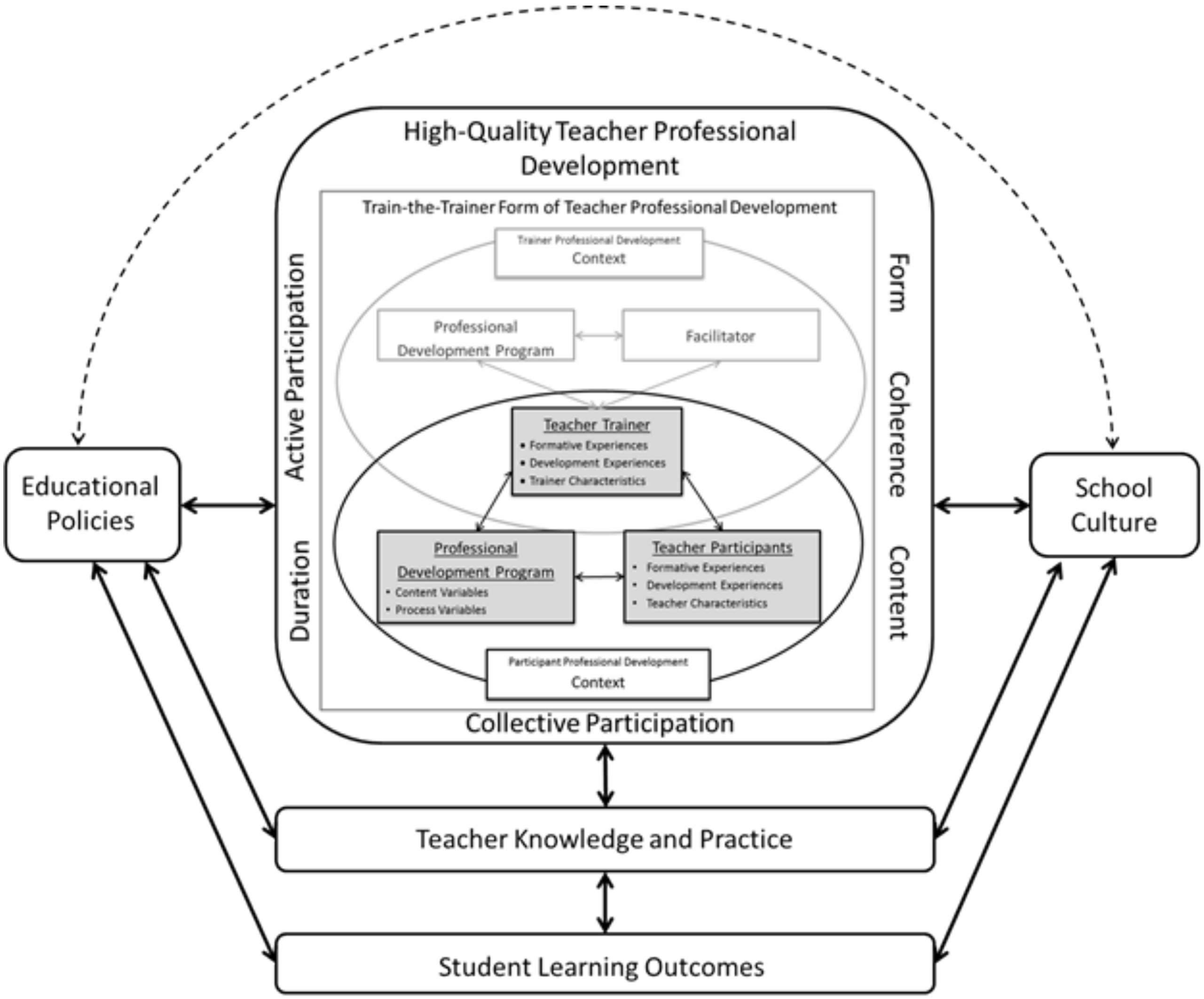
Abstract

The National Research Council (2009 & 1996) and the National Research Agenda (Doerfert, 2011) have called for an examination of teacher professional development (PD) practices as a way to develop highly-qualified, expert teachers who can impact student learning. Little research has examined interactions between the elements of PD and teacher change in practice. This study begins to address this void by exploring the various elements of high quality teacher PD and teachers' perceptions about the PD content over the course of a year following the participation in the NATAA program. Using a conceptual model to guide the study of high-quality teacher professional development, respondents completed a variety of instruments to assess their perceptions of the elements of high-quality professional development at four points throughout the year following their participation in a NATAA workshop. The researchers found a positive correlation between the two main content topics of the professional development. There were additional positive and negative relationships identified, however they were not consistent throughout all four data collection points. Additional research is needed to explore the complex relationships which exist within teacher professional development.

Introduction

The National Research Council (2009 & 1996) and the National Research Agenda (Doerfert, 2011) have called for an examination of teacher professional development (PD) practices as a way to develop highly-qualified, expert teachers who can impact student learning. While research has focused mainly on teacher satisfaction, commitment to innovation (Desimone, 2009), and detailing key characteristics and design elements of PD (Good, 2007), little research has examined interactions between the elements of PD and teacher change in practice. This study begins to address this void by exploring the various elements of high quality teacher PD and teachers' perceptions about the PD content over the course of a year.

The National Agriscience Teacher Ambassador Academy (NATAA) is one of the longest running national PD opportunities for secondary agriculture teachers. NATAA utilizes a train-the-trainer (TtT) PD model to provide a select group of teachers from across the United States with an intensive, weeklong PD program that immerses them in science integration and inquiry-based instruction (IBI) (Myers & Parker, 2011). Upon completion, those teachers become ambassadors, or trainers, and are expected to conduct workshops to help additional teachers learn how to utilize IBI in their classrooms. Research has shown that NATAA creates change in the trainers' teaching practices (Myers, Thoron, & Thompson, 2009; Shoulders & Myers, 2011; Thoron, Myers, & Abrams 2011). However, the impact of ambassador-led workshops on the participants' teaching practices had not been determined.



Conceptual Framework

High-quality teacher professional development has been a necessity for teachers to continually update their knowledge and practices related to the profession. The effectiveness of professional development for teachers must be considered throughout the process, beginning
Figure 1. A model for the study of high-quality teacher professional development utilizing train-the-trainer model for professional development. (Adopted from Borko, 2004; Guskey & Sparks, 1996) with the planning process and following through to the improvement of student learning outcomes (Guskey & Sparks, 1996). Teacher professional development is a multidimensional process that involves complicated relationships between professional development, teacher change, and improvements in student learning (Guskey & Sparks, 1996). Many models have theorized relationships between elements of teacher professional development that have a positive impact on teacher knowledge and skill as well as student learning outcomes (Guskey & Sparks, 1996; Loucks-Horsley & Matasuma, 2000; Borko, 2004).

A conceptual model was used to guide this study and explain high-quality teacher PD utilizing the train-the-trainer (TtT) form of PD (adopted from Borko, 2004; Guskey & Sparks, 1996). High-quality teacher PD directly impacts teacher knowledge and practice, which in turn influences student learning outcomes. Teacher participants' knowledge and practice related to the adaptation of PD content are also influenced by school culture and the educational policies imposed within their school systems. School culture and educational policies also influence teacher PD and student learning outcomes. When discussing high-quality teacher PD, literature has identified a set of core facets to consider, which include duration, active participation, collective participation, form, coherence, and content (Desimone, 2009).

The central focus of the theoretical model guiding this study (Figure 1) is high-quality teacher professional development. Although it has no direct impact on student learning outcomes, professional development is an important and necessary part of improvements in student learning (Guskey & Sparks, 1996). Though little is known empirically about high-quality professional development, a core set of facets that comprise effective high-quality professional development has gained consensus (Desimone, 2009; Garet et al., 2001). These facets provide a theoretical framework for examining the quality of a diverse array of professional development opportunities provided for teachers. The educational literature has suggested that these features are critical to improving teacher knowledge and skills which, in turn, create change in teaching practices, leading to positive student learning outcomes (Grieman, 2010). Content, duration, coherence, active learning, collective participation, and format are explicit facets that represent a guide for the considerations which must be made in order to develop and plan a high-quality professional development program.

Literature has theorized that content may be the most important factor in teacher professional development. Content is the knowledge and skills that have been selected for teachers to learn to enhance their professional practices (Guskey & Sparks, 1996; Loucks-Horsley & Matasumo, 2000). Greiman (2010) emphasized the need to complement content knowledge by also presenting pedagogical knowledge within professional development programing.

Literature concerning the duration of professional development has indicated that two aspects of time should be considered for professional development. The first is the number of contact hours spent on the professional development activity, emphasizing the time spent at a professional development event (Desimone, 2009; Garet et al., 2001). The second is the time span over which the professional development activities occur (Desimone, 2009; Garet et al., 2001). Both elements of duration contribute to the effectiveness of professional development, because as time increases, a deeper discussion of content and pedagogical strategies may occur.

Three elements are of importance when describing the coherence of professional development experiences. The professional development opportunities must align with the individual teacher knowledge, beliefs, and practices, as well as the school, district, state and federal expectations and trends. Additionally, professional development opportunities should also be coherent with previous, concurrent, and future professional development opportunities they have participated in (Desimone, 2009; Garet et al., 2001). Professional development must build and expand on previous professional development experiences by helping teachers make connections to what they have previously learned.

Teachers must be actively engaged in their own learning, just as they engage their students in the learning process (Garet et al., 2001). Garet et al. (2001) described active learning as learning that involves teachers in "meaningful discussion, planning and practice" (p. 925). Active participation, also referred to as active learning, should occur both during the professional development and as part of the follow-up procedures that are incorporated as teachers apply the professional development content to their classrooms (Guskey & Yoon, 2009).

Collective participation allows for teachers who participate in professional development to interact and support each other as they implement the professional development innovation in their own classrooms. Desimone (2009) articulated that collective participation can occur through "participation of teachers from the same school, grade, or department" (p. 184).

The core facets of High-Quality Teacher Professional development can be implemented in a variety of ways, which develop into different forms of professional development. In each professional development there are relationships between the context of the PD, the PD program, the facilitator, and the participant. In this study a Train-the-Trainer (TtT) form of professional development was utilized (as shown in Figure 1).

The conceptual model for this study then connects the high-quality professional development to teacher knowledge and practice. Professional development has a direct effect on teacher knowledge and practices, which directly influences student learning outcomes. Teacher knowledge and practices are the most significant outcome of any professional development effort (Guskey & Sparks, 1996; Loucks-Horsley & Masumoto, 1999). If professional development does not change teacher professional knowledge or classroom practices, then improvements in student learning should not be expected (Guskey & Sparks, 1996). Loucks-Horsley and Matsumoto (1999) recognized that teacher learning, in both knowledge and practice, is the connection between teacher professional development and student learning.

The model for high-quality teacher professional development recognizes the impact educational policies make on teacher knowledge and practice, as well as the professional development experience and student learning outcomes. New course mandates, curriculum frameworks, testing and policies cannot produce increases in student learning without an investment in the professional development of teachers, as the need for changes in teaching practices have often been founded on changes in educational policy (Darling-Hammond & McLaughlin, 2011).

Additionally, the conceptual model recognizes the importance of school culture on the study of professional development. School culture represents the elements of a teacher's specific school system, including but not limited to administration, peer teachers, parents and students that may contribute to the school environment. The importance of a supportive school culture to professional development became "…clear in the 1960s and 1970s when teachers who attended exciting National Science Foundation-funded institutes found it difficult to apply their learning once they returned to their own schools" (p. 265), as they lacked the administrative, collegial, material, and parental support to use new practices learned through the professional development (Loucks-Horsley & Matsumoto, 1999).

The final aspect of the Model is student learning outcomes. Student learning outcomes have been the paramount purpose of education, as all elements of schooling demand that students learn. Desired student learning outcomes influence the educational policies and the school culture, as well as the knowledge and skills needed by teachers. Goals for student learning outcomes influence high-quality teacher professional development, as they have demanded that teacher knowledge and practice are current and effective. Designing professional development programs with clear student learning outcomes in mind requires those designing professional development to cultivate an ideal mix of effective practices that lead to the desired results (Guskey, 2000).

Purpose and Objectives

The purpose of this study was to determine the relationship between NATAA workshop participants' perceptions of science integration in agriculture and IBI and selected elements of the high-quality teacher PD model over the course of a year following a workshop. The objective for this study was to determine the correlations between the teacher variables, PD program variables, school culture, and other PD at four points throughout the year following the participants' participation in the NATAA workshop.

Methods

This study used a quasi-experimental, post-test only design. A post-test only design was utilized because the population for the study could not be identified prior to their participation in the workshop. The study's population was secondary agricultural teachers who attended NATAA workshops at the 2012 National FFA Convention and the 2012 National Association of Agriculture Educators (NAAE) National Convention. This study was a census, so all members of the population were contacted to participate in the study.

The survey instrument used in this study was based on two instruments used by other researchers examining science integration and inquiry-based instruction related to agriscience education (Dunbar, 2002; Layfield, Minor, & Waldvogel, 2001; Thompson & Balschweid, 1999; Thompson & Schumacher, 1998). Additional questions were added to the survey instrument, concerning professional development experiences and school culture that related to the objectives of the study. A panel of experts consisting of faculty from the University of Florida reviewed the instrument for face and content validity.

The Integrative Science Survey (ISS) instrument developed by Thompson and Schumacher (1998) was used to identify participant perceptions of integrating science and agriculture. The instrument used 5-point Likert-type scales to assess teacher perceptions related to preparation for, barriers to, and support for integrating science into agriculture programs. The Inquiry-based Teaching Techniques (ITT) instrument was used to examine teachers perceptions related to their use of inquiry-based teaching practices. The ITT instrument asked teachers to report the frequency of engagement in inquiry-based instructional practices and their perceptions of IBI on student learning outcomes. The School Culture Survey (SCS) was developed by Gruenert and Valentine (1998) and based on literature related to school culture, effective school cultures, and collaborative school cultures. The instrument included 35 Likert-type questions, from strongly disagree to strongly agree, that examined six factors related to school culture (Gruenert, 1998). The six factors were: (a) collaborative leadership, (b) teacher collaboration, (c) professional development, (d) collegial support, (e) unity of purpose, and (f) learning partnerships. The Teacher Attitudes about Professional Development (TAP) scale was developed by Torff, Sessions, and Brynes (2005) to assess how favorably teachers respond to professional development initiatives. The TAP scale used five Likert-type questions (strongly agree to strongly disagree) to measure how professional development impacts teaching practices. Additional questions were added to assess the participants' perceptions of the core facets of professional development, as identified in the conceptual model. The PostHoc reliability for each instrument was assessed at each data collection point; the results can be found in table 1.

Table 1. PostHoc reliability of instruments

Instrument	Reliability Coefficient (α) January	May	September	December
ISS	.96	.96	.86	.89
ITT	.99	.90	.86	.92
SCS			.94	.95
Collaborative Leadership			.88	.85
Teacher Collaboration			.79	.81
Professional Development			.79	.76
Unity of Purpose			.81	.88
Collegial Support			.78	.69
Learning Partnerships			.69	.73
Core Facets				
Coherence			.91	.84
Active Participation			.92	.84
TAP				.75

Data were analyzed through SPSS version 20. Pearson's Product Moment or point bi-serial correlations were calculated. Findings are summarized following the study's objectives.

A majority of respondents in this study were female (60.5%), and the mean age of respondents was 40. The average number of years of teaching experience for the respondents was 14.64 (SD = 8.97) with 9.39 (SD = 7.13) years at their current school. Many of the respondents had previously attended an NATAA workshop (50.9%) and a majority had attended other workshops focused on science integration in agriculture (55.3%). Additionally, many respondents reported conducting scientific research, 43.4%. Respondents had a variety of post-secondary education levels, ranging from a bachelor's degree to a doctoral degree.

Findings

A summary of the findings within each instrument are provided to provide context for the correlations which were the objective of this study. The ISS asked participants to complete subscales assessing their perceptions towards: integration of science, preparation to integrate science, support for integration, and the student impact of integration, barriers to integration, and their level of integration. The ISS was administered at all four data collection points and the grand means were as follows: January was 3.74 (SD = .37), May was 3.79 (SD = .27), September was 3.66 (SD = .30) and December 3.82 (SD = .39). The grand means indicate respondents' tendencies to have favorable perceptions of science integration overall.

Respondents completed the TAP scale in December to assess their attitudes towards professional development. The grand mean for the TAP construct was 3.93 (SD = .45), indicating respondents had generally positive attitudes towards professional development. A vast majority of the respondents (90.1%) believed the professional development events they had attended enriched their teaching practice. Additionally a vast majority of the respondents

(81.3%) agreed that professional development helped teachers develop new teaching techniques. A majority of the respondents reported professional development has had an impact on their teaching (71.7%), and professional development events were worth their time (82.5%). However, only 30.1% of the respondents disagreed with the statement "if I did not attend inservice workshops they would not be able to improve their teaching".

The SCS was composed of 35 items, with 6 subscales: collaborative leadership, teacher collaboration, professional development, unity of purpose, collegial support, and learning partnerships. The mean score and standard deviation for the scale and each subscale are shown in Table 2. The mean score of the overall SCS scale was 3.20 (SD = .57) in September and 3.31 (SD = .56) in December. In September, the mean score for each of the six subscales fell between 2.73 and 3.43. The subscale of professional development had the highest mean (3.43, SD = .72), indicating it was the most agreed with and the subscale of teacher collaboration had the lowest mean (2.73, SD = .67), indicating it was the most disagreed with. In December, the mean scores for each of the six subscales fell between 2.79 and 3.60. The subscale of collegial support had the highest mean (3.60, SD = .60), indicating that respondents agreed with it the most, while the subscale of teacher collaboration had the lowest mean (2.79, SD = .71), indicating that respondents disagreed with this subscale of school culture more. It should be noted that only 3 subscales had a mean outside of neutral. In September, both the subscales of collaborative leadership and teacher collaboration were below neutral, while in December only the scale of teacher collaboration was below neutral.

Table 2. Means for school culture survey

	September		December	
	Mean	SD	Mean	SD
	Scale			
School Culture Survey	3.20	.57	3.31	.56
	Subscale			
Collaborative Leadership	2.96	.62	3.36	.58
Teacher Collaboration	2.73	.67	2.79	.71
Professional Development	3.43	.72	3.48	.78
Unity of Purpose	3.23	.74	3.56	.69
Collegial Support	3.28	.82	3.59	.60
Learning Partnerships	3.15	.63	3.07	.75

Note. September n = 20. December n = 38

The respondents' perceptions of four facets of high-quality teacher PD were assessed: duration, collective participation, coherence, and active participation. A majority of respondents reported the length of time spent in the workshop was adequate for them to gain the knowledge and practice need to implement the workshop content in their classrooms (Sept. = 80.6%, Dec. = 67%). A majority of respondents did not attend the NATAA workshop with any teachers or administrators from their school (Sept. = 91.7%, Dec. = 90.5%). However, almost half of all respondents indicated that they attended the workshop with teachers or administrators from their state. A vast majority of respondents indicated that the workshop aligned with their individual beliefs concerning science integration (Sept. = 80.6%, Dec. = 67%), and their prior knowledge about science integration and IBI (Sept. = 80.6%, Dec. = 67%). More than half of the respondents indicated that the NATAA workshop aligned with their school or school district, state, and national policies. In regards to active participation in the NATAA workshop, a majority of respondents indicated that they had the opportunity to ask questions during the workshops (Sept. = 80.6%, Dec. = 67%) and complete the student activity/experiment that was provided by the workshop (Sept. = 80.6%, Dec. = 67%).

The two variables within this study that represented the content focus of the workshop, agriscience Integration (ISS) and IBI (ITT), were found to have moderate positive relationships at three of the data collection points (Jan. r = .35, Sept. r = .45, Dec. r = .43). Additionally, a low positive correlation was found between science integration in agriculture and IBI in May (r = .21).

In January (see Table 3), a positive moderate correlation was found between the ISS and the number of years respondents reported being a teacher (r = .32).

Table 3. Correlations between variables in January

	1	2	3	4	5	6	7	8	9	10
1. ISS	--	.35	.09	.00	-.28	-.18	-.10	.12	.32	.16
2. ITT		--	-.04	-.02	-.15	.10	-.19	.22	.10	.02
3. IS into C			--	.57	.66	.51	-.02	.10	-.33	-.65
4. C with I				--	.35	.82	-.06	.54	-.30	-.64
5. Formed CR					--	.29	.08	.01	-.42	-.56
6. Prior NATAA Participation						--	.02	.68	-.29	-.62
7. CSR							--	-.02	-.13	-.08
8. Gender								--	-.41	-.51
9. Years Teaching									--	.82
10. Age										--

Note. ISS = Integrative Science Scale; ITT = Inquiry-Based Teaching Techniques Scale; IS into C = Integrated Science into Curriculum; C with I = Content with levels of integration; Formed CR = Formed collaborative relationships; Prior NATAA Participation = had previously participated in a NATAA workshop; CSR = Conducted Scientific Research; Gender = Men were the baseline; Years Teaching = Number of years teaching. n = 53.

In May, there was also a positive moderate correlation between the ITT and respondents who had integrated science into the curriculum (r = .40) and those who were content with their levels of science integration (r = .31) (see Table 4).

Table 4. Correlations between variables in May

	1	2	3	4	5	6
1. ISS	--	.21	.07	-.22	-.07	.14
2. ITT		--	.40	-.31	.23	.26
3. IS into C			--	.11	.01	.22
4. C with I				--	.06	.04
5. Formed CR					--	.29
6.SS for SI						--

Note. ISS = Integrative Science Scale; ITT = Inquiry-Based Teaching Techniques Scale; IS into C = Integrated Science into Curriculum; C with I = Content with levels of integration; Formed CR = Formed collaborative relationships; SSforSI = Sought Support for Science Integration. *n* = 50.

In September (see Table 5), three moderate correlations were found between the ISS and independent variables. A positive moderate correlation was found between the ISS and the core facet of active participation (r = .40) as well as for respondents who had sought support for science integration (r = .33). A negative moderate correlation was found between the ITT and the overall school culture survey (r = -.52). The ITT was found to be moderately negatively associated with the constructs of the core facet element of time (r = -.35), the collaborative leadership element of school culture (r = -.45), and respondents who sought support for science integration (r = -.39). A positive moderate association existed between the ITT and the core facet of active participation (r = .35).

In December (see Table 6), the ITT was found to be moderately positively associated with teachers who reported they integrated science into their curriculum (r = .30), formed collaborative relationships (r = .40), and conducted scientific research (r = .34). The ITT was found to be moderately negatively associated with teachers' perceptions of school culture: overall school culture (r = -.42), teacher collaboration in school culture (r = -.31), PD in school culture (r =-.33), unity of purpose in school culture (r = -.33), and learning partnerships in school culture (r = -.31). Additional positive and negative correlations of low magnitudes were found in great variation among the dependent and interdependent variables at each data collection point.

Conclusions and Implications

As respondents' perceptions of science integration in agriculture became more positive, teachers' implementation of IBI increased. This moderate, or low, positive relationship indicates that positive perceptions of science integration in agriculture and implementation of IBI are closely related. It may indicate that teachers with positive perceptions of science integration are more willing to implement science teaching techniques such as IBI. It may also indicate that as teachers implement IBI, their perceptions of science integration into agricultural education become more positive. These close relationships provide a foundation for how to increase teachers' use of IBI and support for science integration in to agricultural education programs.

The great variety in the correlations between elements of high-quality teacher PD and teachers' perceptions of science integration in agriculture provides support for further research examining the relationship between the variables. As teachers' perceptions of the NATAA workshops implementation of core facets such as coherence and active participation increased so did their perceptions of science integration in agriculture. This implies that when teachers deemed the PD to be coherent with their individual beliefs, as well as the current state and national policies, they have more positive perceptions of science integration in agriculture. This may also indicate that they selected to attend the PD because it aligned with their previous beliefs about science integration in agriculture.

There was not a significant relationship found between the core facet of collective participation and the teachers' perceptions of science integration in agriculture. A majority of respondents indicated that there were no other teachers from their school or school district who participated in the NATAA workshop with them, however there were agriculture teachers from their state within the NATAA workshop. This may indicate that there was not a sense of collaboration created within the workshops due to the physical distance between respondents teaching locations.

Table 5. Correlations between variables in September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. ISS	--	.45	.59	.40	-.50	-.34	-.52	.21	-.25	-.17	-.16	-.01	-.02	.26	.33
2. ITT		--	.15	.35	-.39	-.21	-.45	.29	-.24	-.24	-.13	.03	-.09	-.19	-.39
3. CF - C			--	.80	-.06	.56	.48	.44	.31	.41	.49	.38	.20	.01	.11
4. CF – AP				--	.05	.57	.64	.23	.54	.34	.42	.09	.01	-.14	-.01
5. CF - Time					--	.17	.12	-.18	.21	.17	.03	-.32	.08	-.29	.35
6. SCS						--	.89	.60	.75	.85	.93	.69	.12	-.28	-.05
7. SCS – CL							--	.34	.77	.65	.71	.42	.14	-.35	-.07
8. SCS – TC								--	-.01	.45	.74	.49	.17	-.06	-.04
9. SCS – PD									--	.58	.51	.19	-.06	-.26	-.17
10. SCS – UofP										--	.78	.69	-.24	.19	.19
11. SCS – CS											--	.69	.07	-.05	-.10
12. SCS – LP												--	-.21	.41	-.23
13. C with I													--	-.65	.11
14. Formed CR														--	.14
15. SS for SI															--

Note. ISS= Integrative Science Scale; ITT = Inquiry-Based Teaching Techniques Scale; CF-C = Coherence Core Facet; CF-AP = Active Participation Core Facet; CF-Time = Adequate amount of time in PD; SCS = School Culture Scale; SCS- CL = Collaborative Leadership in SCS; SCS-TC = Teacher Collaboration in SCS; SCS-PD = Professional Development in SCS; SCS-UofP = Unity of Purpose in SCS; SCS-CS = Collegial Support in SCS; SCS-LP = Learning Partnership in SCS; C with I = Content with levels of integration; Formed CR = Formed Collaborative Relationships; SSforSI = Sought Support for Science Integration. n = 25.

Table 6. Correlations between variables in December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. ISS	--	.43	.67	.14	-.06	-.17	-.22	-.23	-.23	-.02	-.04	-.12	.04	.26	.21	.04	.65	.08
2. ITT		--	-.15	-.17	.01	-.42	-.26	-.31	-.33	-.33	-.17	-.31	.09	.30	.40	-.01	.34	-.01
3. CF - C			--	.27	-.12	.15	.01	-.01	.02	.34	.30	-.00	.20	.12	.08	-.28	.14	-.14
4. CF – AP				--	-.40	.18	.20	.17	.16	.10	.07	-.14	.15	-.11	.07	.05	-.14	-.01
5. CF - Time					--	.03	.06	.09	.09	-.07	-.03	-.03	.09	.08	.22	-.28	.16	.08
6. SCS						--	.93	.84	.81	.92	.88	.63	.30	.05	.02	-.15	-.31	-.25
7. SCS – CL							--	.72	.67	.86	.79	.52	.26	.05	.03	-.05	-.28	-.17
8. SCS – TC								--	.98	.67	.64	.42	.20	.20	.08	-.16	-.20	-.33
9. SCS – PD									--	.66	.61	.40	.20	.16	.04	-.18	-.24	-.30
10. SCS–UofP										--	.85	.49	.33	.09	-.08	-.20	-.31	.23
11. SCS–CS											--	.48	.32	.10	.08	-.17	-.28	-.19
12. SCS–LP												--	.14	-.23	.18	-.06	-.23	-.13
13. TAP													--	-.03	.11	-.09	-.06	-.07
14. IS into C														--	.29	-.19	.14	.11
15. FormedCR															--	.03	.08	-.21
16. SSforSI																--	-.06	.22
17. CSR																	--	-.13
18. YT																		--

Note. ISS = Integrative Science Scale; ITT = Inquiry-Based Teaching Techniques Scale; CF-C = Coherence Core Facet; CF-AP = Active Participation Core Facet; CF-Time = Adequate amount of time in PD; SCS = School Culture Scale; SCS- CL = Collaborative Leadership in SCS; SCS-TC = Teacher Collaboration in SCS; SCS-PD = Professional Development in SCS; SCS-UofP = Unity of Purpose in SCS; SCS-CS = Collegial Support in SCS; SCS-LP = Learning Partnership in SCS; TAP =Teacher Attitudes towards Professional Development; IS into C = Integrated Science into Curriculum; Formed CR = Formed Collaborative Relationships; SSforSI = Sought Support for Science Integration. CSR = Conducted Scientific Research; YT = Number of years teaching. $n = 38$.

Additionally these findings indicated that respondents who conducted scientific research had more favorable perceptions of science integration in agriculture, and indicated that getting secondary teachers involved with research influenced their perceptions of science in agriculture. Also, those teachers who sought support for integrating science had more positive perceptions of science integration into agriculture courses. This indicates that support does play an important factor in teachers' implementation of science integration. Though follow-up supports were not proved by this PD, it is essential to explore other options of support, especially those that are founded in teacher networking and building teachers' personal relationships.

Respondents who had integrated science into the curriculum and those who were content with their levels of teaching had implemented IBI methods more frequently. Additionally, as IBI implementation increased, the respondents' perceptions of active participation within the workshop increased. However as respondents' perceptions of IBI increased, their perceptions of school culture decreased. An examination of the subscales of school culture in relation to teachers' use of IBI indicated that as respondents utilized IBI more frequently, respondents' perceptions of teacher collaboration, PD, unity of purpose and learning partnerships in school culture decreased. This indicates that the implementation of IBI and the school culture, as well as the individual subscales, may be closely related and may have negatively impacted each other.

Recommendations

This study provides evidence supporting the complex relationships between elements of high-quality PD. Based upon the findings of this study related to PD, additional research is needed to explore the relationships within effective PD for secondary agriculture teachers. Additional studies are needed in agricultural education, as well as teacher education in general, investigating the best methods of teacher PD. Replication of this study involving different groups of teachers and different combinations of the core facets of PD will add to the body of knowledge for the profession. Additionally, this study only gathered data on respondents' perceptions of the core facets of PD. Further research should be conducted that determines the actual implementation of the core facets within a PD experience and the impact they have on teacher knowledge and practice.

This study found that elements of high-quality teacher PD can positively relate to and predict teachers' perceptions of PD content, which yield several recommendations for individuals responsible for teacher PD activities. When planning teacher PD experiences, the core facets of PD should be considered. The coherence of the PD with respondents' individual beliefs and experiences may play a vital role in their implementation of the PD program content. Additionally, active participation at PD programs is essential. PD programs should examine the time needed in relation to the content of the PD. PD opportunities focused on content knowledge development should utilize experts from the field to assist teachers in building their knowledge.

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How Cognitive Style, Problem Complexity, and Hypothesis Generation Affect the Problem Solving Ability of School-Based Agricultural Education Students

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Abstract

The purpose of this experimental study was to assess the effects of cognitive style, problem complexity, and hypothesis generation on the problem solving ability of school-based agricultural education students. Problem solving ability was defined as time to solution. Kirton's Adaption-Innovation Inventory was employed to assess students' cognitive style as more adaptive *or* more innovative. *Students were assigned randomly, by cognitive style, to solve either a simple or complex problem in small gasoline engines. A three-way independent analysis of variance revealed that a statistically significant interaction effect between the independent variables did not exist. Additionally, the two-way interactions between cognitive style and problem complexity, and cognitive style and hypothesis generation were not statistically significant. A statistically significant interaction effect, however, did exist between problem complexity and hypothesis generation. A simple main effects test revealed the students who hypothesized correctly were the most efficient problem solvers. Future research should require students who generate an initial incorrect hypothesis to re-hypothesize prior to attempting to solve the problem. Educators should encourage students to engage in metacognitive activities, such as hypothesizing, prior to engaging in problem solving activities.*

Introduction and Literature Review

"The central point of education is to teach people to think, to use their rational powers, [and] to become better problem solvers" (Gagné, 1980, p. 85). Problem solving is one of the most important outcomes of learning people use in their everyday and professional lives (Jonassen, 2000). In fact, the ability to solve problems has been identified consistently as an essential skill needed for entry-level employment in the agricultural industry (Alston, Cromartie, Wakefield, & English, 2009; Graham, 2001; Robinson, 2009; Robinson & Garton, 2008; Robinson, Garton, & Terry, Jr., 2007). Employers desire those who are creative, inventive, and can think on their feet and solve problems (MacPherson, 1998; Robinson, 2009; Robinson & Garton, 2008; Robinson, Garton, & Vaughn, 2007). To be successful, people need to be able to "solve critical, complex problems, in challenging environments" (Kirton, 2003, p. 1).

A problem is "a situation in which you are trying to reach some goal, and must find a means for getting there" (Chi & Glaser, 1985, p. 229). Problems can be classified as well-structured or ill-structured (Jonassen, 1997). Well-structured problems are common in school settings and provide the problem solver a (a) defined initial state, (b) known goal, and (c) known operational constraint (Jonassen, 1997). Ill-structured problems may (a) not have a clearly defined initial state, (b) consist of unknown elements, (c) have more than one potential solution, and (d) be situated in more than one domain (Jonassen, 1997). Another variation in problem typology is complexity, which is defined by the "number of issues, functions, or variables involved in the problem" (Jonassen, 2000, p. 67). Problem difficulty is a function of complexity, but the two are not synonymous. Typically, problem complexity and problem structure are related; ill-structured problems tend to be more complex than well-structured problems (Jonassen, 2000).

The fundamental goal of education is to foster student learning. Although learning is not synonymous to problem solving, the two are highly connected (Jonassen, 2000; Schunk, 2008). A key to effective problem solving lies in students' ability to become self-regulated learners (Schunk, 2008). Research has indicated that children begin to develop capacity for recognizing problem space and creating mental models for solving problems as early as four years of age (Halford, 1993). Problem space, or mental model representation, is a key process for problem solving, especially regarding technical problems (Jonassen, 2000; Newell & Simon, 1972).

Technical problem solving, or troubleshooting, is a specialized subset of general problem solving where the problem is ingrained in a real-life situation, and the troubleshooter engages in diagnosing a fault (Custer, 1995; Jonassen, 2000; MacPherson, 1998). Prior research in troubleshooting has investigated the problem solving differences between experts and novices. Johnson (1988) and Gitomer (1988) found that experts were able to construct mental models of a troubleshooting task better than novices. Similarly, Johnson (1989) reported differences in troubleshooting ability were attributed to the variety of information acquired. Other researchers have investigated the influence of individual characteristics, such as cognitive style, in the troubleshooting process. Henneman and Rouse (1984) reported that cognitive styles are good predictors of troubleshooting ability. Conversely, MacPherson (1998) reported that cognitive style was an ineffective predictor of problem solving performance.

Agricultural education scholars also have investigated problem solving, troubleshooting, and cognitive styles. Pate, Wardlow, and Johnson (2004) conducted an experimental study to investigate troubleshooting performance when utilizing the think-aloud pair problem solving (TAPPS) technique. Students who utilized TAPPS were more successful; however, no differences in time to solution were reported. Similarly, Pate and Miller (2011) conducted an experimental study to determine the effects of TAPPS on secondary students enrolled in small gasoline engine technology courses. There were no statistically significant differences found in problem solving success of students who utilized the TAPPS technique and those who worked independently. Blackburn, Robinson, & Lamm (2014) sought to determine if student's cognitive style, as measured by Kirton's (2003) Adaption-Innovation Inventory (KAI-I), and problem complexity affected problem solving ability in the context of small gasoline engines. No statistically significant differences in time to solution were found based on cognitive style. However, a statistically significant difference in time to solution based on problem complexity was detected (Blackburn et al., 2014).

Researchers in agricultural education also have utilized Kirton's (2003) Adaption-Innovation (KAI) Theory to investigate differences in problem solving ability. Friedel, Irani, Rhoades, Fuhrman, and Gallo (2008) sought to explore the relationships between critical thinking and problem solving in the context of Mendelian genetics. No statistically significant relationships were found between critical thinking skill and total cognitive style or critical thinking disposition. Critical thinking disposition showed no statistically significant relationship to problem solving level, nor was cognitive style found to be related to problem solving level (Friedel et al., 2008). Lamm, Rhoades, Irani, Unruh Snyder, and Brendemuhl (2011) investigated the relationships between critical thinking disposition, problem solving (cognitive) style, and learning styles of undergraduates who participated in a study abroad program. No relationship was found between cognitive style and learning styles of the students. A low, positive relationship was found between cognitive style and critical thinking disposition.

Using KAI (Kirton, 2003) theory and Bransford's (1984) IDEAL problem solving model as a frame, Lamm et al. (2012) investigated how cognitive style influenced group problem solving of students who attended a study abroad course. Focus groups were conducted with a homogenous, adaptor group; a homogeneous, innovator group; and a heterogeneous group consisting of both adaptors and innovators. The homogeneous, innovator group progressed through all stages of the IDEAL problem solving model. The homogeneous, adaptor group did not progress through all stages of the IDEAL model, and spent most of their time in the anticipating before acting stage. The heterogeneous group was able to progress through all stages of the IDEAL model, but not in a linear fashion (Lamm et al., 2012). After a review of the literature, it was determined that few studies have been conducted investigating school-based agricultural education students' ability to solve problems in authentic contexts.

Theoretical Frame

The theoretical framework employed in this study was Johnson's (1989) model of technical troubleshooting (see Figure 1). This model is comprised of two phases. The first, hypothesis generation, is when the troubleshooter seeks and interprets information with the goal of formulating a hypothesis. The information sought is derived from both internal and external sources (Johnson, 1989). Internal information includes both declarative and procedural knowledge within long-term memory (Schunk, 2008). Troubleshooters must possess and be able to utilize these types of knowledge. External information is gathered from sources such as job aids, technical support and evaluations, and sensory evaluation (Johnson, 1989). After the necessary information is gathered, the troubleshooter determines whether or not hypotheses can be made (Johnson, 1989). Individuals engaged in troubleshooting must have the ability to use symptom information to generate and test possible hypotheses about the faulty system (Jonassen, 2001).

If the troubleshooter is able to generate a hypothesis, then he or she can transition into the hypothesis evaluation phase of the model. If necessary, additional information is gathered so that the troubleshooter can evaluate the hypothesis (Johnson, 1989). Once the hypothesis is evaluated, the troubleshooter makes a decision to confirm or disconfirm the hypothesis. If the hypothesis is confirmed, then the troubleshooter pursues a course of action to correct the problem. If the hypothesis is disconfirmed, the troubleshooter cycles back to the first phase of the model and generates a new hypothesis to evaluate (see Figure 2). More successful troubleshooters are able to generate accurate hypotheses to solve problems quickly (Vasandani & Govindaraj, 1991).

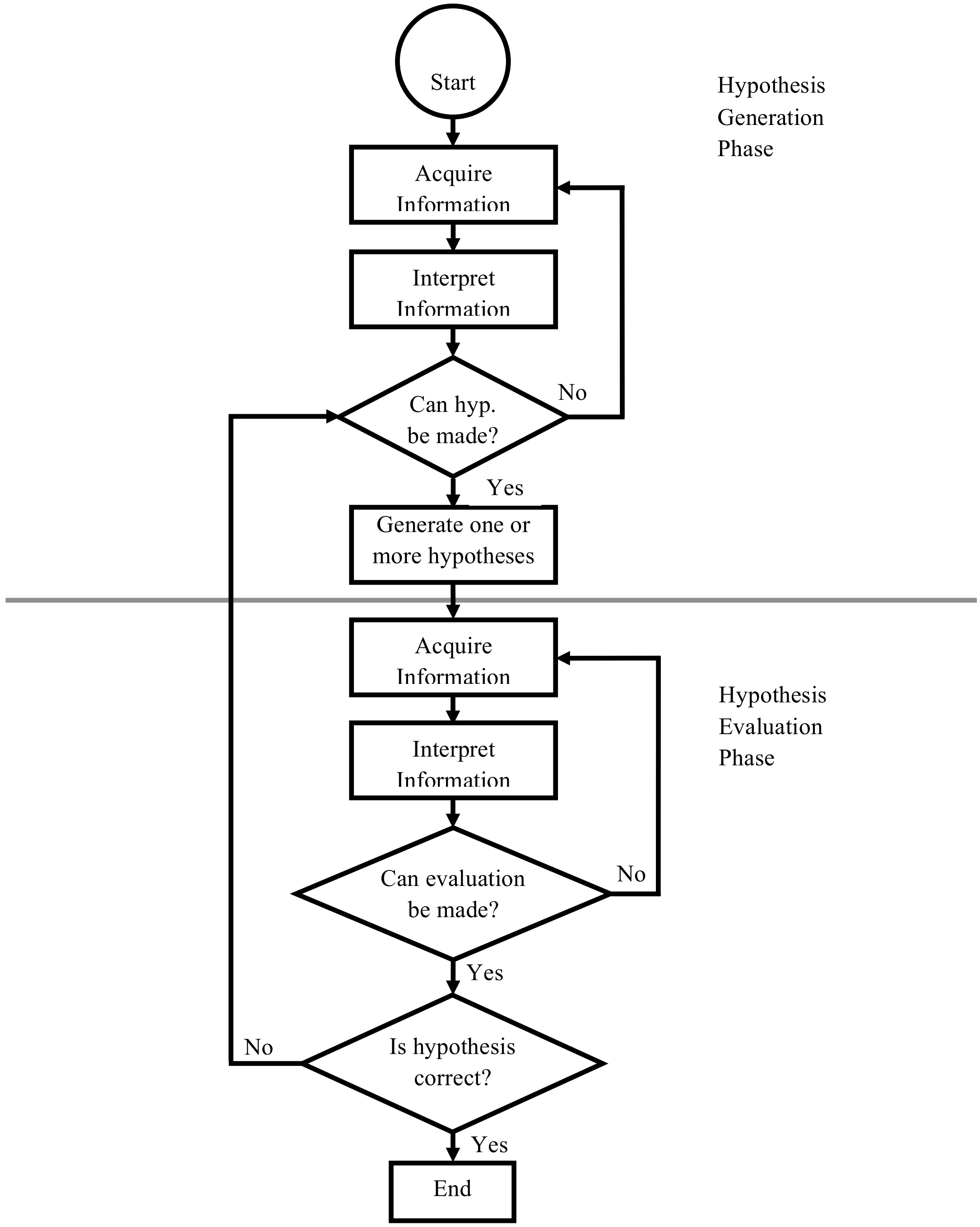

Figure 1. Technical Troubleshooting Model. Adapted from "A description of expert and novice performance differences on technical troubleshooting tasks" by S. D. Johnson, 1989, *Journal of Industrial Teacher Education, 26*(3), p. 20. Copyright 1989 by *Journal of Industrial Teacher Education.* Reprinted with permission.

Conceptual Framework

Conceptually, this study was underpinned using the KAI (Kirton, 1976; 2003) theory. Specifically, A-I theory is concerned with "individual differences in the way humans solve problems" (Kirton, 2003, p. 1). These individual differences are known as cognitive style (Kirton, 2003). Cognitive style is the preference for the approach people take when solving a problem. It remains stable regardless of age or experience (Kirton, 2003). The term *preferred* is used purposefully to indicate a difference between cognitive style and the behavior of solving a problem. Cognitive style thereby influences the behavior of the problem solver. Cognitive style is located along a normally distributed continuum, ranging from highly adaptive to highly innovative (Kirton, 2003). Individuals are neither completely adaptive nor completely innovative; however, there are common characteristics of each cognitive style. The more adaptive prefer problems that are more structured. They tend to work in the boundaries of the current paradigm, and prefer technical solutions (Kirton, 2003; Kirton, Bailey, & Glendinning, 1991; Lamm et al., 2012). On the opposite end of the continuum are innovators who prefer problems that are less structured. They tend to become frustrated by boundaries, and are less concerned with technical solutions (Kirton et al., 1991; Lamm et al., 2012).

MacPherson (1998) expressed concern that few studies investigated the relationship of factors related to problem solving and problem solving ability in authentic settings. Further, [Blinded Author] (2014) recommended that students' ability to generate hypotheses be investigated to determine effects on problem solving ability. Therefore, the principle question that arose from the review of literature was, What effect does problem complexity, hypothesis generation, and cognitive style have on students' ability to solve authentic problems in agriculture?

Purpose of the Study

The purpose of this study was to assess the effects of cognitive style, hypothesis generation, and problem complexity on the problem solving ability of school-based agricultural education students enrolled in an agricultural power and technology (APT) course. The following research questions guided the study:

1. What are the personal and educational characteristics of students enrolled in APT courses in Ohlahoma?
2. What interactions exist between problem complexity, hypothesis generation, and students' cognitive styles on the amount of time required to solve problems correctly?

The following null hypotheses guided the statistical analyses of the study:

$H_0$1: In the population, there is no statistically significant difference in the time required to solve problems due to the interaction of problem complexity, hypothesis generation, and cognitive styles.

$H_0$2: In the population, there is no statistically significant difference in the time required to solve problems due to the interaction of problem complexity and hypothesis generation.

$H_0$3: In the population, there is no statistically significant difference in the time required to solve problems due to the interaction of problem complexity and cognitive styles.

$H_0$4: In the population, there is no statistically significant difference in the time required to solve problems due to the interaction of cognitive styles and hypothesis generation.

Methods and Procedures

All agricultural education teachers in Oklahoma were afforded the opportunity to enroll in a two-day professional development workshop focused on small gasoline engines. The professional development occurred in June 2012 on the campus of Oklahoma State University. A total of 21 teachers attended the workshop. At the conclusion of the workshop, all teachers were provided 10 Briggs & Stratton® engines, as well as researcher developed curriculum based on the undergraduate small gasoline engines course at Oklahoma State University, as well as information available from Briggs & Stratton®. In all, seven teachers agreed to participate in the study by signing the instructor consent form. Per IRB regulations, the teachers also were required to obtain permission from school administration to continue in the study. After the agricultural education teacher recruitment was finalized, secondary students who were enrolled in each of the seven teachers' APT courses were asked to participate in the study. Following the guidelines set forth by IRB, students were asked to sign an assent form indicating their willingness to participate in the study. In addition, parental/guarding consent was obtained for students who were minors. A total of 77 students agreed to participate in the study. In all, 68 students completed all parts of the study, and 62 successfully identified the fault in their assigned engine.

This research study employed a Completely Randomized Factorial 2x2 (CRF-22) design (Kirk, 1995). CRF designs are appropriate when researchers desire to test the effects of multiple independent variables, as well as their combined effects (Ary, Jacobs, & Razavieh, 2002). Time to solution served as the dependent variable of this study and was operationalized as how many minutes each student required to identify correctly the fault in his or her assigned engine. To collect data, the researcher made two site visits to each participating school. During the first visit, students were administered the personal characteristics questionnaire and Kirton's (1976) Adaption-Innovation Inventory (KAI) to determine cognitive style. After the teachers taught the curriculum, the researcher made the second site visit to administer the treatment, in which students were assigned randomly to treatment groups by cognitive style (see Figure 2). Each student was provided a small gasoline engine with a preset fault and a written scenario describing the symptoms the engine would exhibit if a person had attempted to employ starting procedures. Prior to engaging in troubleshooting, students were required to generate a written hypothesis regarding their perception of the engine's problem on their problem scenario sheet. The faults were classified as either *simple* or *complex*. The simple fault was within the ignition system of the engine – in particular, a closed spark plug gap. The complex fault was within the fuel delivery system. Specifically, debris was placed in the main jet of the carburetor. For consistency, the engines utilized for the treatment of the study were of the same make and model the teachers used at the professional development session in June. To ensure fidelity of the treatment, teacher participants were provided resources to teach small gasoline engines content. Teachers were asked to teach 4-cycle theory, fuel systems and carburetors, electrical systems, and compression using the curriculum provided by the researcher. The teachers delivered the small gasoline unit of instruction between the first and second site visit by the researcher. Teachers provided the lesson worksheets to the researcher as evidence that each lesson was taught.

Problem Complexity

Cognitive Style Group		Simple (One)	Complex (Two)
	More Adaptive	Treatment Group A *n* = 19	Treatment Group B *n* = 12
	More Innovative	Treatment Group C *n* = 22	Treatment Group D *n* = 15

Figure 2. The results of random assignment of participants who completed all parts of the study fully into a completely randomized factorial (CRF) 2x2 design.

Validity of research findings is achieved when data interpretation "matches its proposed use" (Creswell, 2012, p. 159). One of the greatest concerns of scholars who design and conduct experimental research is controlling threats to internal validity (Gay, Mills, & Airasian, 2009). Seven of the eight threats to internal validity described by Campbell and Stanley (1963) were either controlled for by random assignment or were not applicable to the study. Experimental mortality, however, may have impacted the study. The entire sample of this study was 77 students from the seven schools; yet, only 68 completed all parts of this research study fully.

The KAI (Kirton, 2003) Inventory was used to determine students' cognitive style (Kirton, 1976). It consisted of 32 items. Scores range from 32 to 160, with a theoretical mean of 96 (Kirton, 2003). According to the theory, scores of 95 and below are considered more adaptive, while scores of 96 and higher are considered more innovative. Internal reliability coefficients of the KAI Inventory have ranged from 0.84 to 0.89 (Kirton, 2003), indicating it is a reliable instrument.

Data related to research question one were analyzed using frequencies and percentages. To answer research question two, a three-way, independent analysis of variance (ANOVA) was employed to determine the main and interaction effects of the independent variables (Field, 2009). Both statistical and practical significance were reported for this study. To determine statistical significance, an *a priori* alpha level of .05 was set. This alpha level was utilized to determine whether to reject the null hypotheses (Kirk, 1996). Effect size, specifically partial eta squared (η_p^2), was utilized to determine practical significance of the ANOVA model. Practical significance indicates whether the sample mean differences are "large enough to be useful in the real world" (Kirk, 1995, p. 64). Using the guidelines described by Cohen (1988), a *small* effect size is 0.0099, a *medium* effect size is 0.0826, and a, *large* effect size is 0.20. Additionally, Cohen's *d* statistic was calculated to determine practical significance of the simple main effects tests. Cohen's *d* was interpreted through the following guidelines reported by Cohen (1988) where 0.20 is a *small* effect size, 0.50 is a medium effect size, and 0.80 is a large effect size.

Findings

Research question one sought to identify characteristics of the students enrolled in an APT course at their respective high schools during the 2012–2013 academic year. In all, 59 students were male and nine were female. Regarding age of the students, 17 were 15 years old, 19 were 16 years old, 14 were 17 years old, 17 were 18 years old, and one student was 19 years old. Regarding academic classification, one student was a freshman, 33 were sophomores, eight were juniors, and 26 were seniors. Caucasian was the ethnicity selected most frequently with 59 students. Eight self-selected Native American as their ethnicity, and one indicated he or she was Hispanic.

The second research question sought to determine if interaction effects existed between the independent variables of cognitive style, problem complexity, and hypothesis generation. Regarding cognitive style, 31 (45.50%) of the students were *more adaptive* and 37 (54.41%) were *more innovative*. Prior to the troubleshooting task, students were asked to formulate a hypothesis of what they believed to be the fault. Regarding those assigned randomly to solve the simple problem, 20 students hypothesized correctly, and 13 hypothesized incorrectly (see Table 1). Regarding students assigned randomly to solve the complex problem, 20 generated a correct hypothesis, and 9 (38.24%) hypothesized incorrectly. The most efficient problem solvers were those who generated a correct hypothesis for the simple problem (M = 6.45 minutes; SD = 5.66). Those who generated an incorrect hypothesis for the complex problem required the longest time to identify the fault (M = 26.22 minutes; SD = 5.47). Regarding cognitive styles, the more innovative students who generated a correct hypothesis for the simple problem required an average of 4.17 minutes (SD = 3.81) to identify the solution. The more innovative students who generated an incorrect hypothesis for the complex problem required an average of 27.86 minutes (SD = 3.44).

Table 1

Mean Time to Solution for Treatment Conditions Problem Complexity, Hypothesis Generation and Students' Cognitive Style (n = 62)

Problem Complexity	Hypothesis Generation	Cognitive Style	*M*	*SD*	*n*
Simple Problem	Correct	More Adaptive	7.43	6.15	14
		More Innovative	4.17	3.81	6
		Total	6.45	5.66	20
	Incorrect	More Adaptive	19.25	10.91	4
		More Innovative	22.33	7.00	9
		Total	21.38	8.04	13
	Total	More Adaptive	10.06	8.69	18
		More Innovative	15.07	10.87	15
		Total	12.33	9.91	33
Complex Problem	Correct	More Adaptive	22.50	4.78	8
		More Innovative	19.67	11.10	12
		Total	20.80	9.04	20
	Incorrect	More Adaptive	20.50	9.19	2
		More Innovative	27.86	3.44	7
		Total	26.22	5.47	9
	Total	More Adaptive	22.10	5.28	10
		More Innovative	22.68	9.78	19
		Total	22.48	8.40	29

Prior to employing a three-way independent analysis of variance (ANOVA), Levene's test of error variances was calculated to ensure the assumption of equal variances was not violated. The Levene's test was not statistically significant at the .05 level, $F(7, 54) = 1.08$, $p = 0.392$. Therefore, ANOVA was utilized to determine main and interaction effects of problem complexity, hypothesis generation, and cognitive style on time to solution. The three-way interaction effect was not determined to be statistically significant (see Table 2). Specifically, the three-way interaction effect of problem complexity, hypothesis generation, and cognitive style yielded an $F(1, 54) = 0.19$, $p = 0.67$. Therefore, the researcher failed to reject the first null hypothesis.

Table 2
Analysis of Variance Summary Table for the Effect of Problem Complexity, Hypothesis Generation, and Students' Cognitive Style on Time to Solution

Source	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Problem Complexity	961.58	1	961.58	17.41	0.00	.244
Hypothesis Generation	902.44	1	902.44	16.34	0.00	.232
Cognitive Style	13.02	1	13.02	0.24	0.63	.004
Problem Complexity * Hypothesis Generation	390.46	1	390.46	7.07	0.01	.116
Problem Complexity * Cognitive Style	15.25	1	15.25	0.28	0.60	.005
Cognitive Style * Hypothesis Generation	188.52	1	188.52	3.41	0.07	.059
Problem Complexity * Hypothesis Generation * Cognitive Style	10.19	1	10.19	.19	0.67	.003
Error	2983.04	54	55.24			
Total	24795.00	62				

Analyses of the two-way interaction effects were required because of a lack of statistical significance of the three-way interaction effect (Kirk, 1995). Regarding the interaction of problem complexity and hypothesis generation, the ANOVA yielded a $F(1, 54) = 7.07$, $p = .01$, and power = 0.74. As such, the second null hypothesis was rejected. The effect size for the interaction effect of problem complexity and hypothesis generation was, between medium and large ($\eta_p^2 = 0.116$). Regarding the interaction effect for problem complexity and cognitive styles, the ANOVA yielded a $F(1, 54) = 0.28$, $p = .60$. Therefore, the researchers failed to reject the third null hypothesis. Finally, the ANOVA yielded and $F(1, 54) = 3.41$, $p = 0.07$ for the interaction of cognitive styles and hypothesis generation (see Table 2). As such, the researchers failed to reject the third null hypothesis.

A test of simple main effects was employed to understand the interaction of problem complexity and hypothesis generation better (Kirk, 1995). Simple main effects tests were performed to interpret the interaction based on problem complexity and hypothesis generation. The comparison based on hypothesizing correctly was determined to be statistically and practically significant with a $F(1, 54) = 37.90$, $p = .00$, $d = 1.90$ (see Table 3). Regarding the incorrect hypothesis comparison, the test was determined not to be statistically significant with a $F(1, 54) = 0.83$, $p = 0.37$.

Table 3
Simple Main Effects Test for Problem Complexity

Hypothesis Generation		*SS*	*df*	*MS*	*F*	*p*	*d*
Correct	Contrast	2093.53	1	2093.53	37.90	.00	1.90
	Error	2983.04	54	55.24			
Incorrect	Contrast	45.70	1	45.02	.83	.37	0.13
	Error	2983.04	54	55.24			

Conclusions

The typical student participant was Caucasian, male, between 15 and 18 years of age and either a sophomore or senior with a cognitive style of *more innovative*. The more innovative students were more likely to generate an incorrect hypothesis for the simple problem and a correct hypothesis for the complex problem. Johnson (1988) reported that novice troubleshooters were more likely to generate irrelevant hypotheses than experts. Experts are superior in hypothesis generation due to their ability to gather relevant information to work through the problem space (Johnson, 1988; Jonassen, 2000; Newell & Simon, 1972). Most students were able to solve their assigned problem, regardless of their cognitive style or the complexity of the problem. This is consistent with the A-I theory that states that everyone has the ability to solve problems, regardless of cognitive style (Kirton, 2003). [Blinded Author] (in press) reported that most presevice agriculture teachers were able to solve problems regardless of complexity or cognitive style. Pate and Miller (2011) found that the majority of secondary students were not able to troubleshoot a small gasoline engine compression problem successfully, regardless of whether they worked individually or employed the TAPPS method.

In all, 33 students solved the simple problem scenario successfully. Students who generated a correct hypothesis solved the simple problem nearly 15 minutes before those who generated an incorrect hypothesis. The students who were *more innovative* and generated a correct hypothesis were able to solve the problem most efficiently. The students who were *more innovative* and hypothesized incorrectly were the most inefficient at troubleshooting the simple problem. The students who were *more adaptive* and generated an incorrect hypothesis were able to solve the simple problem quicker than their more innovative counterparts. Overall, these findings align with previous research suggesting those who generate accurate hypotheses are able to make better and quicker decisions when solving problems (Johnson, 1989; Vasandani & Govindaraj, 1991).

A statistically significant two-way interaction effect between problem complexity and hypothesis generation existed. On further analysis, the simple main effects test revealed that students who generated a correct hypothesis were able to solve problems more efficiently than those who generated an incorrect hypothesis, regardless of problem complexity. This aligns with Johnson (1988; 1989) who concluded that the greatest difference in troubleshooting performance was attributable to information the problem solvers acquired and hypotheses generated. This indicates the importance of students employing metacognitive processes during the problem solving process. The main effect of cognitive style was determined not to be statistically significant. This is consistent with the KAI (Kirton, 2003) theory that states cognitive style is not a measure of performance, but rather an indicator of problem solving preference.

Recommendations for Practice

Employers in the agricultural industry desire employees who can solve problems efficiently and effectively (Robinson & Garton, 2008; Robinson et al., 2007). As such, school-based agricultural educators should encourage students to engage in problem solving activities whenever possible. Based on the results of this study, agricultural education teachers should teach students how to acquire relevant information and employ metacognitive processes to formulate hypotheses when solving problems. Teachers who feel uncomfortable teaching problem solving should seek in-service training opportunities that focus on teaching methodologies such as inquiry-based learning, experiential learning, or the problem solving approach to teach students how to solve problems accurately.

Recommendations for Research

Additional research is warranted to further investigate the effect of hypothesis generation and problem complexity on problem solving ability of school-based agricultural education students. The results of this study indicate a statistically significant interaction effect exists regarding hypothesis generation and problem complexity in the context of small gasoline engines. Future research should focus on the role of knowledge in hypothesis generation. Johnson (1988; 1989) concluded that successful troubleshooters had greater and better-organized knowledge than those who were unsuccessful. Specifically, teachers should be prepared to guide students to make better decisions when they are confronted with challenging problems. Specifically, students who generate an incorrect hypothesis initially should be encouraged to write alternative hypotheses and test each individually.

Replication of this study is needed because teachers were not selected randomly to participate; therefore, it cannot be assumed that the teachers in this study are representative of all agriculture teachers in Ohlahoma. In addition, replications of this study should occur with larger samples of teachers and students. This would assist in detecting treatment effects through greater statistical power and decrease the chance of committing a Type II error (Kirk, 1995). Variables within the affective domain, such as motivation and interest, should be considered in future studies to account for additional error variance. Research also should investigate mechanical aptitude differences between successful and unsuccessful troubleshooters. The amount of information provided in the problem scenarios could be varied among future research participants to determine how clues affect troubleshooting performance. Although the results of this study do not indicate that cognitive style has a statistically significant effect on problem solving ability, further research is needed to determine the role cognitive style plays during the problem solving process in agricultural mechanics. Specifically, additional research is needed that assesses the interaction effect of cognitive style and hypothesis generation when troubleshooting problems of differing complexity.

KAI theory states clearly that all people can solve problems regardless of cognitive style (Kirton, 2003). However, in certain situations, such as troubleshooting, it may be beneficial for problems to be solved more quickly. Findings from this study indicated differences in time to solution between the more adaptive and more innovative. Future research should continue to focus on how cognitive style influences the amount of time required to solve problems. Additionally, research should investigate how teachers' cognitive style impacts the problem solving ability of students.

Much of the literature concerning KAI centers on problem solving among groups. As such, research should be conducted that investigates the role of cognitive style among groups during troubleshooting tasks. Pate et al. (2004) reported that students who utilized the TAPPS method were more successful than those students working individually when troubleshooting small gasoline engines. Therefore, research should examine how the interaction of cognitive style and TAPPS affects troubleshooting ability. Specifically, research should investigate how heterogeneous groups, such as a more adaptive student paired with a more innovative student, compare to homogeneous cognitive style groups when troubleshooting. Employing TAPPS could also allow researchers to gauge the troubleshooters' ability to work in the problem space to develop mental models, which is an important phenomenon to consider when solving problems (Jonassen, 2000; Newell & Simon, 1972).

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Engagement and Motivation in Learning: Perspectives of Middle School Agricultural Education Students

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Abstract

The purpose of this study was to ascertain the perspectives of middle school agricultural education students on engagement and motivation in learning. Descriptive research was used to identify middle school agricultural education students' self- perceptions of motivation and engagement in learning. A correlational design was used to examine the relationship between students' age, grade level, and gender and students' self-perceptions of motivation and engagement in learning. The majority of the 213 participants were female, and the largest portion was 13 years old and in the 8th grade. Students tended to report higher scores in learning focus, anxiety, task management, and self-sabotage, and lower scores in valuing and planning. Students in higher grade levels tended to report slightly lower levels of self-belief, uncertain control, task management, valuing, and persistence, and they tended to report slightly higher levels of self-sabotage and disengagement. Older students tended to report slightly higher levels of self-sabotage and uncertain control. Males reported slightly higher levels of disengagement and females reported slightly higher levels of anxiety and learning focus. Recommendations are provided on ways to increase students' valuing, planning, self-belief, task management, and persistence, as well as ways to decrease anxiety, self-sabotage, uncertain control, and disengagement.

Introduction/Theoretical Framework

"The high school dropout crisis in the United States claims more than one million students each year, costing individuals the loss of potential earnings and the nation hundreds of billions of dollars in lost revenue, lower economic activity and increased social services" (Balfanz, Bridgeland, Bruce, & Horning Fox, 2012, p.5). The dropout crisis affects more than an individual's ability to earn higher wages to support his or her family. On a national scale the dropout crisis affects every U.S. citizen. The Civic Enterprises Everyone Graduates Center indicated that by graduating half of one class of dropouts the U.S. taxpayer would save $45 billion dollars in that single year, as the average high school dropout costs the U.S. economy roughly $240,000 over his or her lifetime in lower tax contributions, higher criminal activity, and higher dependence on programs such as Medicaid, Medicare, and welfare (U.S. Department of Education, 2009).

According to the annual update of the *Building a Grad Nation: Progress and Challenge in Ending the High School Dropout Epidemic* report (2012), "lagging high school graduation rates have risen in a time when the demands of today's globally competitive economy have placed a high premium on education" (p.18). Today's global and fast changing economy demands workers who are knowledgeable and can synthesize and evaluate information, think critically, and solve problems (Fredricks, Blumenfeld & Paris, 2004). The requirements of today's workforce have dramatically changed in the last forty years. In 1973, 73% of all U.S. jobs only required a high school diploma, whereas the workforce of this decade and future decades will require not only completing high school but also attaining some college or post-secondary training (Civic Enterprises Everyone Graduates Center, 2012).

In March of 2010, the Civic Marshall Plan (CMP) created two clear goals: a 90% nationwide high school graduation rate for the class of 2020 (at 75.5% for the class of 2009, ~ 1.3% point increase per year is needed through 2020); and the highest college attainment rates in the world, with at least six in ten students earning a college degree by 2020 (up from three in ten today). While the national graduation rate is currently at 75%, the rate of improvement has not been occurring fast enough to achieve the goal of a 90% national graduation rate by the class of 2020 (Civic Enterprises Everyone Graduates Center, 2012). As a result, attention and investments at all levels - including local, state, and federal - have been called for to address the high school dropout crisis (Civic Enterprises Everyone Graduates Center, 2012).

More than 20 years ago, Newmann, Wehlage, and Lamborn (1992) indicated the most urgent and continuing issue for students and teachers is not low achievement but rather student disengagement. Moreover, low achievement levels have been attributed to low student motivation and engagement in learning (Fredricks et al., 2004). Newmann et al. (1992) argued that efforts must be focused on learning how to engage students in order to enhance achievement. Over the past decade, additional research has shown academic engagement as a key factor to student success in school, as it predicts learning, grades, achievement test scores, attendance patterns, student retention, academic resilience, and graduation rates (Skinner, Furrer, Marchand, & Kindermann, 2008). Therefore, an investigation of student engagement is the most local approach to close gaps in student achievement and develop interventions to decrease school dropout rates (Appleton, Christenson, Kim, & Reschly, 2006).

Appleton et al. (2006) noted that although interest in engagement has exponentially amplified in recent years, the distinction between motivation and engagement remains a matter of debate. Engagement has been defined as a person's participation in a task, or "energy in action" (Appleton et al., 2006, p.428), while motivation differentiates the direction, concentration, and quality of an individual's energies, answering the "why" question of an individual's given behavior (Appleton et al., 2006, p.428). Furthermore, motivation has been stated to underpin student achievement (Martin, 2003). Therefore, motivation and engagement have been suggested as separate but cohesive constructs (Appleton et al., 2006). Literature on motivation and engagement to date has been conceptualized in numerous studies (Fredricks et al., 2004). In spite of that, a shortage of information concerning students' insights on motivation and engagement in learning exists.

Motivation and engagement have been defined as a student's energy and drive to engage, learn, work effectively, and achieve potential at school and have been argued to play a large role in students' interest and enjoyment in school (Martin, 2007; 2008). Marks (2000) noted that student engagement leads to achievement and contributes to students' social and cognitive development. According to Patrick, Ryan, and Kaplan (2007), a student's success in school is dependent upon the extent to which he or she engages in classroom learning tasks. Marks (2000) argued that students who are engaged in the classroom will be more likely to learn, view classroom experiences as rewarding, graduate from school, and pursue higher education. Research has shown a variety of indicators that affect students' motivation and engagement, including nature of instruction, relationships with teachers, parental attitudes and expectations, peers, the classroom learning environment, structure and culture of the school, and socio-demographic status, gender, and age of the student (Martin, 2008).

Efforts to increase student engagement arose in the mid-1980s and have been a theme in school reform over the past three decades (Marks, 2000; Taylor & Parsons, 2011). Today, schools have consistently faced the issue of student disengagement due to an increased cultural diversity in the student body, large portions of students with special needs, and a vast array of distractions that compete with students' time and emotional investments (Newmann et al., 1992). The challenge for students in schools today has been the ability to cope with high demands of the teacher while avoiding boredom, maintaining self-respect, and aiming to succeed in school (Newmann et al., 1992). At the same time, teachers have been faced with the challenge of encouraging students to do academic work while taking it seriously enough to learn (Newmann et al., 1992). Additionally, a lack of student engagement has been attributed to factors of school characteristics including curriculum fragmentation, weak instruction, and low expectations for learning (Marks, 2000).

A call for reform in all school levels has been prevalent in research, yet a call on schools serving early adolescents has been especially strong (Lee & Smith, 1993). Middle school students continue to be underperformers in the U.S. educational system (Balfanz, Herzog & Iver, 2007). While steep declines of motivation have been seen across all grade levels (Fredricks et al., 2004), students' academic motivation has been recorded to steadily decline following the transition from elementary to middle school (Jang, 2008). Jang (2008) indicated as students transition through levels of school workloads and difficulty of work increase, grading becomes more rigorous, and instruction becomes less personalized. U.S. Secretary of Education Arne Duncan noted "the middle grade years have been called the 'Bermuda Triangle' of K-12 education. It's the time when students sink or swim" (Civic Enterprises Everyone Graduates Center, 2012, p.8). According to Balfanz et al. (2007) signs of behavioral and emotional disengagement are most prevalent in adolescent children.

With more than 20,000 middle school agricultural education students in Florida alone, the question can be raised, what could school-based agricultural education do to increase student motivation and engagement at the middle school level? A research priority of agricultural education nationally calls for learners being actively engaged in their learning (leading to higher levels of achievement) in all learning environments (Doerfert, 2011). Since younger students may respond differently on scales used to measure motivation and engagement (Martin, 2009), age, grade level and gender are also worthy of study. Learners who are not engaged in meaningful learning may be at risk for failure; therefore one of the challenges of the profession is to address student engagement and motivation (Doerfert, 2011).

Purpose and Objectives

The purpose of the study was to ascertain the perspectives of middle school agricultural education students on engagement and motivation in learning. This study aimed to address the following objectives:
1) identify middle school agricultural education students' self-reported perceptions of motivation to learn;
2) identify middle school agricultural education students' self-reported perceptions of engagement in learning; and
3) examine the relationships between middle school agricultural education students' demographic characteristics (age, gender, and grade level), and their perceptions of motivation to learn and engagement in learning.

Research Methods and Procedures

This study utilized a descriptive/correlational research design. Descriptive research methodology was utilized to address objectives one and two of this study. Additionally, correlations were utilized to address objective three because it enabled the researcher to gather data from individuals on gender, age, and grade level and determine the relationships with students' self-perceptions of engagement and motivation in learning (Ary, Jacobs & Sorenson, 2010).

Population

The population of interest for this study included middle school agricultural education students in Florida. A convenience sample was used in this study based on geographical location to the researcher. Six middle school agricultural educators agreed to participate in the study. The six middle school teachers who agreed to participate were located in Alachua, Baker, Clay, Gilchrist, Levy and Suwanee counties. The students within the six classrooms of those agricultural educators who agreed to participate became the accepting population of this study. Instruments were sent to participating teachers who agreed to participate in the study. A total of 218 instruments were received from participants in the six schools; only 213 were included in the analysis of this study since five instruments were incomplete.

Instrumentation

This study utilized a directly administered questionnaire in order to increase the probability of receiving a high response rate (Ary et al., 2010). The Motivation and Engagement Scale-High School was first developed by Martin (2007). In previous studies Martin (2007) found the confirmatory factor analysis (CFA) to fit the data. In a further study, Martin (2009) described the development of the Motivational and Engagement Scale across the academic life span, including junior high school, high school, and university. A pilot study conducted by Martin showed younger students had difficulty differentiating the finer-grained points on the 7-point scale. Martin (2009) indicated that in order to simplify the instrument for younger students, the scale was shortened to a 5-point Likert-type scale. Martin (2009) indicated that all three sample loadings were acceptable and was supported by acceptable reliability coefficients. Ultimately, Martin (2009) found invariance across junior high school, high school, and university settings.

The Motivation and Engagement Scale-Junior School (MES-JS) was used in this study. The MES-JS was designed to measure junior high school students' (9-13 years old) perception of motivation and engagement in learning (Martin, 2012). The MES-JS collected data on student motivation and engagement through three adaptive cognitive dimensions, three adaptive engagement dimensions, three maladaptive cognitive dimensions, and two maladaptive engagement dimensions (Martin, 2012). The instrument was a 44-item questionnaire comprised of four items for each of the eleven factors. The questionnaire was a 5-point Likert-type scale with answer choices consisting of 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). A mean reliability (Cronbach's α) for the eleven subscales was reported as .78 (Martin, 2012).

Data Collection and Analysis

This study was approved by the Institutional Review Board (IRB) at the University of Florida. After receiving IRB approval, data were collected between December 2012 and January 2013. Middle school agricultural educators were invited to participate in this study. Packets containing administration protocols and a large envelope to collect the instruments were distributed to teachers. Teachers were instructed to read the script of IRB directions and distribute IRB consent forms to be sent home with students in order to obtain parental consent, as participants were minors. Once returned, IRB consent forms were collected and educators were instructed to administer the MES-JS to only those students who returned IRB consent forms. Additionally, teachers were provided a script of instructions to read aloud in order to ensure consistency, and directions were also printed at the top of the instrument. Upon completion of the instrument students were instructed to place their questionnaire in a large envelope in order to ensure privacy and security. Following the approved protocol, a follow up of students who did not participate could not be conducted. Data were entered into Microsoft Excel by the researcher and analyzed using SPSS version 17.0 for Windows XP software. Research objectives one and two utilized descriptive statistics and included means, range, frequencies, and standard deviations. Research objective three investigated relationships; correlations were utilized to analyze the data. Cronbach's alpha was utilized to determine a post-hoc reliability of .79 for the instrument used in this study.

Findings

Findings for the study are reported only for the 213 middle school students who presented parental consent forms and were present when the instrument was administered. Care should be taken in generalizing the findings beyond the responding group. The majority of participants were female (51.6%); 47.4% were males; a small portion of students (0.9%) did not report their gender. Age of participants was categorized as ages 11, 12, 13, 14, 15, and 16. The largest group of participants was 13 years old (38.0%). The second largest group was 12 years old (28.6%), followed by 14 years old (19.2%), 11 years old (10.8 %), 15 years old (2.3%), and 16 years old (0.5 %). A small portion (0.5%) of participants did not report their age. Participants' grade levels were categorized into grades 6, 7, and 8. The largest group of participants was in the 8th grade (37.6%), followed by 7th grade (36.6%), and 6th grade (24.9%). A small portion (0.9%) of students did not report their grade level.

Objective One

Participants completed the MES-JS that measured the constructs of adaptive cognitive dimensions (self-belief, learning focus, and valuing) and maladaptive cognitive dimensions (uncertain control, failure avoidance, and anxiety) (Lifelong Achievement Group, 2012). Means for adaptive cognitive constructs were self-belief 83.05 (SD = 12.4, n = 213), learning focus 83.24 (SD = 13.1, n = 213), and valuing 80.92 (SD = 14.9, n = 213). Means for maladaptive cognitive constructs were uncertain control 41.37 (SD = 15.6, n= 213), failure avoidance 55.27 (SD = 21.6, n = 213), and anxiety 62.78 (SD = 17.3, n =213) (Table 1). Mean construct scores for adaptive and maladaptive constructs were also calculated by age, grade level, and gender. Enrollment in local colleges, 2005

Table 1. Adaptive and Maladaptive Motivation Construct Summated Mean Scores (N=213)

	Range			
	Low	High	Mean	Standard Deviation
Adaptive Construct				
Self-Belief	40	100	83.05	12.4
Learning Focus	40	100	83.24	13.1
Valuing	30	100	80.92	14.9
Maladaptive Construct				
Uncertain Control	20	87	41.37	15.6
Failure Avoidance	20	100	55.27	21.6
Anxiety	20	100	62.78	17.3

Note. Scores are based on an average of 100 for junior school students. Higher scores are considered better for adaptive constructs and lower scores are considered better for maladaptive constructs (Martin, 2012).

Objective Two

Participants completed the MES-JS that measured the constructs of adaptive engagement behaviors (persistence, planning, and task management) and maladaptive engagement behavior dimensions (self-sabotage and disengagement) (Lifelong Achievement Group, 2012). Means for adaptive engagement constructs were persistence 73.30 (SD = 13.9, n = 213), task management 75.02 (SD = 16.4, n =213), and planning 68.22 (SD = 17.3, n = 213). Means for maladaptive engagement constructs were disengagement 35.33 (SD = 13.9, n = 213) and self- sabotage 36.92 (SD = 16.3, n = 213) (Table 2).

Table 2. Adaptive and Maladaptive Engagement Construct Summated Mean Scores (N=213)

	Range			
	Low	High	Mean	Standard Deviation
Adaptive Construct				
Persistence	25	100	73.30	13.9
Task Management	30	100	75.02	16.4
Planning	20	100	68.22	17.3
Maladaptive Construct				
Disengagement	20	85	35.33	13.9
Self- Sabotage	20	95	36.92	16.3

Note. Scores are based on an average of 100 for junior school students. Higher scores are considered better for adaptive constructs and lower scores are considered better for maladaptive constructs (Martin, 2012).

Objective Three

To accomplish this objective Pearson's Product Moment Correlations (Pearson R) were calculated between variables with continuous data and point-biserial correlations were calculated for dichotomous data. The terminology presented by Davis (1971) was used to describe the magnitude of the associations among variables. A correlation of zero denotes no association between variables, whereas a correlation of 1.00 denotes a perfect relationship (Davis, 1971). Accordingly, correlations that fall in the range of .01 to .09 are considered to be negligible, .10 to .29 to be low, .30 to .49 to be moderate, .50 to .69 to be substantial, and .70 to .99 to be very high (Davis, 1971).

Correlations were computed between global mean construct scores for adaptive/maladaptive motivation/engagement constructs and age, grade level, and gender. A low negative association was found between grade level and mean global booster thought scores (the average of self-belief, valuing, and learning focus constructs) ($r = -.11$). Students in higher grades tended to report slightly lower levels of booster thoughts. Low positive association was found between grade level and mean global guzzler scores (the average self-sabotage and disengagement constructs) ($r = .15$). Students in higher grades tended to report slightly higher levels of guzzler engagement. Low positive associations were found between age and mean global guzzler scores ($r = .17$) and mean global muffler scores (the average of anxiety, failure avoidance, and uncertain control MQ scores) ($r = .14$). Older students tended to report slightly higher levels of guzzler engagement and higher levels of muffler thoughts.

A low negative association was found between gender and mean global guzzler scores ($r = -.12$), and a low positive association was found between gender and mean global muffler scores ($r = .14$). Males tended to report slightly higher levels of guzzler engagement, while females tended to report slightly higher levels of muffler thoughts. All other associations between mean global construct scores and age, grade level, and gender were found to be negligible.

Investigating individual constructs that comprise global scores, low negative associations were found between grade level and adaptive motivation constructs self-belief ($r = -.11$), valuing ($r = -.10$), and maladaptive motivation construct uncertain control ($r = -.10$). Students in higher grade levels tended to report slightly lower self-belief, uncertain control, and valuing. Low negative associations were also found between grade level and adaptive engagement constructs persistence (*r* = -.12) and task management (*r* = -.11). Students in higher grade levels tended to report slightly lower levels of task management and persistence. Low positive associations were found between grade level and maladaptive engagement constructs disengagement (*r* = .12) and self-sabotage (*r* = .14). Students in higher grade levels tended to report slightly higher levels of self-sabotage and disengagement. All other associations between grade level and adaptive/maladaptive motivation and engagement constructs were found to be negligible.

Low positive associations were found between age and maladaptive motivational construct uncertain control (*r* = .14) and maladaptive engagement construct self-sabotage (*r* = .19). Older students tended to report slightly higher levels of self-sabotage and uncertain control. All other associations between age and adaptive/maladaptive motivation and engagement constructs were found to be negligible.

Low positive associations were found between gender and adaptive motivational construct learning focus (*r* = .11) and maladaptive motivational construct anxiety (*r* = .27). Females tended to report slightly higher levels of anxiety and learning focus. A low negative association was found between gender and maladaptive engagement construct disengagement (*r* = -.19). Males tended to report slightly higher levels of disengagement. All other associations between gender and adaptive/maladaptive motivation and engagement constructs were found to be negligible.

Table 3. Pearson Correlations Between Motivation/Engagement* and Personal Traits (N=213)

Trait	1	2	3	4	5	6	7	8	9	10	11
Grade	-.11	-.12	-.07	-.10	-.11	.01	.12	.14	-.10	.20	.00
Age	.02	.00	.20	.08	-.02	.00	.09	.19	.14	.08	.09
Gender	.02	.03	.11	.07	.08	.02	-.19	-.04	.04	.02	.27

*1=Self-belief; 2=Persistence; 3=Learning Focus; 4=Valuing; 5=Task Management; 6=Planning; 7=Disengagement; 8=Self-Sabotage; 9=Uncertain Control; 10=Failure Avoidance; 11=Anxiety

Conclusions/Recommendations/Implications

Conclusions

The majority of students were female, and a large portion of students were 13 years old and in the 8th grade. Results mirrored the findings of previous researchers, including Martin (2012), Newmann et al. (1992), Appleton et al. (2006) and others. However, caution should be taken in generalizing the results of this study beyond the participant group since Institutional Review Board approval did not allow additional contact with non-respondents. Students in this study tended to report higher scores in learning focus, lower scores in valuing, and higher scores in anxiety as well as higher scores in task management, lower scores in planning, and higher scores in self-sabotage. Students in higher grade levels tended to report slightly lower levels of self-belief, uncertain control, task management, valuing, and persistence. Additionally, students in higher grade levels tended to report slightly higher levels of self-sabotage and disengagement. Older students tended to report slightly higher levels of self-sabotage and uncertain control. Males tended to report slightly higher levels of disengagement and females tended to report slightly higher levels of anxiety and learning focus.

Within the individual constructs of adaptive motivational thoughts, students in this study tended to report higher scores in the construct learning focus and the lowest scores in the construct valuing. Specifically, female students in the study tended to report higher scores in self-belief, valuing, and learning focus than male students. Students in higher grade levels in this study tended to report decreased levels of self-belief and valuing. Consequently, it was concluded that students in this study felt the most pleased with themselves when they understood what they were taught in school and when they were able to solve problems and develop skills. However, students in this study did not find value in what was being taught in school or find curriculum to be relevant to them. Male students were less likely than females to have confidence in their ability to understand or do well in their school work, and to focus on learning or solving problems. Furthermore, as students progressed in to higher grade levels they felt less likely to understand what was being taught in school or to find value in their school work. Students in this study tended to feel nervous or uneasy when they thought about their school work and/or had a fear about performing poorly on their schoolwork. Specifically, females tended to feel more anxious about their schoolwork than males. Students in higher grade levels tended to feel unsure in how to avoid doing poorly in schoolwork.

Students in this study have trouble planning their schoolwork and/or study time, as well as keeping track of their progress in school. Additionally, as students progressed into higher grade levels they are less likely to work out or try to understand difficult problems. Students also tended to self-sabotage themselves, for example putting off doing assignments or wasting time rather than studying for an exam or completing schoolwork in order to have an excuse for performing poorly on schoolwork. Students also tended to feel disengaged from their schoolwork, especially males and older students/students in higher grade levels.

Recommendations for Practice

Drawing upon Martin's (2002) work and the conclusion that students have difficulty relating the curriculum to their needs and interests, it is recommended that educators make connections between curriculum and world events and with other subjects being taught. Connecting curriculum taught in their agricultural education classes to math, science, and reading concepts demonstrates to students the consecutiveness of all subjects taught within a school environment. Educators should work on teams with other subject area teachers to accomplish this recommendation. For example, the water cycle being taught in a science course could be related to a horticulture, environmental, and/or soil science unit being taught in the agricultural classroom.

Educators should also encourage students to think critically and analyze ways curriculum can be helpful in their individual lives (Martin, 2012). Educators can provide opportunities for critical thinking and analyzing by developing activities that allow students to explore lesson concepts in their lives.

Following the suggestions of Newmann et al. (1992), educators should serve as role models by showing value towards curriculum being taught. It is important for the educators to show enthusiasm in their teaching. Demonstrating their own value towards the curriculum helps display the importance of curriculum to students. Further, educators can improve student self-belief by maximizing opportunities for success in the classroom. Breaking assignments into smaller components (Martin, 2012), such as providing worksheets, practice assignments for objectives, and activities to practice new vocabulary, enables students to experience smaller successes along the way. Educators can also help students to rework their definition of success into one that is accessible by all students by individualizing tasks to match students' capabilities. Newmann et al. (1992) also addressed the concerns of anxiety and uncertain control. To reduce anxiety educators should reduce uncertainty in the classroom by communicating clear expectations and objectives (Martin, 2012). When educators communicate to their students their expectations for behavior and in academics students levels of anxiety are lowered. Educators can communicate clear expectations by first reviewing expectations at the beginning of the school year, and then educators should strive to be consistent with these expectations throughout the school year. Educators can also be clear about expectations and objectives by providing rubrics for class assignments and projects. Additionally, educators should display their expectations within the classroom and should display daily objectives and schedules in a visible area for students.

Educators can also help students reduce anxiety leading up to assessments by teaching review techniques and clearly explaining material to be covered on the test (Martin, 2012). Educators should teach their students ways to review for their tests, whether that is using vocabulary flash cards, or outlining techniques for notes or chapters in the text book. In addition to review techniques, educators should clearly explain what material will be covered on assessments, for example providing reviews in class and study guides that include important concepts that will be included on assessments.

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Supporting the research of Newmann et al. (1996), educators can reduce uncertain control in students by showing them how to recognize the aspect of school work they can control. Educators should focus on explaining to students how they have control over the effort they put into their schoolwork, the strategies they use to complete their schoolwork, and the attitude they have towards themselves, their teachers, and their schoolwork (Martin, 2012). Educators need to clearly communicate to students that they cannot control aspects of their schoolwork such as the difficulty of an assignment or distracters in the classroom.

Reducing student uncertainty can lead to greater student success (Newmann et al., 1992). Educators should give feedback on student work to help reduce students' level of uncertain control. Educators should provide task-based feedback, explaining to students what aspects of the assignment students can improve upon (Martin, 2012). Further, providing choices of achieving lesson objectives or the order tasks are completed and providing students the opportunities to choose specific topics for research can reduce anxiety and increase student success.

Appleton et al. (2006) maintained student participation increases engagement and motivation. To address concerns identified in this study, educators should ensure students have clear understandings of expectations on assignments and tests. Educators can help students plan for assignments and test by clearly explaining to students the meaning of key words that will be included in directions, such as compare, analyze, summarize, and discuss. Educators can also help students plan by demonstrating how to check student progress and develop strategies for checking work as it is completed (Martin, 2012).

Educators should demonstrate better planning by showing students how to break school work into components by outlining and thinking about assignments, and educators can improve student persistence by teaching students steps to goal setting (Martin, 2012). Educators should use their FFA unit to teach SMART goals, helping students learn how to set goals that are *specific, measureable, attainable, realistic, and timely.* As a part of the SMART goals lesson educators should have students create SMART goals for their agricultural education assignments, which will in turn encourage students to be persistent in their school work.

The findings of this study also exemplified the work of Newmann et al. (1992) and Appleton et al. (2006) regarding student success, self-sabotage and disengagement. To reduce self-sabotage educators should make it clear to students that their worth is not determined by their grades but rather their effort (Martin, 2012). It is important for educators to teach the notation of hard work and effort. Educators should also have their students reflect on ways to overcome difficulties in schoolwork and encourage students to consider ways they get in the way of their own successes (for instance self-sabotage) and ways to prevent those feelings in the future. Educators should also encourage students to reflect on their efforts and to recognize that effort leads to improvement and successes (Martin, 2012).

Student disengagement can be increased by encouraging students to understand they are not helpless and they control their own quality of schoolwork, who they work with, and what they work on. By communicating these concepts to their students, students may identify the educator as a person who will support them as they become more engaged in school work (Martin, 2012).

Educators should decrease disengagement by increasing student interaction in the classroom Increasing student interaction provides opportunities for social interaction and increases students' engagement levels. Educators should provide activities that allow cooperative group work such as setting up labs in which students are assigned groups or partners.

Educators can also reduce disengagement levels by providing opportunity for students to explore curriculum in the classroom (Martin, 2012). Providing opportunities for students to explore curriculum aids in demonstrating the relevancy of curriculum to students. Educators can provide opportunities to explore curriculum through providing interaction with people beyond the environment of the classroom and school (Willms, Friesen, & Milton, 2009), such as inviting guest speakers that correlate with the lessons being taught within the curriculum. Additionally, educators can also provide multimedia instruction (Dunleavy & Milton, 2009), such as using the internet to research issues within the curriculum or to Skype with experts around the world. Educators can also use multimedia items such as cameras, videos, smart boards, and PowerPoint for assignments to allow students opportunities for creativity (Dunleavy & Milton, 2009).

Recommendations for Further Research

1. Further studies should investigate the impact of environmental attributes (home influences, peer pressures, societal norms, and institutional influences) on students' motivation to learn and engagement in learning, as this study focused primarily on student attributes (gender, age, and grade level) and students' motivation to learn and engagement in learning.

2. Further research should be conducted in the form of an experimental study to investigate the impact of interventions recommended to educators, as a result of this study, on student motivation and engagement.

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Factors Affecting High School Students' Consideration of Agricultural Education as a Career

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Abstract

The shortage of teachers in Illinois is reflective of a trend across the past ten years where the in-state post-secondary institutions agricultural education graduates have not met the need for the number of available teaching positions. The retirement of the many teachers from the Baby Boomer generation is looming over the profession, making recruitment efforts of critical importance (Illinois State Board of Education Report, 2014). With secure funding sources of higher education dwindling, efficiency and effectiveness of recruitment efforts is essential if agricultural education is to continue to survive and thrive by facilitating a steady stream of highly qualified teacher candidates into the field. The purpose of this study was to examine factors influencing high school student consideration of agricultural education as a future career. We included students in grades 9 through 12 ($N = 817$) from 56 different agricultural education programs. Within the overall sample, parental support and a student's report of their agriculture teacher emerged as the most powerful predictors, while noteworthy differences arose across class years. These findings possess significant implications for the timing and focus of recruitment efforts.

Introduction

The shortage of teachers in Illinois is reflective of a recent national trend where the in-state post-secondary institutions' agricultural education graduates have not met the need for the number of available teaching positions. This has resulted in multiple program closures when the boards of education could not find suitable candidates to fill open positions. The number of annual? retirees is forecast to increase as more baby boomers have indicated they plan to retire soon (Illinois State Board of Education Report, 2014). To address this problem, a group representing post-secondary institutions offering agriculture and/or agricultural education, secondary teachers, state agricultural education staff, state FFA staff, and agricultural industry professionals gathered to begin discussions around the implications and propose possible solutions in 2014.

This group determined that ensuring an adequate supply of agricultural educators through a strong pipeline for the profession was to be their primary effort in light of recent news of two long-standing secondary program closures in the state due to no suitable candidates being found to fill the position. Industry professionals indicated the problem is larger than just agricultural education in that there are not enough agriculture graduates to meet the needs of the industry. Similarly, the USDA indicates that in 2013 graduates with degrees in an agriculture and natural resources number approximately half (53%) of the positions available in the industry (Goecker, Smith, Smith, & Goetz, 2010). Secondary agricultural education programs are essential in providing exposure to the wide array of career paths available in agriculture for K-12 students through a variety of programming.

The group began to direct special effort to the recruitment of agricultural educators at both the secondary level and from within the agriculture industry, an effort supported in recent agricultural education research (Dyer & Breja, 2003; Lawver & Torres, 2012). When this effort was initiated, the group determined it was essential to gather data that would help decide where efforts should be specifically directed to make the most efficient use of limited time and financial resources. Determining the specific factors within the agricultural education system that are more strongly associated with a student's consideration of agricultural education as a career was selected as primary in determining where financial resources could be allocated or reallocated within the next academic year (Lawver & Torres, 2012). Also, focusing on current high school students in the midst of making decisions about their higher education might yield more accurate information than current college students asked to remember their high school experiences.

Agricultural educator recruitment efforts currently exist and are steadily being increased given the current shortage of certified teachers on both a state and national level. The challenge of recruitment for future agricultural educators is well documented and longstanding (Kantrovich, 2007). The retirement of the many teachers from the Baby Boomer generation looms over the profession, making recruitment efforts of critical importance (Illinois State Board of Education Report, 2014). With secure funding sources of higher education dwindling, a critical need exists to increase the efficiency and effectiveness of recruitment efforts. Therefore, this study focuses on the factors that are most closely associated with a high school student's decision to consider agricultural teaching as a profession.

Review of Literature

Many factors contribute to when individuals make a decision as significant as their career choice. When post-secondary education students have been asked to respond to questions related to the motivating factors in pursuing a career in education and/or agricultural education, they have primarily considered: perception of the education field as an enjoyable career; the opportunity to help in youth development and work with youth; impact on and service to others; advancement opportunities; and a "calling" to teach (Elfers, Plecki, St. John, & Wedel, 2008; Harms & Knobloch, 2005; Kyriacou & Coulthard, 2000; Lawver & Torres, 2012; Thieman, Marx, & Kitchel, 2014). High rates of placement for graduates following completion of a degree program depends heavily upon the students being correctly matched with a degree program that will provide them with the opportunity for academic success and an avenue to accomplish their professional career goals. High levels of career decision self-efficacy are associated with increased scores on the Academic Major Satisfaction Scale, which also correlates highly with determination of students to persist in their chosen major (Nauta, 2007).

When college students at large were asked to identify important factors in considering career options, job stability ranked first, listed as *very important* by 77% of the 610 respondents (Elfers et al., 2008). Interestingly, only 43% of these students described teaching as a career that *definitely* offers job security. Historically, teaching has been considered a career option with high stability and job security, similar to other necessary public service fields such as nursing (Elfers et al., 2008). The second most important factor identified was opportunity for intellectual challenge, listed as *very important* by 67% of the respondents. The perception of teaching as a career *definitely* offering intellectual challenge dropped to 32%. Starting salary and earning were also considered, with over half of the participants indicating these factors as *very important,* while less than 10% indicated teaching as *definitely* offering these things (Elfers et al., 2008). This data suggests that a majority of university students have already rejected an education-related career, and presumes a critical need to study students still in high school and currently considering their career options.

High school students overwhelmingly indicate their parents, and specifically their mother, as among the most influential individuals when making career decisions (Faulkner, Baggett, Bowen, & Bowen, 2009; Marx, Simonsen, & Kitchel, 2014; Rocca & Washburn, 2005; Wahl & Blackhurst, 2000). The secondarily identify other family members and professionals in the consideration of career paths. Gender and gender role expectations have also been found to play a role in career aspirations as early as the second grade, where evidence suggests girls identify a decreased range of occupational aspirations and lower goals for occupational attainment than boys (Wahl & Blackhurst, 2000). However, the role of race and gender in restricting occupational aspirations through consideration of applying to college may be mediated by socioeconomic status (Valadez, 1998). Students of color identified knowledge of opportunities in agricultural education, financial stability, and family/community/professional support as key components for selecting agricultural education as a career (Vincent, Henry, & Anderson II, 2012). A recent study on 114 high school juniors and seniors in agricultural education found various components and activities within the agricultural education program possess a moderate influence on career decisions, such as participation in career development events/leadership contests, state/national FFA conventions and conferences, leadership workshops and serving as an FFA officer (Marx et al., 2014).

When considering how individuals make decisions, the factors relevant to their decision-making is important to consider. This study focused on the factors most strongly predictive of being open to agricultural education as a career by high school students enrolled in agriculture courses. The factors associated with their decision are critical to the agricultural teaching profession as increasing the number of students who are considering agricultural education represents an initial step in resolving the national shortage of teachers. Identifying the individuals, events, and activities most predictive of students' positive consideration of agricultural education as a career can lead to more informed decisions regarding where to invest recruitment resources.

Theoretical Framework

The theoretical framework applied to this study is the Eccles, Wigfield and colleagues expectancy-value model of achievement (Eccles, 1984; Eccles et al., 1983; Wigfield, 1994; Wigfield & Eccles, 1992, 2000). This framework was used in development of the research questions, instrumentation and interpretation of data and finally applied to the discussion of the implications the current study. The model presents a comprehensive, context-based application in explaining achievement-related choices, such as of a high school student selecting a future career. Expectancy-value theory models the consideration of individuals, events, and experiences which lead to increased consideration of agricultural education as a career.

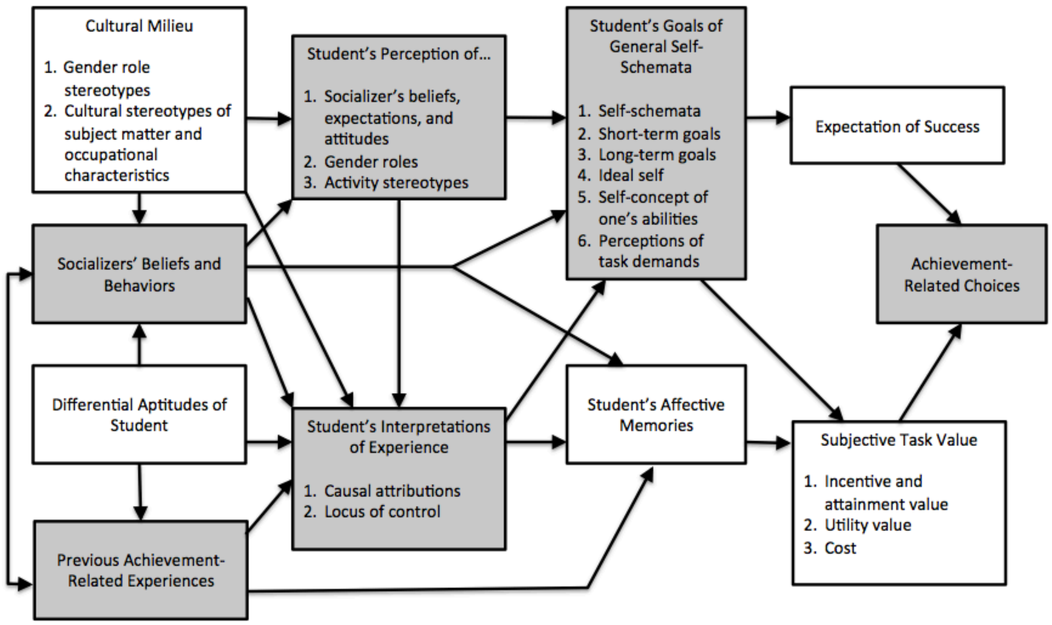

Figure 1. Eccles, Wigfield, and colleagues' expectancy-value model of achievement motivation (Wigfield & Eccles, 2000).

Figure 1 shows the expectancy-value theory of achievement characterized by the influence of personal beliefs regarding expected success and value of activities and one's context on an individual's choice, persistence, and performance related to a specific decision (Eccles et al., 1983; Wigfield & Eccles, 2000). The current version of the model displays the direct impact that expectations and values have on an individual's achievement-related choices. Expectations of success and task value are effected by the individual's perceptions of cultural influences and interpretations of previous experiences.

Factors studied in the consideration of agricultural education as a career for the current study are highlighted in grey on the model in Figure 1. These included specific FFA activities, gender, perception of parental opinion of agricultural education as a career, and positive perception of the agriculture teacher as a role model. The decision to consider agricultural education as a career option represents the achievement-related choice for this study. FFA activities in which the student participates corresponds to "Previous Achievement-Related Experiences" and serve as precursors to "Student's Interpretations of Experience."

Parents and agricultural educators represent "Socializers" within the model for the current study. The actions and beliefs of these socializers effect a student's perception of their beliefs, expectations, and attitudes related to the career of agricultural education in addition to gender roles and activity stereotypes. These perceptions also influence the degree to which students begin to develop their schemata of an ideal self, possibly in the image of an agriculture teacher, and construct their self-concept of abilities specific to the role of agriculture teacher while setting short- and long-term goals consistent with this identity. Through application of the expectancy-value model of achievement motivation (Wigfield & Eccles, 2000) in addressing the current shortage of qualified candidates for secondary agricultural educator positions, we define concrete areas of study to examine the motivations of students in considering agricultural education as a career.

Purpose and Research Questions

Knowing exactly when, how, and where to invest recruitment dollars and efforts for agricultural educators is a critical the future of agricultural education and the broader field of agriculture. As a first step to provide data to help Illinois determine where state-level recruitment resources should be invested, this purpose of this study was to examine the factors influencing high school student consideration of agricultural education as a future career. Two research questions were developed for the current study to address this purpose:

1. *What are the factors that significantly predict high school students' consideration of agricultural education as a potential career option?*
2. *How do factors significantly predicting consideration of agricultural education as a potential career option vary by high school grade level?*

Methods

Population and Sample

This state-wide study included students in grades 9 through 12 (n = 817) from 56 different agricultural education programs from all regions of the state. The majority of the programs had between one and ten completed questionnaires attributed to them (n = 33, 59%), followed by a range of 11 to 20 completed responses (n = 9, 16%) and a range of 21 to 40 responses (n=8, 16%), and 11% of the programs having between 41 and 81 completed questionnaires. Within this sample, 54% of students (n=454) identified as male. Approximately 29% (n=246) identified as freshmen; 28% (n=235) as sophomores; 24% (n=206) as juniors; and 15% (n=130) as seniors. An additional 4% (n=30) also identified as being in junior high school, and were not included within this research study. Many students (48%, n = 403) indicated participation in at least one Career Development Event, 22% (n=183) reported being a Chapter FFA Officer; 24% (n=206) as having attended at least one national FFA convention; 19% (n=157) as having attended at least one statewide FFA convention; 12% (n=100) as having attended FFA Leadership Camp; and 18% (n=154) as having attended a 212 Conference.

When asked if parents and family would be supportive if the student chose to become a teacher in the field of agriculture, 36% (n=304) reported "definitely yes," 43% (n=367) responded "probably yes," 11% (n=89) reported "probably not," while 6% (n=50) responded "definitely not." Approximately 36% (n=304) "strongly agreed" that their agriculture teacher served as a role model, while 31% (n=260) reported "agree;" 17% (n=145) reported "neither agree nor disagree;" 5% (n=39) reported "disagree;" and another 5% (n=46) reported "strongly disagree."

To measure our central variable of interest, we asked participants if they have ever considered becoming a high school agriculture teacher, resulting in 26% (n = 220) responding "yes" and 69.5% (n = 589) responding "no," with 4.5% (n = 38) not responding. Students were provided with the opportunity to indicate by open-ended text entry the career they intended to pursue following high school; these responses were coded according three categories. The majority

(46%, n = 386) indicated they were planning to pursue a career in either agriculture or education, 35% (n = 295) indicated a career path not within agriculture or education, and 5% (n = 40) planned to pursue a career in agricultural education.

Data Collection

All agriculture education programs in Illinois were invited to participate in this study by sending an initial informational email to all agricultural educators and parental information forms with the opportunity for parents to deny student participation in the study. This email, sent the first week of May in 2014, notified teachers of the aims and goals of the study to improve recruitment for agricultural educators in high school students. Incentives were also described with each school having at least ten students completing the questionnaire receiving entry into a random drawing for one of four $120 gift cards to MyCAERT curriculum source. One week following the informational email, teachers were emailed the anonymous Qualtrics survey link via a shortened URL to distribute to students not having parent/guardian disallowing participation. Within the following two weeks, all teachers were sent one reminder email each week, with the survey link closing three weeks following the invitation email.

Instrumentation

The current study was part of a larger study that was commissioned by the [STATE DEPT OF AG ED] in an effort to inform recruitment and retention practices in establishing and maintaining a pipeline for the development of agricultural educators to address the critical shortage of supply currently being faced. The main goal of the survey for the current study was to obtain data from high school students that could provide a framework for recommendations for future recruitment efforts and funding. The questionnaire was examined for face and content validity by a panel of experts (N = 8) of university faculty and graduate students, high school agriculture teachers, and first year agricultural education students who were FFA members. The instrument, administered electronically through Qualtrics was developed specifically to identify the events and structures within the state currently used or identified prospectively as avenues for recruitment. The anonymously completed instrument included demographic questions to establish gender, ethnicity, grade level, and high school. The questionnaire asked students if they had ever considered agricultural education as a career and provided a text box to add comments. They were also asked what their specific career goals were Participants were asked to identify items related to how likely their parents were to support agricultural education as a career choice using a Likert scale ranging from “highly likely” to “highly unlikely.” Students were asked to complete a checklist of FFA Activities they had participated in from a selected list. Data collected, but not included in the current study included parental demographics on career and education level and Supervised Agricultural Experience project information.

The FFA Activities included in the analysis were purposively selected based on having high frequencies of student attendance and/or activities designated by the state staff in agricultural education as having a primary objective of recruitment for future agricultural educators. Activities considered include: Chapter FFA Officer, State FFA Convention, National FFA Convention, Career Development Events/FFA Contests, 212 Conference, FFA Leadership

Camp, and the Elite Conference. The Elite Conference is a state-wide conference designed for high school Juniors and Seniors expressing an interest in becoming agricultural educators.

Data Analysis

The goal of this research study was to examine the factors that significantly predicted high school students' consideration of agricultural education as a potential career option. Therefore, we conducted a series of hierarchical logistic regression analyses. Our dependent variable was a dichotomous nominal variable coded as "Teacher Consideration," where students responded to the survey item, "Have you considered becoming an agriculture teacher/FFA advisor?" For each analysis, we created a three-step regression. We included only gender as a predictive variable within the first block. Within the second block of variables, we included the degree of parental support and FFA involvement items to determine each item's unique contribution to students' consideration and to examine the overall contribution of FFA involvement. Items of FFA involvement not applying to the particular grade level analyzed were eliminated from that particular analysis. Lastly, to examine the contribution of students' relationship with their agriculture teachers, our third block included the degree to which students considered their agricultural teacher a role model for them.

To explore our first and overall research question, our initial analysis included the entire dataset. To examine the predictive variance across high school grade level, our subsequent analyses included a hierarchical logistic regression that included the most relevant FFA-related involvement items using a class-year-specific sample for each grade level.

Results

Research Question #1: What are the factors that significantly predict high school students' consideration of agricultural education as a potential career option?

We conducted a hierarchical logistic regression to examine that extent to which gender, FFA involvement, and parent support predict students' consideration of agricultural education for a career. Overall results are displayed in Table 1. A student's gender, the only variable within the first block, predicted approximately 4% of the variance (Nagelkerke's R-square = .04) in students' consideration of being an agriculture teacher. Parent support for a student's decision to become an agriculture teacher and FFA involvement items, entered within the second block of variables, independently predicted 24% of the variance in student choice, determined by subtracting the second block Nagelkerke statistic (.28) from the first block statistic. Within the third block, students' identification of their agriculture teacher as a role model to them independently predicted 4% of the variance in student choice. A Hosmer and Lemeshow Test resulted in a non-significant p-value (.92), indicating a good model fit for the analysis.

Within the model, perceived parental support for becoming an agriculture teacher, identifying one's agriculture teacher as a role model, participation in CDE activities, and a statewide Leadership Camp, or a 212 Conference all significantly predicted students' consideration to become an agriculture teacher themselves. Parent support and identifying one's teacher as a role model emerged as the most powerful predictors (i.e. largest Wald statistic) within the model that included all students regardless of grade level. For every single step increase in parental support (a 5-step range from strongly disagree to strongly agree), a student's odds of considering a career in agricultural teaching increased 195%. For every step increase in identification of one's agriculture teacher as a role model (a five-step range from strongly disagree to strongly agree), a student's odds increased 154%. The most powerful FFA related predictor was participation in CDE activities. A student's report of such participation resulted in a 163% increase in their odds of considering teaching agriculture as a career. Participation in Leadership Camp resulted in a 189% increase; however, participation in such activities was not nearly as widespread within our sample, resulting in smaller Wald statistics.

Table 1
Hierarchical Logistic Regression for Overall Sample

	β	SE β	Wald's χ^2	df	p	e^{β}	ΔR^2
Block 1							.04
Gender	.32	.19	3.08	1	.08	1.39	
Block 2							.24
Parent Support	.67	.13	26.04	1	<.0001	1.95	
Chapter Officer	.24	.27	.79	1	.38	1.27	
State Convention	.41	.30	1.84	1	.17	1.50	
National Convention	.12	.28	.19	1	.66	1.13	
CDE Participation	.49	.21	5.65	1	.02	1.63	
212 Conference	.48	.24	3.73	1	.05	1.60	
Leadership Camp	.64	.30	4.70	1	.03	1.89	
Elite Conference	.19	.57	.11	1	.74	1.21	
Block 3							.04
Teacher Role Model	.43	.10	19.80	1	<.0001	1.54	

Research Question #2: How do predictive factors vary by high school grade level?
To examine the variance that occurs due to high school grade level, we conducted a series of hierarchical logistical regression analyses similar in structure to the overall analysis reported above, one for each reported grade level. Each analysis resulted in non-significant Hosmer and Lemeshow tests (p values ranged from .46 to .90), indicated a good model fit within each grade level.

Freshmen. The results from our freshmen analysis are found in Table 2. Our model was not as powerful relative to the model for the collapsed sample; it predicted only 28% of variance (Nagelkerke's R-squared) compared to 49%. The most significant variable within the model was the degree to which freshmen students identified their agriculture teacher as a role model, while the only other variables that emerged as significant within the model were participation in the 212 Conference and in CDE activities. Participating in both activities increased the odds of students' reporting of their consideration of becoming an agriculture teacher by 250% and 270%, respectively.

Table 2
Hierarchical Logistic Regression for Freshmen

	β	SE β	Wald's χ^2	df	p	e^{β}	ΔR^2
Block 1							.01
Gender	.07	.364	.04	1	.84	1.08	

Block 2							.22
Parent Support	.43	.24	3.26	1	.07	1.53	
Chapter Officer	-.57	.68	.69	1	.41	0.57	
State Convention	.08	.97	.01	1	.94	1.08	
National Convention	.74	.51	2.13	1	.14	2.10	
CDE Participation	.99	.35	7.86	1	.01	2.70	
212 Conference	.92	.45	4.13	1	.04	2.51	
Leadership Camp	1.12	.64	3.09	1	.08	3.05	
Block 3							.05
Teacher Role Model	.55	.19	8.05	1	<.0001	1.74	

Sophomores. The results from our sophomore analysis are found in Table 3. The model predicted a student's decision to consider teaching agriculture slightly more powerfully, predicting 35% of the variance. Parental support was the most powerful predictor variable closely followed by identification of a one's agriculture teacher as a role model, while serving as a chapter officer was the only other significant variable within the model.

Table 3
Hierarchical Logistic Regression for Sophomores

	β	SE β	Wald's χ^2	df	p	e^{β}	ΔR^2
Block 1							.03
Gender	-.07	.37	.03	1	.85	.93	
Block 2							.26
Parent Support	.91	.270	11.23	1	.001	2.47	
Chapter Officer	.99	.507	3.79	1	.05	2.69	
State Convention	.44	.563	.61	1	.43	1.55	
National Convention	.37	.502	.55	1	.46	1.45	
CDE Participation	-.12	.422	.08	1	.78	0.89	
212 Conference	.06	.500	.01	1	.90	1.06	
Leadership Camp	.37	.633	.35	1	.56	1.45	
Block 3							.06
Teacher Role Model	.64	.22	8.51	1	.004	1.89	

Juniors. The results from our junior class analysis are found in Table 4. The model predicted 33% of variance in students' decision to consider a career in agricultural teaching. Parental support remained the most powerful predictor of decision-making, while identifying one's agriculture teacher as a role model no longer emerged as a significant predictor. Student gender served as the only other significant predictor. As juniors, the odds of women choosing to become an agriculture teacher was 235% higher than men, while student gender independently predicted 9% of the variance within the model.

Table 4
Hierarchical Logistical Regression for Juniors

	β	SE β	Wald's χ^2	df	p	e^{β}	ΔR^2
Block 1							.09
Gender	.85	.37	5.39	1	.02	2.35	
Block 2							.23
Parent Support	.81	.25	10.08	1	.001	2.25	
Chapter Officer	.52	.46	1.29	1	.26	1.68	
State Convention	.73	.54	1.80	1	.18	2.07	
National Convention	-.29	.56	.28	1	.60	.75	
CDE Participation	-.06	.45	.02	1	.89	.94	
212 Conference	.72	.46	2.40	1	.12	2.05	
Leadership Camp	.09	.50	.03	1	.86	1.10	
Block 3							.01
Teacher Role Model	.20	.16	1.61	1	.20	1.23	

Seniors. The results from our senior class analysis are found in Table 5. The model predicted only 52% of the variance in a student's decision to consider a career in agriculture – the most of any of our models. Within the model, a student's gender and participation Leadership Camp emerged as the twp most significant predictor variable, while gender independently predicted 13% of the overall variance. Completing CDE activities, and reporting one's agriculture teacher as a role model also served as significantly predictive variables. Simply being female increased the odds of considering a teaching career by 706%. Attending Leadership Camp increased one's odds by fully 2,104%. Participating in CDE activities increased one's odds of considering agricultural education as a career by 459%. For every step increase in identification of one's agriculture teacher as a role model, a student's odds increased 187%. One's reported parental support did not emerge as a significant variable for senior-level students.

Table 5
Hierarchical Logistical Regression for Seniors

	β	SE β	Wald's χ^2	df	p	e^{β}	ΔR^2
Block 1							.13
Gender	1.95	.71	7.55	1	.006	7.06	
Block 2							.35
Parent Support	.41	.47	.72	1	.37	1.50	
Chapter Officer	-1.60	1.44	1.23	1	.26	.20	
State Convention	1.21	.93	1.70	1	.19	3.33	
National Convention	-1.06	1.34	.63	1	.43	.35	
CDE Participation	1.53	.80	3.69	1	.05	4.59	
212 Conference	.53	1.00	.29	1	.59	1.70	
Leadership Camp	3.04	1.10	7.74	1	.01	21.04	
Block 3							.04
Teacher Role Model	.93	.33	3.58	1	.05	1.87	

Discussion and Implications

Our research questions were focused on the factors that were most strongly predictive of a high school students' consideration of teaching agriculture as their chosen profession. As expected and supporting numerous other studies, parental support of agricultural education as a career was a significant predictor in a student considering a career in agricultural education (Faulkner et al., 2009; Marx et al., 2014; Rocca & Washburn, 2005; Vincent et al., 2012; Wahl & Blackhurst, 2000). These findings suggest that a parental education campaign as critical to recruiting future high school teachers of agriculture, as the student's perceptions of parental dispositions toward their career choice seem an integral component in changing or encouraging student orientations toward such a career. These findings highlight the potential need for parents to be included in the recruitment process, and that the sophomore year might be the critical time to begin involving parents in an informational campaign about agricultural education as a profession. In addition, future studies related to parental perceptions of agricultural education and factors parents use in determining how to counsel their student(s) in future careers could serve to further elucidate a model of student career choice.

Students' perception of their agricultural teacher as a role model for them also served as a powerful predictor, supporting previous literature finding that the agriculture teacher has influence in a student's choice of agricultural education as a major in college (Hillison, Camp, & Burke, 1986; Marx et al., 2014). Such perceptions outweighed all FFA-related activities within the aggregated student population in predicting an openness to consider agriculture teaching as a profession. This finding further emphasizes the need for teacher education programs and those in charge of educator professional development to provide skill-building in the interpersonal and affective domains of teaching agriculture. Through encouragement of prioritizing the relational aspects of the student-teacher relationships, agricultural educators must continue to excel at building positive, impactful relationships with students. These impactful relationships can be the catalyst leading a student to choose to follow in their agriculture teacher's footsteps (Wigfield & Eccles, 2000).

Participation in specialized leadership conferences emerged as significant predictors for students considering agricultural education careers, also in accordance with previous findings (Marx et al., 2014). Expectancy-value theory posits that these previous experiences are essential in how a student develops positive affect toward a career when considering their options (Wigfield & Eccles, 2000). The FFA experiences most significant to a student's decision to consider a career in teaching agriculture included attending the 212 Conference, Leadership Camp, and the Elite Conference. When considering where to allocate more resources and time, these specific events should be examined to determine if they can be made more robust and potentially allow more students to participate as all three conferences have had waiting lists for several years running. This is especially noteworthy as our results suggest these experiences may be most predictive for freshman and sophomores. Further investigation of these events could help determine the factors contributing to effectiveness to ensure those components remain in the programming.

The agricultural experience within our model that served as the most powerful predictor was participation in career development events, which was previously identified as a powerful influence on career decision-making (Marx et al., 2014). Given these findings, agriculture teachers should be encouraged to structure their career development event selection system in a manner that can be as largely inclusive for students as possible, rather than as exclusive systems wherein only a small number of students participate. State staff and teacher educators can play a role in this process through providing programming on best practices for inclusion and recruitment of students for career development event participation.

It may be important to note that parental support did not emerge as a significant predictor in freshmen and seniors. This has not been reflected in other studies, although those failed to disaggregate data by grade level. It may be possible that parents of freshmen have not explicitly begun discussing career options with their children yet. Moreover, seniors may have already solidified their career choices, reducing the influence of parents in predicting such choices. The findings from this study suggest that providing parental education during the freshmen year could be particularly beneficial in keeping students open to considering a career in teaching agriculture.

A final significant finding was that the older that students were, the more predictive their gender was in the decision to consider teaching agriculture as a career. By the time students reach their senior year, many more girls remain open to teaching agriculture than boys, even controlling for variation in parental support, perceptions of their current agriculture teacher, and participation level within a variety of co-curricular experiences related to the agriculture classroom. These results suggest that recruitment efforts that fail to focus on boys prior to their senior year may not maximize their potential effectiveness, as boys represented over half of the sample within this study, but a small minority of seniors who remain open to teaching agriculture.

Overall, the findings suggest that the foundation for decision-making in considering agricultural teaching as a career begins freshmen, and can be influenced by their involvement level in co-curricular experiences related to the agriculture classroom. Students' decision-making influences evolve by their sophomore year through the development of their relationship with their agriculture teachers and by junior year, their openness to consider teaching has largely ended. By their senior year, students' gender, for example, is roughly twice as powerful a predictor as their relationship with their agriculture teacher.

Limitations and Future Research

Limitations of the study are the inclusion of only one state in the study, this should be expanded as every state and region is a unique context. A more purposeful sampling technique with stratification for a variety of variables could contribute to a more generalizable data set. Within instrumentation, the use of "perceived" parental support might have affected validity of that variable.

The findings of this study could be beneficial to agricultural education programming in other states, it is recommended a similar study be undertaken in other states to determine if similar trends can be observed. With the centralized nature of the National FFA Organization and TeachAG campaign, having data from a National sample would be a strong asset in keying in on the most important factors for recruitment of future agricultural educators. In light of the significance parental support was found to have in the current study the inclusion of parents of secondary agricultural education students in future studies could provide some very important information.

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Students Motivations, Value, and Decision to Participate in Service-Learning at the National FFA Days of Service

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Abstract

As agricultural educators continue to seek methods of instruction to make learning impactful for students, service-learning has emerged as a desirable technique for meeting these educational objectives. A gap in the agricultural education literature exists, however, in terms of describing whether these learning experiences motivate students intrinsically. This investigation sought to describe FFA members' level of intrinsic motivation resulting from participation in a service-learning activity, specifically the 2013 National FFA Days of Service. Deci and Ryan's Self-Determination Theory (SDT) served as the theoretical base for understanding FFA members intrinsic motivation through three empirically based constructs– interest, value, and perceived choice. Results from the study indicate that FFA members were interested in and valued their service-learning experience; however, they exhibited varied views in terms of their choice to participate. The findings also indicate a congruency between the tenets of service-learning and the axioms of SDT. We, therefore, offer the Intrinsic Service Learning Model in hopes of assisting practitioners of this pedagogical technique with delivering an intrinsically motivated service-learning experience for agricultural education students.

Introduction

American education is not delivering graduates with the capability to function in an egalitarian society (Butin, 1989). Concerning this quandary, Boyer (1990) summoned school officials to integrate a component of service into their curriculum. Multiple strategies have attempted to rise above this deficiency; however, teachers are often unable to frame their curriculum in a way that connects to real-world problems (Driscoll, 2009; O'Meara, 2008). Agricultural educators have echoed these sentiments. For example, Dailey, Conroy, and Shelly-Tolbert (2001) articulated the need for life-skills to be incorporated into the agricultural education curriculum. They explained:

> The main purpose [of agricultural education] is getting students ready for life. I think high school academies are very important, but life skills and social skills are the most important thing you can get out of high school. Surely the skills that you learn in vocational agriculture or even agriscience are really important, but all in all, it's making a well-rounded student that can get out in the real world and be successful and survive. (p. 15)

These concerns have given rise to service-learning as a preferred pedagogical technique in agricultural education (Barkley, 1999; Connors, 1992; Davis, 2001; Hess, 2001; Mattingly & Morgan, 2001; Slavkin & Sebastian, 2013; Webster & Hoover, 2006; Woods, 2002a, 2002b, 2002c, 2002d, 2004). Bringle and Hatcher (1995) offered clarification to this educational practice. They described service-learning as:

> A credit-bearing educational experience in which students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation for the discipline, and an enhanced sense of civic responsibility. (p. 222)

Although service-learning remains an emerging pedagogical technique, various scholars have postulated the teaching approach has five major stages: investigation, preparation, action, reflection, and demonstration (Glickman & Thompson, 2011; Haines, 2010; Kaye, 2004; Lake & Jones, 2008; Smith et al., 2011). Throughout each phase of the service-learning process, teachers, students, and community members collaborate to resolve community issues while integrating purposeful contextual connections (Kaye, 2004; Smith et al., 2011).

Across disciplines, service-learning proponents endorse numerous benefits of this method of instruction. Advantages for students include a heightened sense of citizenship (Falk, 2013; Gray, Ondaatje, Fricker, & Geschwind, 2000), increased learning outcomes (Cawthron, Leege, & Congdon, 2011; Eyler, 1999; Giles & Eyler, 1994; Warren, 2012), enhanced self-esteem and personal image (Miciano, 2006; Ngai, 2006; Newman, Dantzler, & Coleman, 2014; Tannenbaum & Berrett, 2005), improved compassion for others (Lee et al., 2013; Brown, 2007), and a better understanding of societal issues (Boyle-Baise, 2002; Camarillo, 2000; Morgan & Streb, 2001; Parker, 2003). However, numerous historical events such the Soviet Union's launch of *Sputnik* (Bybee, 1997; Kirst & Meister, 1985; Rochealu, 2004) and William Bennett's *A Nation at Risk* report in 1983 (Guthrie & Springer, 2004; National Commission on Excellence in Education, 1983) have attempted to derail progressive educational approaches, such as service-learning, by placing added emphasis on mathematics and science (Rochealu, 2004). Nevertheless, there is a positive view of service-learning in agricultural education due to its strong connections with experiential learning (O'Neil & Lima, 2003).

Service-learning easily lends itself to the classroom and laboratory component of agricultural education's three-circle model (Roberts & Edwards, 2014). However, an interesting pivot in philosophical thought regarding service-learning in agricultural education occurred in the early 21st Century (Roberts & Edwards, 2014). For instance, at the 80th National FFA Convention, voting delegates identified value in integrating service-learning into the doctrine of the National FFA Organization (Slavkin & Sebastian, 2013). As a result, SBAE students now have numerous opportunities to incorporate service-learning throughout agricultural education's three-circle model, an idea promoted as *Three-Circle Service* (3CS) (National FFA Organization, 2014b; S. Donaldson, personal communication, August 27, 2014). One such opportunity arose in 2014 with development of the Agricultural Service-Learning SAE (National FFA Organization, 2014c). In the new SAE area, students gain agricultural knowledge and skills through home-based projects while simultaneously confronting issues troubling their local communities (National FFA Organization, 2014b). Meanwhile, in the FFA component of agricultural education's three-circle model, a popular activity utilized to encourage service-learning occurs through the *National FFA Days of Service* (National FFA Organization, 2013a). Each year this event is held in conjunction with *National FFA Convention* and allows thousands of students to have an opportunity to give back through "an educational activity related to agricultural education" (National FFA Organization, 2011, para.

1). Despite the notoriety of this particular occasion, however, little empirical evidence exists to understand the outcomes of the event on FFA members. Especially, in terms of participant's motivations, value, and decision to participate in service-learning at the National FFA Days of Service.

Theoretical Framework

Deci and Ryan's (1985, 2000, 2001a, 2001b, 2002, 2008, 2010) Self-Determination Theory (SDT) clarifies the power of intrinsic and extrinsic motivation and how these factors can specifically impact an individual's experience in educational activities such as at the National FFA Days of Service. The theory revolves around three modes of motivation (Deci & Ryan, 2001a, 2001b, 2002, 2008, 2010). Specifically, the theory holds mankind has three internal desires: "(a) autonomy, (b) competence, and (c) relatedness" (Deci & Ryan, 2008, p. 183).

Attainment of autonomy empowers individuals to exercise freedom of personal choice and relieves them from the confining nature of external influences (Deci & Ryan, 2001a, 2001b, 2008; Taylor et al., 2014). Consequently, autonomy can be best described as an individual operating with an internal *locus of control* (Deci & Ryan, 2001a; Hass, Allen, & Amoah, 2014). If motivated to action through external means, one would, in fact, not be living autonomously (Deci & Ryan, 2001b). Individuals attain competence as they become confident in their ability to perform a skill (Deci & Ryan, 2001b). While relatedness is achieved as individuals perceive they have attained a sense of harmony in their relationships with groups and/or individuals (Deci & Ryan 2001b, 2002, 2008, 2010). An individual's will power and the nature of their social environment both have a unique influence on the three desires (Deci & Ryan, 2002; Zandvliet, Perry, Mainhard, & Tartwijk, 2014). As such, this theory served as the most appropriate frame to structure this investigation.

Purpose

The intent of this study was to understand FFA member's motivations, value, and choice to participate in service-learning at the National FFA Days of Service. As such, Deci and Ryan's (1985) Self-Determination Theory was the optimal framework in which to structure this investigation.

Significance

The purpose of this study is linked to Priorities 4 and 6 of the National Research Agenda of the American Association of Agricultural Education (Doerfert, 2011). Priority 4, *Meaningful, Engaged Learning in All Environments,* stresses the merit for "The design, development, and assessment of meaningful learning environments which produce positive learner outcomes are essential to properly educating the citizens of the 21st century" (Doerfert, 2011, p. 9). Priority 6, *Vibrant, Resilient Communities*, focuses on the need for additional analysis "to ensure the environment where positive community change transforms unhealthy communities into high-capacity communities" (Doerfert, 2011, p. 10).

Research Questions

Deci and Ryan's (1985) Self-Determination Theory was used to frame the following research questions:

1. What are the personal characteristics (sex, ethnicity, location, and years of membership) of FFA members who participated in the 2013 National FFA Days of Service?
2. Did FFA members have an interest in participating in the 2013 National FFA Days of Service?
3. Did FFA members who participated in the 2013 National FFA Days of Service value the experience?
4. Did FFA members who participated in 2013 National FFA Days of Service perceive they had a choice to participate?
5. What are the relationships between FFA members' level of interest, value, and perceived choice and selected student characteristics?

Methods and Procedures

Upon IRB approval, this study employed Creswell's (2012) cross-sectional survey design procedures to guide the administration of Deci and Ryan's (1985) Intrinsic Motivation Inventory (IMI). In cross-sectional survey design, researchers use a single data collection to measure participant's "current attitudes, beliefs, opinions, or practices" concerning a phenomenon (Creswell, 2012, p. 377). Therefore, to gather data associated with the subject's beliefs regarding their motivations, value, and decision to participate in the 2013 National FFA Days of Service we felt cross-sectional survey design procedures were the most appropriate methodological approach (Creswell, 2012). In addition to the IMI, a demographic inventory questionnaire was also developed to correlate differences in experiences based upon selected characteristics. The number of individuals in the population and the accessibility to that group facilitated the purposeful selection of a census instead of a sampling population (Creswell, 2012). The National Safe Place was the largest service-learning site at the 2013 National FFA Days of Service in terms of participation. For five consecutive days, two 4-hour shifts of approximately 140 to 180 FFA members helped pack nutritional meals for homeless shelters across the United States. This investigation was confined to members who participated in the *National FFA Days of Service* at the National Safe Place service site on November 1, 2013 in Louisville, Kentucky during the second 4-hour shift of the day. In all, 144 of the 146 FFA members present completed the instrument yielding a response rate of 98.6%. Results and conclusions generated from this study should not be generalized more broadly than to this group of FFA members.

Instrumentation

Deci and Ryan's (1985) multifaceted IMI was designed to collect data associated with experiences related to a service-learning activity. Evidence of the success of the instrument spans three decades (Ryan, Mims & Koestner, 2011; Plant & Ryan, 1995; Ryan, Connell, & Plant, 1990; Deci, Eghrari, Patrick, & Leone, 1994). According to Deci and Ryan (1985), "The instrument assesses participants interest/enjoyment, value/usefulness, and perceived choice while performing a given activity" (p. 1).

The name of the instrument, Intrinsic Motivation Inventory, is misleading because the *interest/enjoyment* subscale is the only actual assessment of intrinsic motivation (Deci & Ryan, 1985). While the *perceived choice* subscale is a "positive predictor of both self-report and behavioral measures of intrinsic motivation" (Deci & Ryan, 1985, p. 1). The *value/usefulness* subscale aids in understanding whether the individual finds value in their experience, which is imperative to know whether the individual would be willing to participate in the activity again (Deci & Ryan, 2002).

Oklahoma State University agricultural education faculty and graduate students served as the panel of experts used to evaluate the face and content validity of the instrument before administration. The panel considered the instrument to be valid and a post-hoc reliability estimate of the IMI instrument was conducted yielding a Cronbach's alpha of .83. Further, the three constructs produced the following reliability estimates: interest/enjoyment (α = .83), value/usefulness (α = .82), and perceived choice (α = .84). As a result, the instrument was considered both valid and reliable.

Demographic Questionnaire

Research Question 1 created the need to collect data relating to specific characteristics of program participants. Participants wrote information in designed spaces of the instrument to indicate their home state, sex, race, years of FFA membership, and age. These items were collected before the service-learning experience to assist with reducing participant fatigue (Creswell, 2012).

Post-Experience Questionnaire

A 25-item questionnaire was administered to subjects after they completed tasks associated with the 2013 National FFA Days of Service. Items were derived from the IMI instrument and were used to assess perceptions regarding their experience after a service-learning activity. These items composed three subscales: perceived choice, enjoyment, and level of interest. The response choice for each item was a 7-point Likert-type scale, with response choices of Strongly Agree (7), Slightly Agree (6), Agree (5), Neutral (4), Slightly Disagree (3), Disagree (2), and Strongly Disagree (1) (Deci & Ryan, 1985).

Data Analysis

The Statistical Package for Social Sciences (SPSS) version 20 for Apple OSX was used to analyze all data related to this investigation. Research Question 1 was analyzed using frequencies, which helped identify the prevalence of participants in the following demographic categories: sex, ethnicity, location, age and years of FFA membership. For the remaining questions, means were taken for each construct. However, Miller's (1998) comments regarding the use of mean cores as "nonsensical" when explaining nominal and ordinal data were taken into account (p. 2). Therefore, modal responses for each item within the three constructs were also recorded and considered. As such, the measures of central tendency considered the most appropriate to report for Research Questions 2, 3, and 4 were participant's minimum score, maximum score, mode, and total modal percentage (Gay, Mills, & Airasian, 2006). For Research

Question 5, Pearson product correlations between the three constructs−interest/enjoyment, value/usefulness, perceived choice and their age and years of FFA membership−were analyzed to understand the relationships between the each variable.

Statistical and Mathematical Procedures

Davis' (1971) recommendations were followed to address descriptive statistics to determine participants' personal characteristics in the first research question. Since a census of the population was taken, calculating frequencies of each demographic variable and item associated with Research Question 2, 3, and 4 was deemed the most appropriate data analysis approach (Davis, 1971).

Creswell's (2012) recommendations were used to analyze relationships associated with Research Question Five. Creswell (2012) explained, "A correlation is a statistical test to determine the tendency or pattern for two (or more) variables or two sets of data to vary consistently" (p. 338). Therefore, Pearson's *r* square was employed to assist with understanding the relationship effects for each correlation taken in the study. "Effect size in the correlational context is referred to as the strength of association between two variables" (Chen & Popovich, 2002, p. 42). Creswell's (2012) recommendations were utilized for determining correlation relationships. Table 1 outlines Creswell's (2012) recommendations for understanding correlations.

Table 1

Creswell's (2012) Recommendations for Describing Correlation Relationships

Strength	Range	Use
Slight	.20 – .35	Little value in prediction.
Limited	.35 – .65	Limited value in prediction.
Good	.66 – .85	Good value in prediction.
Very Strong	.86 and above	Strong value in prediction.

Findings

Research Question One

The first research question was designed to describe selected characteristics (sex, ethnicity, location, and years of membership) of FFA members participating in the 2013 National FFA Days of Service. The group of participants was composed of 79 females (54.9%) and 65 males (44.4%). Participating members were overwhelmingly non-Hispanic Whites (f = 142; 98.6%) with two members (1.4%) self-identifying as African American. In terms of years of FFA membership, 31 (21.5%) members were first year members; 45 (31.3%) were second year members; 34 members (23.6%) were third year members; 19 (13.2%) were fourth year members; seven (4.9%) were fifth year members; and eight (5.6%) were sixth year members. The age of the participants ranged from 12 to 19 years old. Twenty-eight (19.5%) were less than 15 years old; 41 (28.5%) were 15 years old; 39 (27.1%) were 16 years old; 27 (18.8%) were 17 years old; and nine (6.3%) were 18 years old or older. The participating FFA members represented six different states. In particular, 39 (27.1%) were from South Dakota; 30 (20.8%) were from Michigan; 23 (16%) were from Indiana; 23 (16%) were from Kentucky; 17 (11.8%) were from Missouri; and 12 (8.3%) were from Wisconsin.

Research Question Two

The second research question addressed FFA members' level of interest in participating in the 2013 National FFA Days of Service. The mean score for the interest construct was 5.40 with a standard deviation of 1.34. It should be noted that seven of the eight items within this interest construct had a modal response of Strongly Agree. The other item, "I would describe this activity as very fun" yielded a modal response of Agree. Table 2 provides a summary of the data associated with this construct.

Table 2
Summary of Modal Responses on Interest Construct (N=144)

Item	Min.	Max.	Mode	Modal %
This activity was fun to do.	1	7	7	41
I felt like I was enjoying this activity while doing it.	1	7	7	40.3
I enjoyed doing this activity very much.	1	7	7	38.2
I thought this was a boring activity.	1	7	1	38.2
While doing this, I was thinking about how much I enjoyed it.	1	7	7	36.1
I would describe this activity as very enjoyable.	1	7	7	33.3
I thought this was an interesting activity.	1	7	7	29.9
I would describe this activity as very fun.	1	7	6	25.7

Note. 1=Strongly Disagree; 6=Agree; 7=Strongly Agree.

Research Question Three

The third research question examined the level of value that FFA members placed on participation on 2013 National FFA Days of Service. The mean of the value construct was 5.35 with a standard deviation of 1.20. Of the items evaluated on the value construct, eight exhibited modal responses of Strongly Agree. One item, "This activity could improve my study habits" yielded a modal response of Strongly Disagree (23.5%). Table 3 displays data associated with this construct.

Table 3
Summary of Modal Responses on Value Construct (N=144)

Item	Min.	Max.	Mode	Modal %
I think this is an important activity.	1	7	7	52.1
I believe this activity could have some value.	1	7	7	50.7
This improves concentration.	1	7	7	45.1
I am willing to do this again, it's useful.	1	7	7	45.1
I am willing to do this again because it has some value.	1	7	1	43.8
This activity is important for my improvement.	1	7	7	43.8
This activity could be beneficial.	1	7	7	34.7
This could improve my study habits.	1	7	1	23.5
This activity could help me in school.	1	7	7	22.4

Note. 1=Strongly Disagree; 7=Strongly Agree.

Research Question Four

The fourth research question examined the level of choice FFA members perceived they had when deciding to participate in the 2013 National FFA Days of Service (see Table 4). The mean score for the perceived choice construct was a 4.24 with standard deviation of .95. This construct had the most discrepancy among the three constructs included in this study. Four items had a modal response of Undecided/Neutral; two had a modal response of Strongly Agree; one had a modal response of Agree; and one had a modal response of Strongly Disagree.

Table 4
Summary of Modal Responses on Perceived Choice Construct (N=144)

Item	Min.	Max.	Mode	Modal %
I did this activity because I had to.	1	7	1	29.2
I felt like it was not my own choice.	1	7	4	27.8
While doing this activity, I felt like I had no choice.	1	7	4	27.2
I felt like I had to do this activity.	1	7	4	26.4
While doing this activity, I had some choice.	1	7	4	26.4
I really did not have a choice about this activity.	1	7	1	22.9
I had some choice about this activity.	1	7	6	22.2
I did this activity because I wanted to.	1	7	1	22.2

Note. 1=Strongly Disagree; 4=Undecided/Neutral; 6=Agree; 7=Strongly Agree.

Research Question Five

The fifth research question assessed the relationships between interest, value, perceived choice, years of membership, and age. Analysis of these data showed the magnitude of correlations contrasted from negligible to very strong (Davis, 1971). For example, the interest construct had a very strong correlation with value construct ($r = .79$). This relationship was deemed significant at $p < .01$. The interest and value construct did not significantly correlate with any of the other relationships investigated. The perceived choice construct also had a slight correlation with the interest construct ($r = .26$) and value construct ($r = .28$). Years of membership had a strong correlation ($r = .72$) with age (Davis, 1971). Conversely, no significant correlations existed between years of membership and interest ($r = .17$), value ($r = .06$), or perceived choice ($r = .12$), (Davis, 1971). No significant correlations existed between age and interest ($r = .12$), value ($r = .05$), or perceived choice ($r = .06$).

Conclusions, Implications, and Recommendations

Research Question One

A compelling conclusion emanating from the first research question is nearly all of the participants in the study were non-Hispanic White. Why is there such a lack of racial and ethic diversity among participants in this particular FFA program? The current literature on this topic argues agricultural education and the National FFA Organization are in fact *not* meeting interests or needs of students from ethnically diverse cultures (LaVergne, Larke, Elbert, & Jones, 2011; Roberts et al., 2009). This conclusion also elucidates a chasm with Deci and Ryan's (1985, 2000, 2001a, 2000b, 2002, 2008) SDT in terms of *relatedness*. For example, Deci and Ryan (1985, 2000, 2001a, 2000b, 2002, 2008) strongly recommend individuals have the opportunity to bond and make a connection to their prior experiences to become intrinsically motivated. As such, the National FFA Organization should consider taking measures to ensure diverse students are embraced and welcomed at these events. Although eight other service-learning opportunities were available at the same time as this event, none promoted an agenda that spoke directly to diverse populations. Therefore, we do not perceive that ethnically diverse FFA members would have been more attracted to serve at a different service site. With this thought mind, perhaps a service-learning project focusing on individuals from ethnically diverse populations could be developed and promoted through the National FFA Days of Service. This conclusion also stresses the need for additional research to understand better why non-White students are not participating in the National FFA Days of Service. National FFA Organization demographic information suggests that 22% of FFA membership identify as Hispanic, 8% identifies as American Indian, Alaskan Native, Black, or African American, and 3% are Asian, Native Hawaiian, Pacific Islander, or two or more races (National FFA Organization, 2013b). Therefore, a better understanding is needed concerning ethnically diverse students experiences and factors surrounding their choice to participate in the National FFA Days of Service, attempts could be made to tailor the program to attract more participation from these types of FFA members to promote a sense of relatedness for ethnically diverse members (Deci & Ryan, 1985, 2000, 2001a, 2000b, 2002, 2008, 2010).

Research Question Two

Based on the findings we conclude FFA members participating in activities associated with National FFA Days of Service exhibited an interest in such activities. Deci and Ryan (2000, 2002) surmised individuals seek to fulfill a desire for *competence* in the activity in which they partake and that one's sense of interest can ultimately influence their participation. Therefore, this conclusion clearly aligns with the foundational basis of SDT. The conclusion is also consistent with the current literature concerning agriculture students' interest in service-learning activities. When examining student pride through service-learning, Hess (2001) surmised that agricultural educations students' interest and desire to learn was piqued through service-learning because they were better able to understand how their course work connected to the "big picture" (p. 10). In an attempt to sell service-learning as a viable method of instruction, Davis and Scott (2001) described a service-learning experience from the perspective of a student in which they attained a sense of achievement, or competence, through problem-based learning objectives. Therefore, FFA member's development of competence through interesting activities at National FFA Days of Service is encouraging for service-learning in agricultural education.

Research Question Three

Data associated with this research question lead to the conclusion that FFA members who participate in the National FFA Day of service value their service-learning experience. In fact, modal responses for eight of the nine items associated with this construct were Strongly Agree. The National FFA Organization's motto states members should be " . . . living to serve" (National FFA Organization, 2014a, p. 8); therefore, having members acquire a *heart of service* is a foundational tenet for FFA members. Results from this study suggest that the National FFA Days of Service is a valued occasion that empowers FFA members to uphold the aspirations promoted in the FFA Motto. This finding is consistent with the existing literature pertaining to service-learning in the context of agricultural education (Barkley, 1999; Connors, 1992; Davis, 2001; Hess, 2001; Mattingly & Morgan, 2001; Webster & Hoover, 2010; Woods, 2002a, 2002b, 2002c, 2002d, 2004). Deci and Ryan (2008) posited that individuals should have opportunities to master concepts, or exhibit competence, to reach a high degree of intrinsic motivation. It is clear participants in the National FFA Days of Service perceived they developed competence in terms of understanding how to " . . . liv[e] to serve" (National FFA Organization, 2014a, p. 8).

Research Question Four

Data associated with this objective lead to the conclusion that FFA members had varied views of their choice to participate in the 2013 National FFA Days of Service. In fact, this construct had more variability than the other two constructs investigated. The variation associated with this construct could indicate that FFA members need more independence regarding their choice to participate. This concept easily connects to the *autonomy* component of SDT (Deci & Ryan, 1985, 2000). Deci and Ryan (2000) postulated a lack of autonomy can reduce an individual's intrinsic motivation, while also generating negative feelings towards tasks. Furthermore, it is well documented within the literature that having an individual's perceived choice to participate in an activity can directly affect the individual's overall perception of the activity (Deci, Koestner, & Ryan, 1999; Reeve, Nix, & Hamm, 2003; Ryan, Koestner, & Deci, 1991). With these sentiments in mind, it might be of value for the National FFA Organization to modify strategies concerning recruitment and registration for the National FFA Days of Service. However, we understand that most students typically travel and participate in National FFA Convention activities in group settings; therefore, participant's level of autonomy regarding their ability to chose to participate is difficult modify. Therefore, we stress the need for local programs to design member led service-learning experiences in an effort to balance members' lack of choice inherent in service-learning events like National FFA Days of Service.

Research Question Five

An examination of relationships among variables included in this study lead to the conclusion that the more interested FFA members are participating in the National FFA Day of Service the more value they will find in the event. The third construct, perceived choice, had slight correlations to the other two constructs; therefore, members' level of choice could slightly influence their interest and value, as well. As such, FFA members' interest and value in service activities might be a positive predictor of FFA members' level of intrinsic motivation controlling for students' personal characteristics of years of membership and age. Implications for this conclusion extend far beyond the National FFA Days of Service. If the National FFA Organization can develop service-based opportunities incorporating a high degree of interest and value, students might be intrinsically motivated to partake in service-based events in the future. Additional research focusing on the influence of the perceived choice of participants is needed. These findings may well serve as a key to understanding what best motivates FFA members to choose to participate in service-based learning opportunities and aid in understanding how to inspire members to get involved with other service-learning experiences in the future.

Discussion

Results from this study suggest FFA members were largely intrinsically motivated to participate in the 2013 National FFA Days of Service at the National Safe Place service site. Further, we recognize the event was a meaningful and valuable experience for both participants and recipients. However, we suggest augmenting the service-learning experience could present several unique benefits for participants. We, therefore, seek to stimulate discussion regarding the alignment of service-learning opportunities at the National FFA Days of Service with the five major stages of authentic service-learning: investigation, preparation, action, reflection, and demonstration (Glickman & Thompson, 2011; Haines, 2010; Kaye, 2004; Lake & Jones, 2008; Smith et al., 2011). Through personal observation during the data collection process, we noted three of the five components – investigation, preparation, and reflection– were not integrated into students' experience. Additionally, it was observed that adult leaders of this program did not make efforts to connect agricultural education curriculum to the service project at the National Safe Place site. Perhaps the National FFA Organization should consider delivering the service-learning activity more purposefully so a more robust learning experience can be achieved.

Scholars and practitioners alike have endorsed service-learning as a natural enhancement to the experiential-grounded doctrine of agricultural education (Barkley, 1999; Connors, 1992; Davis, 2001; Hess, 2001; Mattingly & Morgan, 2001; Slavkin & Sebastian, 2013; Webster & Hoover, 2006; Woods, 2002a, 2002b, 2002c, 2002d, 2004). Confusion persists, however, regarding how to deliver a service-learning experience that motivates students to apply the skills learned through their agricultural education courses in a contextual service-based learning experience (Connors, 1992; Woods, 2002a, 2002b). The aforementioned observations suggest the activities FFA members experience through the National FFA Days of Service could be contributing to this confusion.

Could purposeful interventions of intrinsic motivation factors assist SBAE instructors in delivering a solution to this problem? Results and observations from this study suggest the infusion of Deci and Ryan's (1985, 2000, 2001a, 2001b, 2002, 2008, 2010) three components of SDT– competence, relatedness, and autonomy– into service-learning activities might, in fact, yield an intrinsically motivated service-learning experience for agricultural education students.

To that end, we put forth the Intrinsic Service-Learning Model (see Figure 1) to provide SBAE and the National FFA Organization with a framework to operationalize this concept. The model integrates conceptualizations from Deci and Ryan's SDT (1985, 2000, 2001a, 2001b, 2002, 2008, 2010) with the five stages of authentic service-learning (Glickman & Thompson, 2011; Haines, 2010; Kaye, 2004; Lake & Jones, 2008; Smith et al., 2011). By coalescing the two theories, the Intrinsic Service-Learning Model might catalyze intrinsic motivation in FFA members and agricultural education students' throughout their service-learning experiences.

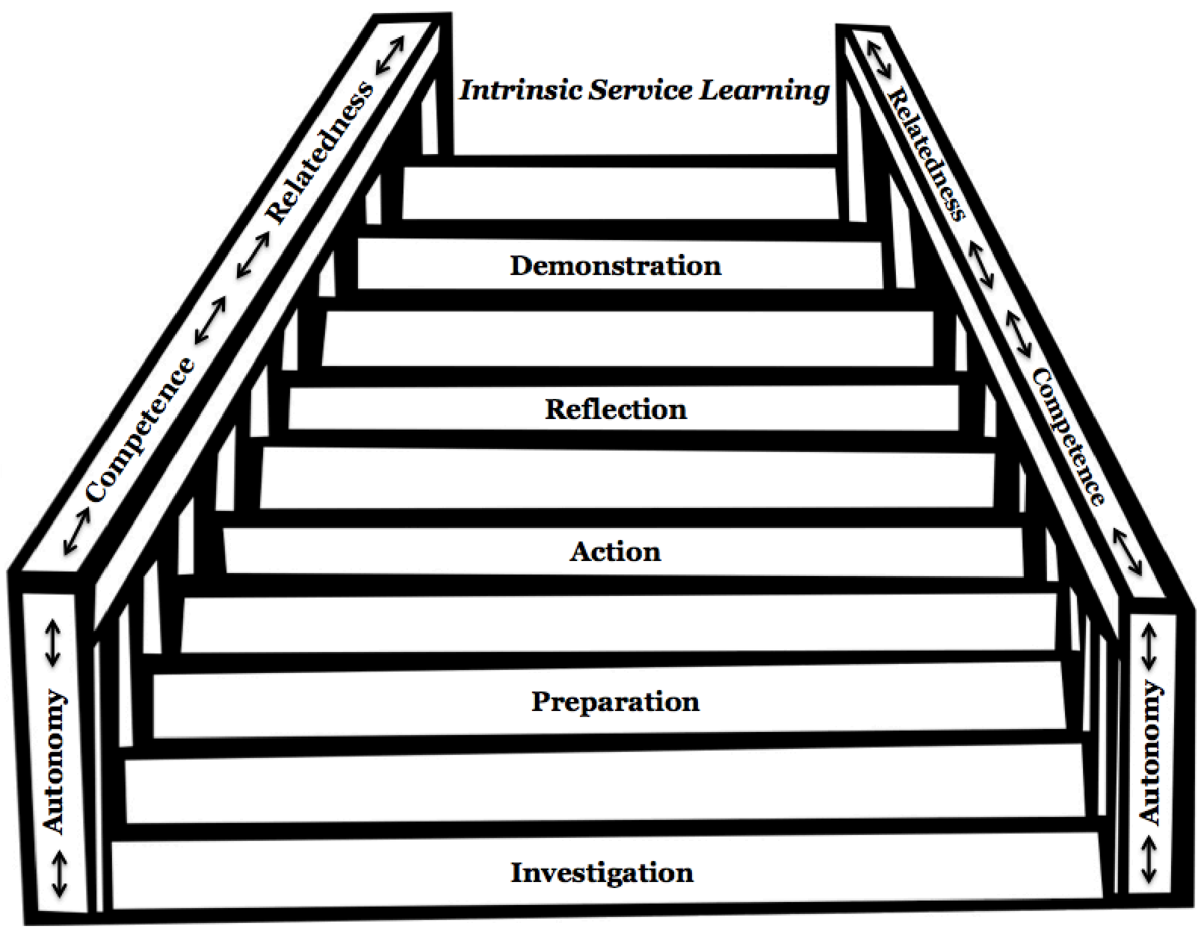

Figure 1. Intrinsic service-learning model.

The Intrinsic Service-Learning Model presents autonomy, competence, and relatedness, the three major tenets of SDT, as a support structure for FFA members as they experience the five-stages of authentic service-learning. As such, practitioners could simultaneously or independently use autonomy, competence, and relatedness as an intervention tactic so a sense of intrinsic motivation can be maintained as students move through the five stages of authentic service-learning. The culmination of this process is the attainment of an intrinsic service-learning experience for each student.

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