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Marshall Baker
Research Conference Chair

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Password: AAAEShares

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Password: 013909

Validation of the Effective Teaching Instrument for School-Based Agricultural Education Teachers

Christopher J. Eck, Oklahoma State University
J. Shane Robinson, Oklahoma State University
Ki Lynn Cole, Oklahoma State University
Robert Terry Jr., Oklahoma State University
Jon W. Ramsey, Oklahoma State University

Abstract

Producing competent, qualified, effective, school-based agricultural education (SBAE) teachers to meet a growing nationwide demand is a daunting task. Teaching effectiveness is an elusive concept, of which is perhaps even more exacerbated in SBAE programs considering the uniqueness. A 58-item effective teaching instrument for SBAE teachers was implemented, as the characteristics were deemed vital by a panel of experts through a nationwide Delphi study. The purpose of the study was to validate and refine the instrument. The population of interest was SBAE teachers nationwide (N = 12,690). More than 3300 individuals from 45 states participated in the study. Through principal component analysis, 26 of the original 58 items were retained as measures of SBAE teacher effectiveness. These items formed the following components: (a) intracurricular engagement, (b) personal dispositions, (c) appreciation for diversity and inclusion, (d) pedagogical preparedness, (e) work-life balance, and (f) professionalism. The instrument was validated and found to have acceptable Cronbach's *alpha* levels for each of the six components. As a result, we conclude the instrument is appropriate for measuring the effectiveness of SBAE teachers.

Introduction and Review of Literature

Effective teaching is a multidimensional concept and can be described in numerous ways (Farrell, 2015). At the most fundamental level, effective teachers are those who have expertise in their subject matter, hold at least a baccalaureate degree, and have passed the required certification examinations in their respective states (U.S. Department of Education, n.d.). Specific characteristics of effective teachers include servant leadership, self-efficacy, and nonverbal communication (Steele, 2010). In addition, effective teachers are those who provide clarity, variability, enthusiasm, task-oriented business-like behavior, and the opportunity for their students to apply their learning (Rosenshine & Furst, 1971). Teachers in school-based agricultural education (SBAE) programs have additional expectations and duties outside of classroom instruction, and therefore must be effective in multiple areas. Specifically, SBAE consists of a three-component model, including "(1) classroom/laboratory instruction (contextual learning), (2) supervised agricultural experience programs (work-based learning), and (3) student leadership organizations" (National FFA Organization, 2015, para. 2). In addition to these three components, effective SBAE teachers must be proficient in the following areas: community relations, marketing, professionalism/professional growth, program planning/management, and personal qualities (Roberts & Dyer, 2004). Evaluating these components of the overall program requires a more diverse and in-depth assessment regarding teacher effectiveness (Enns, Martin, & Spielmaker, 2016; Roberts & Dyer, 2004).

"Teachers of agricultur[al] education teach in what may be perceived as a unique environment when compared to other teachers in a secondary school" (Harper, Weiser, & Armstrong, 1990), as SBAE is an intracurricular elective taught under the Career and Technical Education (CTE) umbrella in a public school setting (Association for Career and Technical Education, 2019). Therefore, the criteria for assessing effective SBAE teachers is unique as well. Producing competent, qualified, effective SBAE teachers to meet a growing nationwide demand is a daunting task (Foster, Lawver, & Smith, 2018); however, it is a necessity. Roberts and Dyer (2004) concluded "creating effective agriculture teachers is imperative for the long-term sustainability of agricultural education programs" (p. 94). The *No Child Left Behind Act* of 2001 aimed to improve primary and secondary schools, with a main focus of providing highly qualified teachers in all classrooms; although, the law only requires teachers to acquire state teacher licensure requirements (U.S. Department of Education, n.d.). The added focus on highly qualified teachers was initiated through a teacher quality grant program available to states for the purpose of preparing, training, and recruiting teachers (United State Department of Education, n.d.). Unfortunately, school districts "are [only] required to demonstrate annual progress in ensuring that all teachers teaching in core academic subjects within the State are highly qualified" (U.S. Department of Education, n.d., p. 3). Alas, defining and measuring teacher effectiveness is a difficult proposition. Teaching effectiveness is "an elusive concept . . ." and a ". . . complex task . . ." considering ". . . the multitude of contexts in which teachers work" (Stronge, Ward, & Grant, 2011, p. 340).

Considering the uniqueness of the program (Harper et al., 1990), determining teacher effectiveness in SBAE is perhaps even more challenging. Eck, Robinson, Ramsey, and Cole (2019) conducted a nationwide study for that purpose. An expert panel in their study identified 58 characteristics to be essential for an effective SBAE teacher. The experts considered these characteristics as guiding principles for effective SBAE teachers, resulting in the recommendation for the validation of the instrument to measure these attributes among pre-service teachers (Eck et al., 2019). The researchers further recommended the instrument be used to evaluate in-service SBAE teachers to help improve their effectiveness and delivery of a complete program.

Theoretical/Conceptual Framework

This study was undergirded in the human capital theory. Human capital evaluates the stock an individual takes in his or her own education, skills, experiences, and training (Becker, 1964; Little, 2003; Schultz, 1971; Smith, 2010; Smylie, 1996) with the goal of becoming gainfully employed (Becker, 1964). Human capital can be general or specific, and is advantageous on numerous levels in various sectors of particular industries (Smith, 2010). SBAE teachers work to increase their own human capital, while also striving to foster the development of human capital within their students. When furthering their own personal human capital, they are improving personal competence as it relates to their vocation (Heckman, 2000), in this case, as SBAE teachers. The human capital needed by individuals differs based on that person's profession of choice (Lepak & Snell, 1999). For traditionally certified SBAE teachers, it begins with the skill set learned through a teacher preparation program, followed by a student teaching internship (NCATE, 2010), and finally through professional development in-service or continued

education. Alternatively certified SBAE teachers, however, are relegated to developing their human capital while teaching. Although, both groups acquire necessary human capital, the timing and route to developing such can look very different. Therefore, an assessment tool is warranted that addresses the human capital needs of SBAE teachers (Eck et al., 2019; Smith, 2010). According to Robinson and Baker (2013), current literature related to this phenomenon is lacking.

The development of career specific human capital for SBAE teachers commonly begins with an agricultural education teacher preparation program. Schultz (1971) stated education is "an investment activity undertaken for the purpose of acquiring capabilities that render future satisfaction or that enhance future earnings of the person as a productive agent" (p. 78). Smith (2010) stated that individuals begin life "with the same innate characteristics" (p. 37); although they have the opportunity to choose the amount of development they receive over their lifetime (Smith, 2010). Even in those whose abilities are innate, they still require specialized training to become productive in a chosen skilled sector (Smith, 2010).

Purpose of the Study

The purpose of this study was to validate the effective teaching instrument for SBAE teachers, as identified by Eck et al. (2019). Three research questions guided this study:

1) Determine the primary components of an effective SBAE teacher,
2) Validate the effective teaching instrument for SBAE teachers, and
3) Determine the internal consistency reliability of the components of the effective teaching instrument for SBAE teachers.

Methods and Procedures

This non-experimental study implemented a descriptive survey research design. A non-experimental research design is one in which the procedures used to measure variables associated with the research problem do not involve any manipulation of circumstances revolving around the study (Gay, Mills, & Airasian, 2012). The population of interest was all SBAE teachers across the U.S. (N = 12,690) in 2017 (Smith et al., 2018). A distribution frame was constructed for 48 states, including 9121 individual email address, along with agricultural education email listservs for 15 states. Four U.S. states/territories (Hawaii, Michigan, Puerto Rico, and the U.S. Virgin Islands) refused to participate. After the frame was established, the effective teaching instrument was submitted to SBAE teachers using electronic mail. Specifically, a Qualtrics Survey link was sent to 9121 individual email addresses and listservs from 15 states. The email followed the Tailored Design Method (TDM) (Dillman, Smyth, & Christian, 2014) ensuring it addressed the usefulness of the study and included the limited response time, a cash incentive drawing for participants, the Oklahoma State University logo, and the lead researcher's pertinent contact information. In addition, the participation request was submitted to each state individually to "personalize all contacts, to the extent possible" (Dillman et al., 2014, pp. 332-333). Instruments were received from 3339 individuals representing 45 states, resulting in a 28.2% response rate. No responses were received from Alaska, Vermont, or

Virginia. After excluding incomplete instruments, the sample was reduced to 2807 valid responses for a response rate of 23.7%.

The instrument was developed based on the findings of Eck et al. (2019), which was a nationwide replication of a study conducted originally in Florida by Roberts and Dyer (2004). This study identified characteristics essential for an effective SBAE teacher. Dillman et al. (2014) recommended grouping related questions. Therefore, the 58 effective teaching items (Eck et al., 2019) were organized into eight categories: classroom instruction, FFA, SAE, program planning, diversity and inclusion, work-life balance, professionalism, and personal dispositions. The categories were evaluated to determine groupings. For this administration of the instrument, the items were organized in the following seven categories: classroom instruction, FFA/SAE, program planning, diversity and inclusion, work-life balance, professionalism, and personal dispositions. The original categories of FFA and SAE were combined due to their close association and the low number of items in those categories (Dillman et al., 2014).

Principal Component Analysis (PCA) was employed to answer Research Questions 1 and 2. PCA is used to reduce the number of items in a dataset to a smaller set of related components (Costello & Osborne, 2005). The usable sample size in this study exceeded the 10:1 recommended participant-to-item ratio as recommended by Comrey and Lee (1992). The initial analysis evaluated all 58 items using PCA and a Varimax rotation. A Varimax rotation, developed originally by Kaiser (1958), was chosen based on the instrument's design, with the assumption the seven components would be correlated since they all are related with effective teaching in SBAE (Eck et al., 2019). With the assumption of seven independent components, an orthogonal rotation was needed (Field, 2009) in which case a Varimax rotation is most common (Abdi, 2003). The output was then evaluated beginning with the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, with a minimum acceptable value of 0.6, and an ideal value closer to 1.0 (Beavers et al., 2013; Cerny & Kaiser, 1977).

Eigenvalues greater than 1.0 identified potential components to retain, which were then evaluated against those obtained through parallel analysis. Any observed eigenvalues greater than those obtained through parallel analysis were retained as established components. Parallel analysis is a "recommended procedure for deciding on the number of components involv[ing] extracting eigenvalues from random data sets that parallel the actual data set with regard to the number of cases and variables" (O'Connor, 2000, p. 397).

SPSS was utilized to employ a simulation of 1000 matrices to mimic the 2442 cases and 58 uncorrelated variables. Eigenvalues of the uncorrelated dataset provide a minimum benchmark of observed eigenvalues to the true data (O'Connor, 2000). In addition to eigenvalues, the cumulative percentage of total explained variance was evaluated, along with communalities, identifying all communality extractions for items greater than 0.5. Utilizing the number of statistically significant components identified by the parallel analysis, the PCA was re-run fitting the model to a given number of components. The new output was then analyzed assessing communalities and rotated component loadings to determine which items (i.e., those with a value greater than 0.6) to retain. The retained items were fit to another PCA with a Varimax rotation. Output was then compared to a new parallel analysis, updated to reflect the reduced number of variables. Using the parallel analysis to determine the number of statistically significant

variables, a final PCA was run based on the retained items and the reduced number of components. Any items loading at a 0.6 or higher on a single component were retained for inclusion on the final instrument.

"The validity of a measurement is the extent to which a measurement for a variable or construct measures what it is purported or intended to measure" (Privitera, 2017, p. 113). With the complete 58-item instrument deemed valid (Eck et al., 2019), the reduction of any items through a PCA will result in a valid instrument, as those items are part of the complete construct (Privitera, 2017) of effective teaching in SBAE. In addition to face and content validity established through the initial instrument development, the PCA served as an opportunity to further the construct validity of the instrument (Privitera, 2017). The retained items in the PCA measure the components identified, allowing them to be operationalized (Privitera, 2017). The overall reliability was established through a Cronbach's *alpha*, which provided an overall reliability measure of the complete effective teaching instrument for SBAE teachers.

"Reliability is the consistency, stability, or repeatability of one or more measures or observations" (Privitera, 2017, p. 109). Reliability of an instrument is extremely valuable; therefore, the retained items were checked for reliability as a complete instrument and within each of the statistically significant components to answer the second and third research questions. Specifically, the reliability measure focused on the internal consistency of the instrument to determine the relationship between the items (Privitera, 2017) measuring teaching effectiveness in SBAE. Based on the items, Cronbach's *alpha* was used to determine the overall reliability of the instrument. "Cronbach's *alpha* measures the internal consistency of a group of items by measuring the homogeneity of the group of items" (BrckaLorenz, Chiang, & Nelson Laird, 2013, para. 3). To verify the overall Cronbach *alpha* value, the item-total statistics were analyzed to determine if deleting any item would increase the Cronbach *alpha* level. Cronbach's *alpha* ranges from zero to one, and any value greater than or equal to 0.7 is considered reliable (BrckaLorenz et al., 2013). An overall instrument reliability score was established before moving into component -specific reliability. Each of the validated components were checked for reliability statistics considering their corresponding items. The Cronbach *alpha* values for the items were considered along with the evaluation of the *alpha* level if an item was removed to establish reliability of each of the components. Together, the initial Delphi design, the implementation of a PCA, and an overall acceptable Cronbach's *alpha* level can produce a valid instrument.

Researchers face constant threats to validity and reliability within a study (Dillman et al., 2014). Survey error, including sampling error, coverage error, measurement error, and non-response error tends to be the most persistent threat (Dillman et al., 2014). To help overcome this common threat, the TDM was employed, which often leads to higher response rates with lower error rates (Dillman et al., 2014). A $100 cash incentive for ten randomly drawn participants who completed the study and provided a valid school issued email address was used to encourage response rate.

During instrument development, conventions from Dillman et al. (2014) were utilized to develop a quality questionnaire with the incorporation of: (a) ensuring the questions displayed across multiple devices and platforms, such as mobile devices; (b) creating welcome and closing

screens that were informative and interesting; (c) using consistent page layouts optimized by Qualtrics; (d) allowing the respondents to go back or start and stop the questionnaire; (e) forgoing the use of a progress indicator; and (f) utilizing personalized correspondence specific to each state. Multiple items were included for the targeted components, which is found to be more reliable than single-item components (Dillman et al., 2014). Following these recommendations helped reduce measurement error by producing more accurate data that can be interpreted appropriately (Dillman et al., 2014).

Findings

Research Question 1: Determine the Primary Components of an Effective SBAE Teacher

The 58-item instrument (see Table 1) was analyzed using a PCA to determine the primary components of an SBAE teacher and reduce the instrument into components accounting for maximum variance.

Table 1

Categorized Characteristics of Effective SBAE Teachers

Category	Identified Characteristic	Item Number
Instruction	I am passionate about education.	I_1
	I provide a variety of learning opportunities to meet the needs of all students.	I_2
	I guide students to grow personally.	I_3
	I am a leader for students.	I_4
	I demonstrate pedagogical knowledge.	I_5
	I am a good communicator.	I_6
	I demonstrate sound educational practices.	I_7
	I am prepared for every class.	I_8
	I demonstrate classroom management.	I_9
	I understand the experiential learning theory.	I_10
	I am motivated for student success.	I_11
	I am knowledgeable about agriculture.	I_12
	I am first and foremost a classroom teacher.	I_13
	I am innovative.	I_14
	I am engaging.	I_15
FFA/SAE	I advise the FFA chapter.	F_1
	I am not just a facilitator of record keeping for degrees and awards.	F_2
	I instruct students through FFA.	F_3
	I am passionate about FFA.	F_4
	I advise the FFA officers.	F_5
	I prepare students to be leaders.	F_6
	I instruct students through supervised agricultural experiences.	F_7

Program Planning	I use the complete agricultural education model as a guide to programmatic decisions and practices.	PP_1
	I am resourceful as an administrator of my program.	PP_2
Balance	I lead a balanced life.	B_1
	I have the ability to say no.	B_2
	I am never afraid to ask for help.	B_3
	I demonstrate a willingness to put in extra hours.	B_4
Diversity and Inclusion	I understand student needs.	D_1
	I am an advocate for all students.	D_2
	I value students regardless of sex.	D_3
	I value students regardless of economic status.	D_4
	I value students from all ethnic/racial groups.	D_5
	I understand diversity.	D_6
	I am culturally relevant.	D_7
	I care about all students.	D_8
	I understand there is not an award for all students, but that does not mean they are not valuable.	D_9
Professionalism	I am a purposeful lifelong learner.	P_1
	I demonstrate adaptability.	P_2
	I am a dedicated professional.	P_3
	I am an advocate for public education.	P_4
	I am engaged in an appropriate professional organization.	P_5
Personal Dispositions	I am fair.	PD_1
	I am student focused.	PD_2
	I am trustworthy.	PD_3
	I am honest.	PD_4
	I am passionate about agriculture.	PD_5
	I am respectful.	PD_6
	I show empathy.	PD_7
	I am dependable.	PD_8
	I am responsible.	PD_9
	I am relatable.	PD_10
	I am genuine.	PD_11
	I am a hard worker.	PD_12
	I am organized.	PD_13
	I am helpful.	PD_14
	I have patience.	PD_15
	I show integrity.	PD_16

The KMO measure of sampling adequacy equaled 0.94, which was deemed acceptable in accordance with Cerny and Kaiser (1977). The initial PCA resulted in 10 components with eigenvalues greater than 1.0. The results of the PCA comparison to parallel analysis indicated only eight components were necessary, as they were above the output of parallel analysis. Data were then re-analyzed (PCA with Varimax rotation) fitting the 58-items to eight components. The communalities and the component loadings of the rotated component matrix of all 58-items were analyzed to determine which items to retain. Thirty (of 58) items were retained from a Varimax rotated PCA fixed to eight components, based on component loadings greater than or equal to 0.6 on at least one component. The 28 items not retained included characteristics such as, *I am willing to put in extra hours, I am passionate about education, I demonstrate pedagogical content knowledge, I am first and foremost a classroom teacher, I am engaging, I am passionate about agriculture, I am fair, I am an advocate for all students*, and *I am knowledgeable about agriculture*. The 30 retained items were then re-analyzed using an additional PCA (without specifying a specific number of components) to verify the number of components in the reduced dataset. The resulting analysis had a KMO measure of 0.89. Seven components had initial eigenvalues greater than 1.0. Six components had initial eigenvalues above parallel, resulting in the need to re-run the PCA with Varimax rotation, limiting the items to fit within six components. Communalities and the component loadings of the rotated component matrix were analyzed, based on a Varimax rotation, of the retained 30 items to determine the final component structure of the items resulting from the 6 components.

The PCA fit to 6 components resulted in 26 (of 30) items loading at or above a 0.6, accounting for 58.1% of the explained variance. The six components are outlined in Table 2 with the corresponding items and the updated item numbers to represent the complete effective teaching instrument for SBAE. The four items that did not fit the six-component model included “I am a leader for students,” “I guide students to grow personally,” “I am a purposeful lifelong learner,” and “I am an advocate for public education.”

Table 2

Retained Items and Emerging Components (26 items)

Component Title	Item	Corresponding Item Description
1. Intracurricular Engagement	IE_1	I instruct students through FFA.
	IE_2	I advise the FFA officers.
	IE_3	I advise the FFA chapter.
	IE_4	I facilitate record keeping for degrees and awards.
	IE_5	I am passionate about FFA.
	IE_6	I instruct students through SAEs.
	IE_7	I use the complete agricultural education 3-component model as a guide to programmatic decisions.
2. Personal Dispositions	PD_1	I am trustworthy.
	PD_2	I am responsible.
	PD_3	I am dependable.

	PD_4	I am honest.
	PD_5	I show integrity.
	PD_6	I am a hard worker.
3. Appreciation for Diversity and Inclusion	AD_1	I value students regardless of economic status.
	AD_2	I value students of all ethnic/racial groups.
	AD_3	I value students regardless of sex.
	AD_4	I care about all students.
	AD_5	I understand there is not an award for all students, but that does not mean they are not valuable.
4. Pedagogical Preparedness	PP_1	I demonstrate classroom management.
	PP_2	I demonstrate sound educational practices.
	PP_3	I am prepared for every class.
5. Work-Life Balance	B_1	I have the ability to say no.
	B_2	I lead a balanced life.
	B_3	I am never afraid to ask for help.
6. Professionalism	P_1	I have patience.
	P_2	I show empathy.

Note. IE = Intracurricular Engagement, PD = Personal Dispositions, AD = Appreciation for Diversity and Inclusion, PP = Pedagogical Preparedness, B = Work-Life Balance, P = Professionalism. Item numbers presented in this table will be used from this point forward.

Research Question 2: Validation of the Effective Teaching Instrument for SBAE Teachers

The instrument resulted in 26 items loading on 6 components. All 26 items loaded at a value greater than .60 (Guadagonli & Velicer, 1988) and have communality extractions at an acceptable level according to Hair, Black, Babin, and Anderson (2010). Instrumentation began with a 58-item instrument that was validated through a nationwide Delphi study (Eck et al., 2019), of which 17 panelists reached consensus on 58 items at an a priori rate of 85% agreement. Those 58 items were reduced through three systematic Delphi rounds from 121 initial statements (Eck et al., 2019). The resulting 26 items are considered valid based on the PCA results measuring the component (Privitera, 2017) of effective teaching in SBAE. In addition to validity of the previously developed items, a reliability estimate based on 26 items resulted in an acceptable Cronbach's *alpha* of 0.87 (Nunnally, 1978). We evaluated the deletion of any item which may have increased the total Cronbach's *alpha* score. After analysis of the item-total statistics, it was determined that the removal of any item would actually decrease the total Cronbach's *alpha* level instead of increasing it, resulting in the retention of all 26 items as part of the valid effective teaching instrument for SBAE teachers.

Research Question 3: Determine the Internal Consistency Reliability of the Components of the Instrument

Although the 26-item instrument was deemed valid through a PCA loading on 6 components, with a Cronbach's *alpha* of 0.87, reliability estimations were analyzed for the corresponding items within each of the 6 components.

The first component included FFA and SAE, two of the three parts of the complete three-component model of agricultural education (National FFA Organization, 2015). The Intracurricular Engagement component resulted in a Cronbach's *alpha* of 0.88 based on 7 items. The removal of any of the seven items would result in a decreased Cronbach *alpha* for the component; therefore, all items were retained for the first component. The seven items have moderate to substantial positive correlations (Davis, 1971), demonstrating interrelated items measuring Intracurricular Engagement (Field, 2013).

The second component centered on Personal Dispositions of SBAE teachers. The Personal Dispositions component had a Cronbach's *alpha* level of 0.86 based on six items. The Personal Dispositions component was composed of six items with strong reliability coefficients; therefore, all six items were retained. According to Davis (1971), the six items measuring Personal Dispositions are interrelated with moderate to very strong positive correlations.

The third component, labeled *Appreciation for Diversity and Inclusion,* was composed of 5 items with a Cronbach's alpha level of 0.87. Five items were retained with strong reliability coefficients representing the component for Appreciation for Diversity and Inclusion. Moderate to very strong positive correlations (Davis, 1971) existed, showing the intercorrelation of the items within the Appreciation for Diversity and Inclusion component (Field, 2013).

The fourth component, Pedagogical Preparedness, resulted in a Cronbach's *alpha* of 0.71 and was composed of three items. All three items were retained for this component, as the deletion of any item would result in a reduced Cronbach alpha. According to Davis (1971), the inter-item correlations for the three items measuring Pedagogical Preparedness were moderately positively correlated.

The fifth component, *Work-Life Balance*, was composed of 3 items, for which the Cronbach *alpha* was 0.73. Although, removal of one of the items (B_3) increased the Cronbach alpha for this component, the item was retained on the basis of Yang's and Green's (2011) assertion that "items that are eliminated based on their effect on coefficient alpha [alone] can [still] contribute substantially to the overall psychometric quality of a scale" (p. 389). In addition, the correlation matrix identifies moderate to substantial positive correlations (Davis, 1971) between the three items, identifying the items as measuring an interrelated component (Field, 2013).

Each of the first 5 components have Cronbach's *alpha* levels greater than 0.70, which is considered to be acceptable (Nunnally, 1978). The alpha for the sixth component was below the *acceptable* threshold with a Cronbach's alpha of 0.58 based on two items. Research suggests a coefficient alpha is a meaningless measure when dealing with two-item scales and recommend reporting the Spearman-Brown reliability indicator (Eisinga, Grotenhuis, & Pelzer, 2013). The Spearman-Brown formula resulted in a reliability estimate of 0.58. Because this component was associated with *Professionalism* and was part of the total 26-item reliable instrument, with a Cronbach's alpha of 0.87, the researchers opted to retain the items, although a two-item

component is problematic (Yang & Green, 2011). In addition to the two items being included in the greater reliable instrument, the inter-item correlation matrix provided rationale to retaining the items as they displayed a moderate positive correlation for the component (Davis, 1971).

Conclusions

This study validated the instrument for effective teaching in SBAE (Eck et al., 2019). The nationwide Delphi study (Eck et al., 2019) identified eight categories of effective SBAE teachers, including: instruction, FFA, SAE, program planning, balance, diversity and inclusion, professionalism, and personal dispositions. Through PCA, the findings of this study generated six components including: Intracurricular Engagement, Personal Dispositions, Appreciation for Diversity and Inclusion, Pedagogical Preparedness, Work-Life Balance, and Professionalism. Although only six components emerged from the PCA, they encompassed all eight categories identified by Eck et al. (2019). The emerging intracurricular engagement category included items related to FFA, SAE, and program planning, condensing three categories into one component. This combination of items aligns with standard four from the American Association for Agricultural Education (2017) of program planning, which encompasses FFA and SAE responsibilities, with the addition of publicizing the SBAE program to key stakeholders (i.e., parents, students, and community members). The remaining five categories identified by Eck et al. (2019) each emerged as an independent component in the PCA of this study. Similarly, the emerging six components aligned with six of the eight factors identified by Roberts and Dyer (2004), with marketing and community relations being the two categories not identified in this study.

The six components spanned 26 items, which were validated as a complete instrument, resulting in an acceptable Cronbach's alpha of 0.87 (Nunnally, 1978). Additionally, the reliability of the instrument was established by individually analyzing each of the six components identified from the PCA (i.e., intracurricular engagement, personal dispositions, appreciation for diversity and inclusion, pedagogical preparedness, work-life balance, and professionalism). Each of the components resulted in moderate to very strong correlations between items (Davis, 1971) and exhibited acceptable Cronbach alpha levels (Nunnally, 1978). It was determined that the removal of any items from the components would result in decreased Cronbach alpha levels; so, all 26 items were retained for the complete, validated effective teaching instrument for SBAE. Therefore, it is concluded that the effective teaching instrument for SBAE (ETI-SBAE) teachers is an appropriate instrument for measuring SBAE teacher effectiveness.

Personal dispositions comprise the largest single component related to SBAE teacher effectiveness. The personal dispositions component corresponded to six items which included: being trustworthy, responsible, dependable, honest, and a hard worker, and maintaining integrity. The need for personal dispositions for high quality and effective SBAE teachers has been identified in multiple studies (Eck et al., 2019; Goe & Stickler, 2008; Mitchell, Robinson, Plake, & Knowles, 2001; Roberts & Dyer, 2004; Steele, 2010; Stronge et al., 2011; Williams, Cannon, & Campbell, 2018) in addition to being recognized by the American Association for Agricultural Education (2017) as one of the six standards for SBAE teacher preparation. Teacher preparation programs accredited by the Council for the Accreditation of Educator Preparation (CAEP) (2015) are charged with developing and assessing professional dispositions per Standard 1 of

their teacher candidates. Therefore, personal dispositions is an area of importance for effective teachers due to the frequency and consistency of items related to that component. Therefore, evaluating an individual's human capital assets and needs (Becker, 1964; Little, 2003; Schultz, 1971; Smith, 2010; Smylie, 1996) are vital to the development of SBAE teachers regarding their teaching effectiveness and employability (Becker, 1964; Robinson & Baker, 2013).

Recommendations

When considering recommendations for practice, the ETI-SBAE is useful in determining factors related to effective teaching in SBAE. Faculty members in SBAE teacher preparation programs should use this instrument to measure growth and development of future teachers related to the effective characteristics an SBAE teacher should possess. The instrument should be administered at key points throughout a student's undergraduate program to determine his or her preparedness to enter the SBAE classroom. These key points for evaluation might include the beginning and end of each semester in the SBAE teacher preparation program. Allowing teacher preparation faculty to establish a baseline and then evaluate the growth in human capital of future SBAE teachers throughout the program would assist university supervisors in placing student teachers in their internships.

Additionally, SBAE teacher preparation faculty need to implement the validated ETI-SBAE to identify the human capital needs of pre-service SBAE teachers. The implementation of the ETI-SBAE could result in optimizing purposeful, pointed, individualized plans of study for pre-service teachers who wish to increase the human capital necessary for becoming effective. Further, school administrators should use the validated ETI-SBAE to evaluate their SBAE teachers and use the results of their evaluations to provide or support sustained, prolonged, and intense professional development of their teachers. The ETI-SBAE also should be paired with current program evaluations used by state program specialists, who might provide another metric to determine overall program quality. Additionally, this metric could be used for purposeful coaching for SBAE teachers, helping them develop human capital in areas that are identified as lacking.

Recommendations pertaining to future research begin with the replication of this study. Although this study was a national census, replication on the state level could provide a more detailed overview of SBAE teachers across various geographic locations. Providing an opportunity for increased participation from each state could lead to an increased understanding of SBAE teachers' needs on a state level.

In addition, examination of key components within SBAE teacher preparation programs impacting teacher effectiveness is necessary. The ETI-SBAE provides insight into the specific human capital being developed in program specific courses (Smith, 2010), allowing program improvement to prepare SBAE teachers with increased teaching effectiveness. Therefore, the ETI-SBAE should serve as an evaluation metric in agricultural education teacher preparation programs nationwide.

Further, the need exists to identify effectiveness needs of early-career SBAE teachers to provide targeted professional development. Allowing early-career SBAE teachers an opportunity to self-assess their teaching effectiveness based on the ETI-SBAE provides SBAE teacher preparation faculty an opportunity to identify pertinent training needs. Additionally, examining the growth

of future SBAE teachers within teacher preparation programs at pivotal stages using the ETI-SBAE is needed. After the initial evaluation of future SBAE teachers when entering the program, additional evaluation is recommended at the end of each semester to determine the growth in human capital related to effective teaching in SBAE.

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The Success Trap: A Case Study of Early Career Agricultural Education Teachers' Conceptualizations of Work-Life Balance

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Abstract

Little progress has been made to understand the (in)abilities of school-based, agricultural education (SBAE) teachers to balance their work and life responsibilities. Nevertheless, advancing this conversation is critical, especially in light of recent teacher shortage trends. In response, this study's purpose was two-fold: (1) examine how early career teachers in [State] co-constructed their conceptualizations of work-life balance as SBAE teachers, and (2) illuminate the contextual factors that shaped how the early career teachers negotiated meaning regarding their reified views of work-life balance. When interpreting findings through the lens of Landscapes of Practice, five themes emerged: (1) The Success Trap, (2) The Work Eclipse, (3) Aspired Boundaries, (4) Grin and Bear It – Silence, and (5) Undercurrents of Change. The findings speak against the dominant narrative perpetuated by various actors and forces in the discipline that have championed the notion that work-life balance should be the ultimate goal. Instead, our findings problematize this notion by illuminating how early career teachers in [State] visualized success and work-life balance in diverse and complex ways. As a result, we offer implications and recommendations to help reimagine how early career teachers can better traverse issues of work and life in the SBAE landscape.

Introduction and Literature Review

> *If I had to use one word to summarize the advice in this issue it would be "balance." Balance your professional career and your personal life. Make sure that you plan time for your spouse, your immediate family, your extended family, your faith, and yourself. Along with the "balance" in your life, develop effective ways of dealing with the stress in your career and personal life. If you accomplish these two tasks, you will be on your way to a long, healthy and happy life.* (Boone, 2011, p. 2)

In the excerpt above from the *Agricultural Education Magazine* (*The Magazine*), Harry Boone challenges secondary agricultural teachers to make purposeful strides in achieving work-life balance and claims that if such is achieved, it could lead a more fulfilling career and life. Similar to Boone (2011), other authors in this issue of *The Magazine* emphasize the importance of work-life balance, as it "ensure[s] happiness at work and home" (Cano, 2011, p. 4) yet " is challenging but it can be done and done successfully" (Elmquist, 2011, p. 21). The message in this issue is straightforward; work-life balance is necessary and it is up to individual agricultural educators to make it happen. Although this advice seems logical, achieving work-life balance appears to be more complex in practice, especially for agriculture teachers whose responsibilities extend far

beyond classroom instruction (Talbert, Vaughn, Croom, & Lee, 2014). With the expectations to engage students in a comprehensive agricultural education program that incorporates classroom and laboratory learning experiences, Supervised Agricultural Experiences (SAEs) and student participation in the National FFA Organization (Talbert et al., 2014), achieving work-life balance as a secondary agricultural education teacher is not straightforward. To this point, extant research paints a murky picture regarding notions of work-life balance in school-based, agricultural education (SBAE) (Blackburn, Bunch, & Haynes, 2017; Murray, Flowers, Croom, & Wilson, 2011; Sorensen & McKim, 2014; Sorensen, McKim, & Velez, 2016; Solomonson & Retallick, 2018; Traini, Claflin, Stewart, & Velez, 2019). As an illustration, conflicting evidence exists, neither supporting nor refuting claims that agriculture teachers struggle with balancing work and non-work obligations. In particular, Murray et al. (2011) examined challenges Georgia agriculture teachers encounter as they balance family and career expectations. They concluded SBAE teachers struggle to balance career and family. When surveyed about perceived barriers to fulfilling family responsibilities, participants reported the following barriers: (a) fatigue from work, (b) night meetings/activities, (c) long work days, (d) weekends away, (e) excessive work demands, (f) inability to leave during the school day, and (g) taking work home (Murray et al., 2011).

These results differ from Sorensen's and McKim's (2014) findings that Oregon SBAE teachers reported moderate levels of work-family balance and that moderate and positive relationships existed among job satisfaction, work-life balance ability, and professional commitment. These findings were also echoed in their 2016 study that reported SBAE teachers experience moderate levels of work-family balance ability and job satisfaction (Sorensen, McKim, and Velez, 2016). Similarly, Blackburn et al. (2017) found that Louisiana SBAE teachers were also primarily able to achieve work-life balance. These results somewhat conflicted with Solomonson and Retallick's (2018) findings that mid-career SBAE teachers struggle to balance their personal and professional lives, which was largely due to changing family dynamics. Moreover, mid-career agriculture teachers noted marriage and children added to this struggle and, despite successes they were experiencing with their career, it affected their family life (Solomonson & Retallick, 2018). One of the most recent studies in the field explored the ways in which agriculture teachers interact with reified forms of success in SBAE regarding work-life balance from a social learning perspective (Traini, et al., 2019). Traini et al.'s (2019) qualitative investigation with early-career agriculture teachers in Oregon found participants encountered tensions about their notions of success in agricultural education and work-life balance. For instance, SBAE teachers perceived they were able to achieve work-life balance (i.e., physical and mental well-being), *or* success in their career (i.e., winning awards, blue banners, or having high program numbers), but never both. And, as they strived for success and balance, they encountered stress, guilt, judgement, fear, and pressure (Traini et al., 2019). Therefore, results from this study suggested that work-life balance may be more difficult than a simple choice, as Boone (2011) suggested in *The Magazine*, but rather an impossible feat if SBAE teachers wish to succeed in their career.

Although no salient themes in the literature point to the (in)abilities of SBAE teachers to balance their work and non-work responsibilities, the conversation regarding work-life balance is critical for the profession, especially in light of teacher shortage trends (Smith, Lawver, & Foster, 2018). Research has shown connections between the struggle to balance work and non-work obligations and the decision to leave the profession before retirement (Igo & Perry, 2019; Lemons et al., 2015; Solomonson & Retallick, 2018) as well as the decision not to enter the profession due to

the inability to balance work and life while fulfilling the obligations of the job (Igo & Perry, 2019). To address the emergent concerns about work-life balance and the teacher shortage problem, scholars have recommended myriad strategies. These often involve increasing the quality and quantity of professional development offered to SBAE teachers about how to better balance work and non-work responsibilities (Blackburn et al., 2017; Igo & Perry, 2019; Sorensen & McKim, 2014; Solomonson & Retallick, 2018), or to better manage their time (Murray et al., 2011). These recommendations align with the aforementioned sentiments espoused in *The Magazine* that framed balance as a personal choice, or a factor that individuals can control. However, other scholars such as Hainline et al. (2015), Sorensen et al. (2017), and Traini et al. (2019) suggested that researchers and practitioners should look beyond the individual SBAE teacher and instead use a systems approach to advance the work-life balance conversation and gain a clearer understanding of how this variable influences SBAE teacher shortage trends. Such a change would necessitate a re-examination of the cultural norms regarding how SBAE measures success in teaching by reducing the expectations placed on teachers (Sorensen, McKim, & Velez, 2016), charging state staff to make purposeful strides in alleviating challenges of work-life balance (Solomonson & Retallick, 2018), and digging deeper into the ways in which teachers experience and manage their work from a social learning perspective (Traini et al., 2019).

Although previous research (Blackburn, et al., 2017; Murray, et al., 2011; Sorensen & McKim, 2014; Sorensen, et al., 2016; Solomonson & Retallick, 2018; Traini, et al., 2019) has advanced the utility of work-life balance as a construct, so far, inconclusive evidence exists regarding the ways in which SBAE teachers can achieve this feat. Further, although existing research has illuminated how a lack of work-life balance may influence teacher attrition (Igo & Perry, 2019; Lemons et al., 2015; Solomonson & Retallick, 2018), little is known about SBAE teachers' conceptualizations of work-life balance and how such operates as a master narrative in SBAE - and as a result may conceal critical dimensions of influence. Exploring this deficiency in knowledge, particularly from a social learning perspective, may allow agricultural education to paint a more granular picture of how SBAE teachers' conceptualizations of work-life balance manifest as a result of the discipline's unique context, expectations, and perspective. This insight might also advance the conversation concerning the ways in which varied representations of work-life balance may support or, perhaps, more importantly stifle the career longevity of SBAE teachers.

Theoretical Framework

We employed concepts from Wenger-Trayner and Wenger-Trayner's (2015) *Landscapes of Practice* to examine how early career agriculture teachers in Louisiana co-constructed their conceptualizations of work-life balance and negotiated meaning in regard to their reified views on work-life balance. Built from previous work on situated learning (Lave & Wenger, 1991) and social learning perspectives (Wenger, 1998), *Landscapes of Practice* offers a broad social perspective on professional learning that situates learning in the context of our lived experiences as participants in a social world (Wenger-Trayner & Wenger-Trayner, 2015). Wenger-Trayner and Wenger-Trayner (2015) postulate learning is a component of our human nature; a social endeavor in which we are active participants in the practices of various communities of practice, and that we construct our identities as we participate in these communities. It is through social participation within a community that learning occurs.

When considering the work of professionals, Wenger-Trayner and Wenger-Trayner (2015) recognized individuals engage in and belong to multiple communities of practice, or groups formed via mutual engagement in a landscape. As professionals engage in and participate in these communities, they negotiate meaning as well as shape and are shaped by the norms, expectations, and repertoires of practice negotiated by its members. Unlike other uses of the word, Wenger (1998) described negotiation as continuous interaction; a process that "is at once both historical and dynamic, contextual and unique" (p. 54) and takes place through the dual process of *participation* and *reification*. Participation involves an active process whereby "the social experience of living in the world in terms of membership in social communities and active involvement in social enterprises" (Wenger, 1998, p. 55). Reification involves the projection of meaning onto the world; it describes our engagement in the world as useful and meaningful. As we participate in the practices of various communities we give "form to our experiences by producing objects that congeal this experience into 'thingness'" (Wenger, 1998, p. 58).

Reification can take many forms including symbols, patterns of behavior, logos, vernacular, abstractions, tools, or stories. The meaning that is negotiated within communities, and the boundaries between them, constitute a *landscape of practice*. As a result, we conceptualized SBAE as a landscape of practice, comprised of multiple communities and boundaries. Similar to Traini et al. (2019) study, we acknowledged SBAE teachers participate in multiple communities in the landscape (e.g., an FFA community, an SAE community, a community associated with the professional association), yet purposefully did not define or identify these various communities as the landscape differs for each individual. Because meaning is negotiated across the landscape, we viewed agriculture teachers as individuals who traverse the SBAE landscape, negotiating meaning with others and as a result build a distinct professional identity. Teachers constantly negotiate meaning through participation and reification and come to understand what it means to be an SBAE teacher through their engagement in this landscape.

Given these tenets, we examined how the concept of work-life balance is taken up by SBAE teachers as they navigate the SBAE landscape. Using this theoretical lens, we assumed they constructed their understanding of work-life balance through active participation in the SBAE landscape and use such to inform their engagement. This may include the negotiation of meaning regarding what it means to be balanced, how one achieves or does not achieve balance, and the influences other individuals in the landscape may or may not have on their conceptualizations. Traini et al.'s (2019) study served as a starting point for this examination by asking Oregon agriculture teachers to consider their own conceptualizations of work-life balance given the profession's reifications of success. Yet, their methods limited their ability to understand how their participants' co-constructed their conceptualizations of work-life balance or how they negotiate meaning in regard to their reified views on work-life balance. Therefore, the current investigation examined how SBAE teachers conceptualized work-life balance using Wenger-Trayner and Wenger-Trayner's (2015) theory to illuminate how SBAE teachers negotiated meaning. This, in turn, may widen our understanding of the connections between the concept of work-life balance and SBAE teacher shortage trends.

Purpose

Building on the work of Traini et al. (2019), this study's purpose was two-fold: (1) examine how early career teachers in Louisiana co-constructed their conceptualizations of work-life balance as

SBAE teachers, and (2) illuminate the contextual factors that shaped how the early career teachers negotiated meaning regarding their reified views on *work-life balance*. Because of the importance of work-life balance in addressing the discipline's teacher retention issue, this investigation's findings could help early career agricultural education teachers remain in the workforce (Igo & Perry, 2019; Lemons et al., 2015; Solomonson & Retallick, 2018). As a consequence, this study supported the American Association for Agricultural Education's (AAAE's) Research Priority 3: *Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century* (Stripling & Ricketts, 2016).

Methodology

Case studies set boundaries for detailed investigation, allowing for in-depth analysis while examining situational and environmental factors in context (Stake, 2005; Meyer, 2001). Our inquiry employed the particularistic and authentic nature of case studies as described by Stake (1995) to address the diverse conceptualizations of work-life balance held by early career agricultural education teachers while underscoring the nuance and nature of the SBAE landscape. The first round of this study was bounded by time and place (Stake, 1995) and included 24 early career agriculture teachers with fewer than five years teaching experience who attended an early career teacher professional development session at Louisiana's agriculture teacher association's summer conference in 2019. Participants were all teachers in Louisiana and evenly represented male and female teachers. The second round of this study included follow-up interviews with four participants from round one, two male and two female. Data collection was conducted by two researchers, both teacher educators, one of which is closely linked to participants as a teacher educator in Louisiana. An additional researcher had no direct connection to participants and acted as an outside inquiry audit, examining the research process and ensuring consistency throughout (Lincoln & Guba, 1985).

During the first round of data collection, we followed the data collection protocol developed by Traini et al. (2019) by facilitating an interactive silent discussion (ISD) allowing participants to publicly respond to eight questions. This included questions such as "what are barriers to achieving balance?", "how would you define a successful agriculture teacher?", and "what is balance?" Each question was written on a large poster board and spread out on an 8'x 30' conference room wall. Participants were asked to engage in the ISD for 15 minutes without talking and were asked to record their thoughts and opinions while also responding to statements of other participants. Thereafter, we facilitated 15 minutes of discussion following the ISD by which participants were asked to share their observations and reflect on the silent-discussion comments that resonated with them most. Participants were then provided a survey link that asked open-ended follow-up questions and provided an opportunity to add additional thoughts and take-aways anonymously. Round one of data collection included the following forms of data: (a) 72 individually written responses on the wall, (b) transcription of the recorded discussion, (c) 30 written comments from the survey, (d) observational field notes recorded by researchers during the professional development session, and (e) subsequent memos from each researcher. Data from round one were compiled and individually coded by researchers for initial impressions using eclectic coding (Saldaña, 2016). During this process of meaning-making, we recognized additional data were needed for a more robust and saturated understanding of the factors at play (Ness, 2015). Therefore, a second round of data collection was initiated using a

semi-structured interview protocol with questions that allowed for deeper meaning to be provided by participants from round one. Six teacher participants who indicated interest in participating in future research and provided information warranting further exploration were contacted for a follow-up interview. Four of the six individuals agreed to engage in a follow-up interview. Participants were asked questions such as “describe your experience during the ISD”, “how would you characterize your work-life balance now”, and “can you think of an agriculture teacher you would consider successful and describe why you identify them as successful?” Interviews, each lasting approximately one hour, were recorded and transcribed verbatim. To enhance the credibility of our findings, data from both rounds one and two were compiled for analysis (Hsieh & Shannon, 2005).

Saldaña (2016) described the coding process as rigorous and cyclical analysis and interpretation beyond the labeling of data to the linking of ideas. He further described the value of teams of researchers bring to the collaborative process of coding through shared interpretation. We initially sifted through data individually by utilizing in vivo coding to allow meaning to be cultivated from the voices involved in this study (Lincoln & Guba, 1985; Creswell & Creswell, 2017), but participated in several rounds of collaborative coding and negotiation during analysis (Schreier, 2012). According to Weston et al. (2001), collaborative coding often generates new and richer codes than coding alone when ideas are free to be questioned, considered, and debated. The consolidation of developed codes to generate categories was also a team process that increased the rigor of our inquiry by requiring intercoder agreement (Burla, Knierim, Barth, Duetz, & Abel, 2008; DeCuir-Gunby, Marshall, & McCulloch, 2011; Krippendorff, 2009) prior to the systematic development of themes. As former SBAE teachers *and* teacher educators, our experiences teaching in eight different states provided membership to several communities of practice and offered multiple angles to consider from different regions of the country. This multifaceted view of SBAE facilitated the triangulation of data with subsequent memos providing additional color and meaning to the perspective brought by individual researchers prior to the final development and arrangement of themes (Stake, 1995).

It was imperative to recognize our positionality as teacher educators and the influence our roles may have on teacher participants. Additionally, reflexivity provided space to acknowledge our potential biases and experiences as former SBAE teachers while shedding light on the various ways our own struggles with work-life balance may have entangled and shaped our perspective during this inquiry (Creswell & Creswell, 2017; Lincoln & Guba, 1985).

Findings

Through our analysis, five themes emerged: (1) The Success Trap, (2) The Work Eclipse, (3) Aspired Boundaries, (4) Grin and Bear It – Silence, and (5) Undercurrents of Change. The themes, woven together by Wenger-Trayner and Wenger-Trayner’s (2015) theory, demonstrate the shifting conceptualizations of work and personal success that were co-constructed by early-career agricultural education teachers in Louisiana. Such findings speak against the dominant narrative perpetuated by various actors and forces in the discipline that have championed the notion that *work-life balance* should be the ultimate goal. Instead, our findings problematize this notion by illuminating how early career teachers in Louisiana visualized and animated personal and career success in secondary agricultural education in diverse and complex ways. A discussion of each theme with salient evidence from the data follows. Illustrative quotes from the

follow-up interview participants are offered using pseudonymes while excerpts from the ISD are offered without quotes as these data points were anonymously reported.

Theme #1: The Success Trap

Consistent with Wenger-Trayner and Wenger-Trayner's (2015) *Landscapes of Practice*, the early career teachers appeared to be greatly influenced by the norms and expectations reinforced by individuals they perceived held power in their social system. For example, a majority of participants in the ISD as well as all of the individuals who participated in follow-up interviews, reported they felt "pressure to be successful" in their career by agricultural education leaders, administrators, and community members. As a result, the early career teachers reified success in their career (Wenger-Trayner & Wenger-Trayner, 2015) through having a "winning tradition" and helping their students obtain "awards" and gain other forms of "recognition." Further, they also described success as impacting students by "engaging" them through "hands-on" and "impactful" learning experiences. However, this success came at a cost for the early career teachers. Once they perceived they were experiencing success in their career they began feeling *trapped* because they felt they had to continue to "meet expectations" and "build on their success." Individuals of influence – state leaders, administrators, and other key stakeholders – in the agricultural education discipline reinforced this notion expressed by the early career teachers. And as they experienced more success in their career, maintaining work-life balance became more "chaotic" and they struggled to maintain "control."

As an illustration, when responding to the question, "does balance factor into your notion of success?" the early career teachers' responded by describing work-life balance as more of a "juggling" act rather than pure balance because they perceived a lack of focus could result in their success in both arenas of life to come crashing down. In response to such conceptualizations, one participant shared they had to have a clear separation between work and life by: "let[ting] everyone know [his] priorities and stick[ing] to them." This concept permeated many aspects of the early career teachers' work and life, and at times, seemed to distort the ways in which they understood how more symmetry could be achieved. Therefore, the *success trap* concretized how they understood and operationalized their role as a SBAE teacher and as a result they struggled to shift this conceptualization. As a consequence, this notion seemed to serve as an impetus for the early career teachers to diminish aspects of their personal lives and struggle with how to break free of the *success trap*. In a follow-up interview, for instance, Mr. Shaw explained that his understanding of work-life balance was still "fuzzy." Therefore, the *success trap* functioned as a master narrative in Louisiana agricultural education by which early career teachers perceived their agency to achieve work-life balance was muted (Wenger-Trayner & Wenger-Trayner, 2015). Further, this notion appeared to form a critical foundation for how the early career teachers understood how to navigate their landscape in secondary agricultural education. As such, it was critical to explore the dimensions of this master narrative to describe how such *supported* as well as *diminished* their conceptualizations of success and sculpted the early career teachers' landscape in secondary agricultural education.

Theme #2: The Work Eclipse

The *success trap*, therefore, appeared to create a harsher landscape for the early career teachers (Wenger-Trayner & Wenger-Trayner, 2015). And as a result, they began to experience a *Work*

Eclipse as they recognized a dichotomy existed between their aspirations and reality regarding work-life balance. In particular, they perceived that at this point in their career their work *eclipsed* their lives (i.e., they had no balance). For example, during an emotional exchange during the ISD one participant posed the following question, “How can I leave work at work when I know students need me?” Meanwhile, another participant revealed that his work habits strained his relationship with his spouse, he shared: “my wife wants me home more.” Another male participant also echoed these sentiments by disclosing, “teaching at the same school as my wife meant work never turned off.” This theme, therefore, illuminated how early career teachers’ work overshadowed many other aspects of their lives – a conflicting reification of success (Wenger-Trayner & Wenger-Trayner, 2015). However, through the co-construction process, participants began to acknowledge that maintaining such an approach might be untenable and result in their work eclipsing their lives as evinced by concerns expressed by participants about their career causing issues and problems in their marriage and other aspects of their personal lives. As such, the negotiation of this meaning among participants revealed their understanding of work-life balance was underdeveloped and, perhaps, even fragmented. Despite this, the participants witnessed other approaches they aspired to incorporate into their lives.

Theme #3: Aspired Boundaries

After recognizing they had constructed fairly contradictory reified forms of success, the early career teachers began to articulate how they aspired to incorporate boundaries between their work and career in more meaningful ways. As a consequence, the third theme illuminated the early career teachers’ desires, motivations, and strivings as a result of observing more established secondary agricultural education teachers who served as their “role models” regarding the elusive notion of balance between work and life. For instance, Ms. Franks explained that her role model was a female teacher who she “... hope[ed] to be as good as one day...” Moreover, Ms. Franks explained that her role model was also successful at maintaining a family life, “I know she does a lot of family stuff. You always see her on social media. She does not stay at school all hours of the day. They go and do stuff, like fun stuff on Saturdays.” These role models appeared to serve as examples of individuals who were seemingly able to successfully create boundaries between their work and life - a skill not yet acquired by the early career teachers.

When reflecting on how he could better unify his work and life, Mr. Arnold, shared the importance of shifting the way in which he conceptualized success to one that more closely represented work-life balance. In narrating this perspective change, he shared an illustrative analogy of how he would approach work in the future as one that relies heavily on delegation and setting up his work systems to be efficient:

> It’s like being the captain of the ship. Most of the time, you are in the boiler room. In the boiler room, the captain can say that we need to go right or left, but if he didn't set up the mechanism to go in the right direction, or didn't tell the boiler room that, then the boiler room wouldn't be able to get done what they need done. I would say that you give guidance as a captain… if you're turning the steam that's, in my opinion, when you're delegating. When you're delegating, you're turning on a part of the ship. So [I think] you create [balance] within the boiler room.

On this point, Wenger-Trayner and Wenger-Trayner (2015) explained individuals interact with expectations of their professional life in diverse ways. Through communities of practice,

however, participants begin to negotiate meaning and construct more stable professional identities (Wenger-Trayner & Wenger-Trayner, 2015). Despite having a desire to achieve boundaries, however, the participants recognized that such was not their current reality.

Theme #4: Grin and Bear It - Silence

Although the early career teachers remained largely optimistic about work-life balance, the notion of *silence* emerged as a dominant theme as we analyzed our field notes and analytic memos. During the ISD, for example, we noted that although participants engaged, they were hesitant and preferred to stay closely huddled together rather than freely sharing their struggles with work-life balance and success. As a consequence, during follow-up interviews, we began to investigate whether the early career teachers' silence may be rooted in broader contextual contours in which talking about their insecurities and weakness may not align with how they viewed and conceptualized a successful secondary agricultural education teacher.

When asked about their silence on work-life balance during a follow-up interview, Ms. Lane shared, ". . . I don't think ag teachers are vulnerable…basically, they put on a smile on their face and *grin and bear it"* (Emphasis added). Sometimes, I think being more honest about the good and bad aspects of the job would help [early career teachers] a lot more." Further, Mr. Carter explained, "we don't really talk about work-life balance. I don't know. We don't really talk about that… it's like there is no balance [to talk about]." Silence among the early career teachers, therefore, appeared to mute some of their more negative views on work-life balance during the ISD. As a consequence, a need emerged to better understand how this phenomenon might be upheld and reinforced as a master narrative in secondary agricultural education.

Theme #5: Undercurrents of Change

The final theme features our journey to understand why the early career teachers desired more work-life balance, but were hesitant to articulate and implement changes that would allow them to achieve such. During individual follow-up interviews, therefore, we probed participants on whether the ISD had initiated any thought or furthered discussion on changes they could implement in practice. As a result, participants reported they had engaged in further discussion about work-life balance, however, they perceived that such was negated by conflicting messages they have received from leaders, administrators, and their community.

For example, Mr. Franks shared, "our leaders tell us not to gripe. That when you're a young teacher you should work your ass off and not complain." Interestingly, all of the early career teachers that engaged in a follow-up interview reported similar sentiments. Despite this, however, they did report that undercurrents of change were rippling throughout Louisiana because continuing on such a path might result in them leaving the profession. Mr. Carter shared, "I feel like if we're not empowered, as in ag teachers, then we'll never stay." The final theme, therefore, offered an expanded view into early career teachers' silence on work-life balance. Further, it demonstrated how early career teachers perceived that to achieve success and work-life balance, the system of agricultural education would have to change moving forward.

Conclusions

The purpose of this study was two-fold: (1) examine how early career teachers in Louisiana co-constructed their conceptualizations of work-life balance as SBAE teachers, and (2) illuminate the contextual factors that shaped how the early career teachers negotiated meaning regarding their reified views on work-life balance. In this study, findings emerged through five themes: (1) The Success Trap, (2) The Work Eclipse, (3) Aspired Boundaries, (4) Grin and Bear It – Silence, and (5) Undercurrents of Change. Therefore, we conclude that early career teachers conceptualizations of work-life balance were influenced by individuals of power in the SBAE landscape who they perceived placed pressure on them to be successful. As such, the early career teachers viewed success in their career as ensuring that their students won awards, banners, and other forms of recognition – a finding that aligns with those reported by Traini et al. (2019). This finding is logical given that Wenger-Trayner and Wenger-Trayner (2015) postulated landscapes of practice are political and power-laden; how one is positioned in the landscape and the claims of competence he/she makes influence the way they respond to and interact with various practices and people. In our study, we saw how reified forms of success influence the actions of early career agriculture teachers as they strive for success. Namely, how work eclipses non-work activities and the aspirations participants had to create boundaries between work and life. Given this, we argue our findings also provided new dimensions to the literature. For example, expectations voiced by individuals of influence in the SBAE landscape appeared to foment the success trap in which the early career teachers perceived they had to continue to build on their success. As a consequence, we conclude that the success trap served as a catalyst for the early career teachers to prioritize their work over their personal lives. Such a sentiment does not appear to have been explored in the agricultural education literature.

In the second theme, work eclipse, the early career teacher recognized a chasm existed between their aspirations and reality concerning work-life balance. As a result, we conclude the participants' work responsibilities greatly diminished aspects of their personal lives, especially in regard to their relationships, marriages, and family responsibilities. Similar findings have been advanced in previous research (Boone & Boone, 2009; Clark, Kelsey, & Brown, 2014; Moore & Camp, 1979; Myers, Dyer, & Washburn, 2005; Roberts & Ramsey, 2017; Torres, Lambert, & Tummons, 2009; Walker, Garton, & Kitchel, 2004). Although work dominated the early career teachers' lives, they aspired to establish more firm boundaries moving forward. This idea was realized through a critical reflection on the strategies and techniques used by their role models, who were more established in their careers as secondary agricultural education teachers in Louisiana. We, therefore, conclude that mentors and role models can serve as powerful examples that can help early career teachers learn to better traverse issues of work-life balance in the SBAE landscape. Although the importance of mentorship has been advanced as a critical strategy to help early career teachers mature (Talbert et al., 2014; Torres et al., 2009), literature on the role of reflective strategies in fomenting this perspective shift is scant.

Unique to the literature on work-life balance, this investigation explored the implications of early career teachers' silence. Wenger-Trayner and Wenger-Trayner (2015) postulated power dynamics within the landscape uplift certain voices and silence others. Given how our participants behaved in the ISD and expressed their struggles with messages from state leaders to silence their struggles, we conclude that this silence muted some of the negative views early career teachers held regarding their agency to overcome issues and problems associated with

work-life balance (Wenger-Trayner & Wenger-Trayner, 2015). Here we see the detrimental effects power dynamics enacted within the SBAE landscape have on our participants, particularly as they built connections between their inability to voice their struggles and the possibility of leaving the profession. And, although undercurrents of change existed, we conclude that the early career teachers perceived that changes would have to transpire at the system level to stimulate tangible progress on work-life balance in the SBAE landscape. Because early career agriculture teachers are striving for belonging within the landscape, and are consequently shaped by existing norms, repertoires of practice, and regimes of competence, it will take those in power (e.g., state leaders in agricultural education, experienced and respected agriculture teachers) to redefine notions of success and work-life balance in the landscape if early career agriculture teachers are to become agentic in voicing their struggles (Wenger-Trayner & Wenger-Trayner, 2015).

Implications, Recommendations, and Discussion

Understanding the various ways teachers navigate and manage membership in diverse communities of practice, while also reifying their conceptualizations of work-life balance and success, is vital to reimagining how early career teachers traverse the SBAE landscape. This case study illuminated some of the concealed contours in the SBAE landscape such as the influence of power, positionality, and silence in the dynamic co-construction of early career teachers' professional identities. Perhaps these influences are sustained and perpetuated as tacit knowledge among multiple communities of practice in the SBAE landscape. As such, we recommend that future research examine the specific traditions and ideological notions that contribute to our shared discourse and permeate the social fabric of our profession. Research exploring the historical and cultural development of communities of practice within the SBAE landscape would help unravel forces contributing to the experiences of agriculture teachers seeking a better balance between work and life. Future research should also explore the dynamics of silence within the SBAE landscape by seeking out and highlighting the perspectives of marginalized voices to reshape agricultural education's discourse that has muted such previously. A more detailed investigation of the various regional, ideological, cultural, and societal factors reinforcing cultures of silence would also provide valuable context to understand differences across the landscape. For instance, are certain regions of the country more likely to foster a culture of sharing? What factors contribute to the openness of dialogue shared by teachers conceptualizing work-life balance? And does the SBAE landscape accurately reflect shifts in the discourse of its membership?

Understanding the dynamics created by a system that recruits and grooms future teachers from the students in the landscape may further compound the effect of positionality once these individuals enter the profession as teachers. As a result, future research should examine whether the long-term nature of these relationships (teacher-student/mentee-mentor) are constructive or destructive to early career teachers as they attempt to cultivate more stable professional identities. Perhaps, by providing healthy perspectives of work-life balance through statements and recommendations at the state and national level, SBAE leaders (e.g., NAAE, AAAE, NASAE) can reshape how early career teachers attempt to sculpt balanced professional identities (Shoulders & Myers, 2011). Further, more professional development opportunities are needed to equip SBAE leaders with tools to engage in positive conversations about work-life balance to

create a more comfortable environment for early career teachers to seek guidance. In recent years, SBAE teachers have created spaces to share curriculum and resources online. Many times, these online environments, or communities, become channels for teachers to seek advice and share their struggles with work-life balance. Developing a unified social media campaign to highlight teachers who have a grasp on success and balance may foster more concrete impressions for preservice and early career teachers struggling to conceptualize their future in SBAE. Additional consideration of long-held traditions and symbols of SBAE should also be revisited to ensure unified statements supporting personal development and balance are unambiguous for teachers navigating the SBAE landscape (e.g., The Ag Teacher's Creed).

Mentors and role models can serve as influential examples for early career teachers, yet tangible strategies are needed to help mentor and mentee teachers cultivate organic as well as reciprocally beneficial relationships. As a consequence, SBAE leaders should ensure early career teachers are seeking out positive models of success *and* balance; mentors who can help them envision a successful future, both personally and professionally. For instance, perhaps early career teachers would be more comfortable with mentors who are closer in age and/or years of experience. It should also be noted that it is short-sighted to believe early career teachers are the only group struggling with work-life balance. For example, in this study, we found the notion of work-life balance, as co-constructed by early career secondary agriculture teachers in Louisian extended far beyond a personal choice, as alluded by members of the profession in the December 2011 issue of *The Magazine*. Instead, we uncovered a more dynamic and complex phenomena; that issues of work-life balance are shaped by power, silence, and conflicting tensions. Moving forward, therefore, we pose two questions: In what ways can we create spaces for agriculture teachers to have the agency needed to not only voice their struggles, but also have candid conversations about their needs? And, how can individuals with power in the agricultural education profession help reconfigure the landscape to disrupt the master narrative perpetuated in SBAE regarding work-life balance and success?

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Hemp, Hemp, Hooray: The Impact of a Hemp Educational Campaign on College Students' Attitudes and Knowledge of Industrial Hemp

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Abstract

For the first time in nearly a half century it is federally legal for farmers in the United States to grow industrial hemp. Farmers from across the country are investigating the potential of the newly legalized crop and are looking to research institutions for assistance. Land-grant universities and other institutions of higher education have been challenged with the task of closing an expansive research gap and are conducting hemp research on their college campuses. Despite its federally legal status, hemp's close association with marijuana and potential public stigma remain. This study investigated university students' knowledge and attitudes toward hemp before and after a hemp educational campaign that involved hemp plants on campus. Results indicated students initially had low knowledge about hemp. A majority of students did not recognize hemp as a legal crop and were unable to distinguish major differences between hemp and marijuana. Despite low knowledge, students still held fairly high attitudes toward hemp. After the hemp educational campaign, students were significantly more knowledgeable and held more favorable attitudes toward hemp.

Introduction

The 2018 Farm Bill removed hemp from schedule I of the Controlled Substances Act, allowing farmers in the United States to legally grow hemp for the first time in nearly a half century (USDA, 2019). The lifting of the federal ban on growing hemp has prompted many states to legalize hemp cultivation at the state level and to create new hemp regulatory guidelines for farmers and processers (e.g. Nebraska Department of Agriculture, 2020). The re-legalization of hemp cultivation in the United States may allow growers and processors to take advantage of an agricultural commodity that U.S. markets have largely depended upon for imports (Johnson, 2018). In fact, the Hemp Business Journal (2018) estimated that in 2017 there were 820 million dollars in hemp product retail sales in the United States alone. The potential uses of hemp are expansive, ranging from fiber and oilseed to medicinal and recreational markets (Jeliazkov et al., 2019). Recent market reports indicated the gross value of hemp production per acre was approximately $21,000 from seed and $12,500 from stalks (Johnson, 2018). The prospect of a new cash crop in the United States has catalyzed claims that industrial hemp could beneficially transform the United States economy (Cherney & Small, 2016).

Despite hedged optimism for hemp to radically transform the agricultural economy, and the 2018 Farm Bill's removal of hemp as a federally controlled substance, many challenges remain to make hemp a viable and mainstream crop in the United States. Stevenson (2017) reported that farmers perceive a severe lack of infrastructure that has halted economic growth of the crop. Furthermore, Johnson (2018) described a "need to reestablish agricultural supply chains, breed

varieties with modern attributes, upgrade harvesting equipment, modernized processing and manufacturing, and identifying new market opportunities" (p. 6). West Virginia stakeholders appropriately desired more interaction with research institutions to achieve such goals (Stevenson, 2017).

The history of institutional hemp research and cultivation has been limited since hemp was included in the Controlled Substance Act of 1970 (Purdue University, 2015). However, the 2014 Farm Bill provided a step forward for hemp research, permitting certain research institutions and state departments of agriculture to grow hemp under pilot programs (Johnson, 2018). According to the National Conference of State Legislatures (2019), at least 47 states have enacted legislation for hemp cultivation and production programs, including a plethora of research programs within institutions of higher education. The demand for additional research, outreach, and education on hemp cultivation will become even more evident as additional growers seek to implement a new federally and state approved crop. It appears that the United States Department of Agriculture is aiming to address gaps in hemp research, as evident by awarding Purdue University with a one million dollar grant related to organic hemp production (Purdue University, 2019).

Despite the clear need for additional hemp research and Extension efforts, some claim the most pressing barrier for the successful integration of hemp as a mainstream agricultural crop in the United States is a severe lack of public knowledge and acceptance (Luginbuhl, 2001), mostly due to industrial hemp's historic and close association with marijuana. Cherney and Small (2016) described marijuana's impact on hemp development simply as "catastrophic" (p. 15). Stakeholders of hemp agree and have urged "an increased need and desire of the public to continue being informed and educated" (Morgan, 2014, p. 47). Fortunately for stakeholders, public education on hemp is becoming more abundant, as demonstrated by nation-wide events such as Hemp History Week, an educational initiative of the Hemp Industries Association (2019).

With hemp becoming more visible on university campuses across the United States, agricultural educators, communicators, and Extension educators must understand how students perceive the crop, whether or not students associate hemp with marijuana, and provide hemp educational programs to combat existing hemp misconceptions. Therefore, this research sought to understand the role of an educational campaign on students' knowledge and perceptions of industrial hemp in support of the American Association of Agricultural Education Research Priority Area 1: Public and Policy Maker Understanding of Agricultural and Natural Resources (Enns, Martin, & Spielmaker, 2016).

Theoretical Framework

Cognitive dissonance theory (Festinger, 1957) was used as the theoretical framework for this study. According to cognitive dissonance theory, individuals seek consistency among their attitudes and behaviors, and when there is inconsistency between the two, internal conflict arises and individuals will likely adjust attitudes or behaviors to reduce the conflict (Festinger, 1957). One paradigm of dissonance processes is belief disconfirmation (Dillard, 2002), which describes the dissonance that occurs when individuals are exposed to new information that is in conflict

with their prior beliefs. Educational or media campaigns aimed at persuasion can elicit cognitive dissonance when new information is presented that is in contrast to participants' former beliefs (Thompson & Rhoades-Buck, 2009). To resolve the newly created dissonance, it is expected that participants will either dismiss the new information or form new opinions that align with the purpose of the campaign. According to cognitive dissonance persuasion theory, participants who form new opinions are likely to exhibit lasting behaviors changes and thought-processes (Thompson & Rhoades-Buck, 2009).

While research explicitly looking at cognitive dissonance related to hemp has been limited, the theory has been applied to other educational campaign studies related to agriculture and contentious topics in science. Hidalgo-Baz, Martos-portal, and Gonzalez-Benito (2017) researched consumers' attitudes and purchasing behaviors for organic food using cognitive dissonance as their framework. The researchers concluded that increasing knowledge did influence both attitudes and behaviors and helped to decrease dissonance related to purchasing decisions (Hidalgo-Baz et al., 2017). Other researchers have similarly suggested that increasing information about organic food products can lower consumers' uncertainty, which would lead to increased sales (Aertsens, Verbeke, Mondelaers, & Von Huylenbroeck, 2009). Yim and Vaganov (2003) applied cognitive dissonance to a study exploring risk perceptions of nuclear technology and also found support for the theory. When respondents possessed positive beliefs toward nuclear energy, they became more supportive of the technology with exposure to new knowledge; however, the opposite was true for those with negative attitudes. The researchers concluded cognitive dissonance had a negative effect when the information was too incongruent with the receiver's attitude (Yim & Vaganov, 2003).

There have been some studies that explored consumers' attitude and knowledge about hemp but did not utilize cognitive dissonance theory. In Poland, Borkowska and Bialkowska (2019) concluded people were not knowledgeable about hemp yet held positive attitudes toward the commodity due to its association with marijuana. Knowledge and negative perceptions of hemp have also been determined to be major barriers to consumers' purchasing of hemp product (Hiller Connell, 2010). However, in recent research with Murray State University students, Morgan (2014) determined over 70% of students correctly answered that hemp cannot be smoked to get "high". Furthermore, Morgan (2014) found that nearly 80% of students understood that THC is present in hemp in much smaller levels compared to marijuana. This study from Morgan (2014) may indicate potential differences in knowledge between students and the general public. If cognitive dissonance operates as expected in relation to hemp, increasing knowledge may have a positive impact on attitudes as long as prior attitudes are not extremely negative (Yim & Vaganov, 2003). Additionally, the increase in knowledge could decrease uncertainty, which would lead to positive changes in attitude and behavior.

Purpose & Objectives

With the 2019 U.S. federal legalization of industrial hemp, and as the number of individual states that legalize hemp increase, it should be expected that many farmers will look to grow the crop. The number of land-grant universities, colleges, and other academic institutions that conduct research, education, and outreach efforts involving industrial hemp are likely to surge. Therefore, industrial hemp will become more prevalent on campuses across the nation. Academic

institutions must consider how to educate their students about the crop, to disassociate industrial hemp from marijuana, and to understand their student body's baseline knowledge and attitude toward industrial hemp. This study investigated the impact of a hemp educational campaign on a university campus and can serve as a case study for other academic institutions introducing hemp on a college campus. The research objectives that guided this study were:

1) Describe changes in student's knowledge of industrial hemp as a result of a hemp educational campaign
2) Describe changes in students' attitudes toward hemp as a result of a hemp educational campaign

Methods

A research permit to grow industrial hemp was granted to Doane University, a small, private university in Nebraska, by the Nebraska Department of Agriculture during the Fall 2019 semester. Industrial hemp was grown in a lean-to style greenhouse connected to the university's science and mathematics building and was easily seen by students utilizing the building during class attendance. Due to prior research that has indicated members of the public may hold misconceptions and negative attitudes toward hemp (Luginbuhl, 2001), and may associate hemp with marijuana (Morgan, 2014; Stevenson, 2017), an educational campaign was launched serving Doane University students who were expected to visually see and be in close contact with the crop. The purpose of the educational campaign was to increase students' knowledge of industrial hemp, to reduce the spread of misinformation regarding the new crop on campus, to add a layer of security and student safety, and to discuss new and expected student research opportunities involving hemp on campus.

Educational Campaign

The hemp educational campaign began during week 13 of the Fall 2019 semester and coincided with the arrival of hemp plants in the lean-to style greenhouse on Doane's campus. The educational campaign included three components. The first component was a 15-minute hemp informational presentation with a follow-up question and answer session. The informational presentation was delivered to students in seven introductory science courses that were held in the science and mathematics building. The presentations were delivered during the start of each class's first meeting day of week 13 of the Fall 2019 semester. A PowerPoint presentation was used during delivery and included appropriate visuals and talking points. The presentation including the following components: (a) description of hemp as an agricultural commodity; (b) difference between hemp and marijuana; (c) historic and current hemp legalization; (d) uses of hemp and hemp products; (e) potential economic opportunities for hemp in Nebraska; (f) student opportunities to attend additional educational events on hemp; (g) plans for hemp research at Doane; and, (h) contact information for Doane's hemp researchers and ways for students to become involved in the research. Following the presentation, students were encouraged to ask additional questions.

The second component of the educational campaign was incorporating industrial hemp plants on campus. After the delivery of the hemp informational presentations, students were encouraged to

view the hemp crop. Approximately fifteen mature industrial hemp plants were brought to campus during week 13 of the Fall 2019 semester. The mature crops were placed in a locked lean-to style greenhouse that was connected to the science and mathematics building. The greenhouse was located in an area that received a high degree of foot traffic, especially for students enrolled in introductory science courses, and were highly visible to students through glass panels. The main purpose of attaining the plants on campus was for scientific research involving growing conditions and the chemical composition of hemp. None-the-less, it was believed that student relevancy (Castillo, 2018) could be established by having physical hemp plants on campus and demonstrating that science-based research is being conducted. The hemp plants remained visible in the greenhouse during the duration of the campaign.

The third component of the educational campaign was placing educational, poster-sized infographics around the science and mathematics building. Infographics were placed at the entrance of the building and near the greenhouse where hemp crops were present. The infographics included basic information about hemp and described opportunities for student research on hemp.

Participants & Sample

To measure the effectiveness of the educational campaign, only students exposed to all components of the campaign were included in this study. The researchers had limited time and resources to conduct the educational campaign, including the delivery of the informational presentation, and therefore strategically selected courses that would maximize exposure to students within the science and mathematics building. Researchers sought permission from professors teaching introductory biology, introductory chemistry, and introductory meteorology courses. The introductory science courses were designed for freshman students but included some sophomores and upperclassman. Researchers gained approval from six professors who taught eight introductory science course, including five introductory biology courses, one introductory chemistry course, and one introductory meteorology course. The total number of students enrolled in the eight courses was 139.

Data Collection & Instrumentation

All data collection and instrumentation was approved by Doane University's Institutional Review Board prior to data collection (IRB#F19015DCIRBHS). Before the educational campaign was delivered, students completed a pretest survey instrument to measure baseline knowledge and attitudes. The pretest survey was administered via paper at the start of the first scheduled class day of week 13 of the Fall 2019 semester, directly prior to the delivery of the informational presentation on hemp. The pretest survey instrument consisted of questions both researcher developed and adapted from prior literature. This research was part of a larger study on students' knowledge, attitude, perceived trends, and use of hemp and hemp products. The portions of the pretest utilized for this study included the following sections: a) informed consent; b) attitude toward the growing of industrial hemp in the United States; c) knowledge of industrial hemp; and d) demographics.

Brown, Irving, and Keegan (2008) suggest that repeating a test between three and six weeks is sufficient to avoid test-retest bias, therefore the posttest survey instrument was delivered three weeks after the pretest survey and informational presentation. The posttest survey followed the same paper format and was administered at the start of the first scheduled class day of week 16 of the Fall 2019 semester. The posttest survey instrument included two sections: attitude toward the growing of industrial hemp in the United States and knowledge of industrial hemp. Each student who participated in the study created a unique identifier using their middle initial and birth date and recorded their personal identifier on the pretest and posttest survey instruments to help match the data.

A bipolar semantic differential scale measuring attitude toward the growing of industrial hemp in the U.S. was modified from a scale used to measure American's attitudes toward genetic modification in science (Ruth, Rumble, Lamm, Irani, & Ellis, 2019). The bipolar semantic differential scale consisted of eight items and each item included five points between two adjectives that were antonyms. Students were instructed to check the box between each set of adjectives that best represented their thoughts about growing industrial hemp in the United States. The following adjectives pairs were used: good/bad, positive/negative, beneficial/not beneficial, acceptable/unacceptable, necessary/unnecessary, important/unimportant, essential/not essential, and crucial/trivial. Negative adjectives were coded as one and positive adjectives were coded as five. A post hoc scale reliability analysis yielded a Cronbach's alpha of .93. Field (2013) reported that scales above .70 are considered reliable and, therefore, the scale used in this study was deemed reliable.

A researcher-developed knowledge test was used to measure students' knowledge of industrial hemp. Previous research has indicated that using true-false testing formats over multiple-choice formats increase internal test reliability (Couch, Hubbard, & Brassil, 2018; Kreiter & Frisbie, 1989) and, therefore a true-false testing format was selected for this study. To reduce correct answers from random guessing, participants were also given the option to select "I don't know" (Burton, 2002). Student's knowledge of hemp was measured by the total number of statements they answered correctly out of 20.

The 20 statements were made up of seven statements on distinguishing hemp from marijuana, six statements on state and federal legislation pertaining to hemp, four statements on hemp cultivation and production, and three statements on hemp composition. Statements were derived from hemp information in federal and state documents and websites (Congressional Research Service, 2019; Nebraska Department of Agriculture, 2020; United States Department of Agriculture, n.d.) A panel of four experts reviewed the statements for content validity (Kerlinger, 1986). Panel members included a professor of chemistry and co-founder of a hemp processing company, an associate professor of biology with a focus in crop genetics, an assistant professor of environmental science with a focus in agriculture, and an assistant professor of agricultural communications. The same 20 statements were used for both the pretest and posttest, and were randomly ordered in the pretest and again randomly ordered in the posttest to reduce testing effects (Campbell & Stanley, 1963). The Kuder-Richardson formula (Kuder & Richardson, 1937), or commonly known as KR20, was used to calculate the tests' inherent reliability. The KR20 reliability is a special case of Cronbach's alpha used to establish reliability of dichotomous data (Huck, 2008), including true-false and multiple-choice content knowledge tests (Burton,

2004). A post hoc KR20 test indicated a Cronbach's alpha of .835, indicating reliability of the knowledge instrument.

Participant demographics were collected in the last section of the pretest survey instrument. The demographics collected were gender, race, political belief, year in school, primary family income (farm or non-farm), description of hometown (urban, suburban, rural), and origin of home (Nebraska, state other than Nebraska, country outside of U.S).

Data Analysis

Each participant's paper copy response was entered digitally to a replicated Qualtrics survey and data were transferred to SPSS version 25 for analyses. Frequencies were used to report demographic variables. Each participant's pretest and posttest were matched via recorded unique personal identifiers. Paired samples *t* tests were used to determine if significant differences existed between participants' knowledge and attitude before and after participating in the hemp educational campaign. An a priori significance of $p < .05$ was established to identify if significant differences existed.

Results

All components of the hemp educational campaign were successfully delivered to approximately 139 students ($N = 139$) enrolled in introductory science courses targeted by the campaign. However, due to student absences during either pretest or posttest administration, and students opting out of the study, the response rate was 80.5% ($n = 112$). More females ($n = 63$, 56.3%) participated in the study compared to males ($n = 49$, 43.8%) and students were predominately white ($n = 95$, 84.8%). A majority of students considered their political belief to be moderate ($n = 54$, 48.2%), followed by conservative or very conservative ($n = 39$, 34.9%), and liberal or very liberal ($n = 15$, 13.4%). Most of the students indicated being freshman ($n = 87$, 77.7%) or sophomore status ($n = 15$, 13.4%), however a few students indicated being upperclassmen ($n = 10$, 8.9%). Despite only sixteen students (14.3%) describing themselves to be from a farming household, a majority of students ($n = 47$, 42.0%) still described their hometown as rural, followed by urban ($n = 37$, 33.0%), and suburban ($n = 28$, 25%). Lastly, most students ($n = 67$, 59.8%) reported being from Nebraska, while 40 (35.7%) students reported coming from a U.S. state other than Nebraska, and five students (4.5%) indicated they were international students.

Change in Knowledge

Students' knowledge levels were assessed via 20 true-false statements regarding industrial hemp. Although the ordering of statements was randomized in both the pretest and posttest instruments, the statements are presented according to categorical themes for ease of viewership.

Seven statements pertained to distinguishing the difference between hemp and marijuana. On average, students answered approximately half or less of these questions correctly on the pretest. Notably, over half of students indicated they were not sure or answered incorrectly that hemp can be smoked to get a "high" or "buzz". Similarly, only half of students knew that hemp and marijuana contained different levels of THC. Students were most unfamiliar with distinguishing

the difference in processing and products between hemp and marijuana, indicated by only 25.0% (*n* = 28) and 30.4% (*n* = 34) of students answering these statements correctly. Furthermore, between approximately 30% and 50% of students indicated they didn't know the answer to statements regarding the differences between hemp and marijuana.

Posttest scores indicated an increase in student knowledge on all but one statement, *hemp and marijuana are both classified as Cannabis.* One-hundred and ten (98.2%) students correctly answered false to the statement hemp can be smoked to get "high", and 105 (93.8%) students correctly answered false to the statement that the level of THC is the same in marijuana and hemp. Table 1 illustrates student pretest and posttest responses to statements that required participants to distinguish the difference between hemp and marijuana.

Table 1. Knowledge responses to distinguishing between hemp and marijuana (*n* = 112).

		Pretest			Posttest		
Statement	A*	C*	I*	DK*	C*	I*	DK*
Cannabis processing is the same for both hemp and marijuana.	F	28 (25.0)	24 (21.4)	60 (53.6)	61 (54.5)	28 (25.0)	23 (20.5)
Similar to marijuana, hemp can be smoked to get a "high" or "buzz".	F	54 (48.2)	25 (22.3)	33 (29.5)	110 (98.2)	1 (0.9)	1 (0.9)
The level of THC in hemp is similar to the level of THC in marijuana.	F	58 (51.8)	8 (7.1)	46 (41.1)	105 (93.8)	3 (2.7)	4 (3.6)
Hemp is significantly different from marijuana at a genome-wide level.	T	39 (34.8)	11 (9.8)	62 (55.8)	66 (58.9)	22 (19.6)	24 (21.4)
Hemp and marijuana are both classified as Cannabis.	T	58 (51.8)	21 (18.8)	33 (29.5)	57 (50.9)	40 (35.7)	15 (13.4)
The products from hemp and marijuana crops are used similarly.	F	34 (30.4)	40 (35.7)	38 (33.9)	81 (72.3)	18 (16.1)	13 (11.6)
There are no genetic differences between hemp and marijuana.	F	62 (55.4)	9 (8.0)	41 (36.6)	92 (82.1)	11 (9.8)	9 (8.0)

**note:* A = answer, C = correct, I = incorrect, DK = don't know

Six statements pertained to federal and state legislation of hemp, including historic and current laws on hemp production (Congressional Research Service, 2019; Nebraska Department of Agriculture, 2020; United States Department of Agriculture, n.d.). Before the educational campaign, only 54 (48.2%) students identified hemp as being a federally legal crop, compared to 95 students (84.8%) after the campaign. Similarly, only 38 (33.9%) of students identified hemp as a legal crop in Nebraska, compared to 93 (83.0%) of students after the campaign. Students struggled understanding the current regulatory agencies associated with hemp on both the pretest (*n* = 3, 2.7%, correct) and posttest (*n* = 20, 17.9%, correct). Table 2 illustrates students pretest and posttest knowledge responses for statements on federal and state hemp laws.

Table 2. Knowledge responses to federal and state hemp laws (*n* = 112).

		Pretest			Posttest		
Statement	A*	C*	I*	DK*	C*	I*	DK*

Hemp is a federally illegal crop in the United States.	F	54 (48.2)	19 (17.0)	39 (34.8)	95 (84.8)	11 (9.8)	6 (5.4)
Current federal law classifies hemp as a scheduled I controlled substance...	F	22 (19.6)	36 (32.1)	54 (48.2)	59 (52.7)	39 (34.8)	14 (12.5)
CBD from hemp is federally legal.	T	51 (45.5)	17 (15.2)	44 (39.3)	82 (73.2)	14 (12.5)	16 (14.3)
The U.S. Drug Enforcement Administration (DEA) currently has regulatory oversight over hemp...	F	3 (2.7)	52 (46.4)	57 (50.9)	20 (17.9)	71 (63.4)	21 (18.8)
Hemp is a legal crop in [state]	T	38 (33.9)	29 (25.9)	45 (40.2)	93 (83.0)	10 (8.9)	9 (8.0)
Prior to the late 1950s, hemp in the United States was considered an agricultural commodity...	F	32 (28.6)	11 (9.8)	69 (61.6)	74 (66.1)	11 (9.8)	27 (24.1)

**note:* A = answer, C = correct, I = incorrect, DK = don't know

Four statements were presented on hemp cultivation and products. Before the educational campaign, a majority of students (*n* = 87, 77.7%) correctly marked true that cannabinoids found in hemp can have medical benefits, similarly, most students (*n* = 93, 83.0%) correctly identified that hemp is harvested for both oils and fiber. Few students (*n* = 6, 5.4%) understood that hemp does not have to be cultivated in carefully controlled, warm, and humid conditions. Posttest scores were improved for all statements regarding hemp cultivation and products. However, most students (*n* = 63, 56.3%) still incorrectly identified that hemp must be grown in carefully controlled, warm, and humid conditions. Table 3 illustrates student responses to statements pertaining to hemp cultivation and products.

Table 3. Knowledge responses to hemp cultivation and products statements (*n* = 112).

		Pretest			Posttest		
Statement	A*	C*	I*	DK*	C*	I*	DK*
Cannabinoids found in hemp can have medical benefits.	T	87 (77.7)	0 (0.0)	25 (22.3)	99 (88.4)	5 (4.5)	8 (7.1)
The plant parts used in hemp production include fiber, grain, ...	T	61 (54.5)	3 (2.7)	48 (42.9)	99 (88.4)	4 (3.6)	9 (8.0)
Hemp crops can be harvested for oils and fiber.	T	93 (83.0)	0 (0.0)	19 (17.0)	108 (96.4)	1 (0.9)	3 (2.7)
Hemp must be grown in carefully controlled, warm, and humid cond...	F	6 (5.4)	59 (52.7)	47 (42.0)	36 (32.1)	63 (56.3)	13 (11.6)

**note:* A = answer, C = correct, I = incorrect, DK = don't know

Lastly, three statements were presented on hemp composition. Pretest scores indicated that most students (*n* = 72, 64.3%) knew that hemp contains CBD; however, most students (*n* = 70, 62.5%; *n* =76, 67.9%) indicated that they did not know about the degree of THC found in hemp. After the educational campaign, knowledge on hemp composition increased. A majority of students (*n*

= 98, 87.5%) correctly marked true to the statement that hemp contains 0.3% or less THC and marked false (*n* = 65, 58.0%) to the statement that hemp is characterized by high levels of THC. Table 4 illustrates responses to statements regarding hemp composition.

Table 4. Knowledge responses to hemp composition (*n* = 112).

		Pretest			Posttest		
Statement	A*	C*	I*	DK*	C*	I*	DK*
Hemp contains cannabinoids, such as CBD.	T	72 (64.3)	5 (4.5)	35 (31.3)	79 (70.5)	22 (19.6)	11 (9.8)
Hemp contains 0.3% or less THC.	T	41 (36.6)	1 (0.9)	70 (62.5)	98 (87.5)	2 (1.8)	12 (10.7)
Hemp is characterized by plants that are high in delta-9 THC, the dominant psychotropic compound...	F	17 (15.2)	19 (17.0)	76 (67.9)	65 (58.0)	21 (18.8)	26 (23.2)

**note:* A = answer, C = correct, I = incorrect, DK = don't know

The total number of correct answers out of 20 were calculated to determine each student's knowledge level. Students scored an average of 8.13 (*SD* = 4.38; 40.7%) correct answers on the knowledge pretest and 14.10 (*SD* = 2.71; 70.5%) on the posttest. Therefore, students scored an average of approximately 30% higher on the posttest compared to the pretest. To determine if this change was significant, a paired samples *t* test was conducted and a significant difference was detected ($t = 14.837$, $p < .001$).

Change in Attitude

Students' attitudes toward growing industrial hemp was assessed prior to and after the educational campaign through an eight-item, five-point, bipolar semantic differential scale. A total of 110 students completed the attitude scale for both the pretest and posttest and were included in analysis. Before the educational campaign, students held a slightly favorable (*M* = 3.59; *SD* = 0.78) attitude toward the growing of industrial hemp. Overall, students perceived hemp to be more *beneficial* than *not beneficial* (*M* = 4.06; *SD* = 0.86) and more *good* than *bad* (*M* = 3.90; *SD* = 1.03). The item with the lowest mean was *crucial/trivial* (*M* = 3.02; *SD* = 0.78). After the educational campaign, students held a more favorable attitude toward the growing of industrial hemp (*M* = 3.96; *SD* = 0.69). Furthermore, the mean for each of the eight items increased, with the largest increase reported for the *good/bad* item (*M* = 4.36; *SD* = 0.83). Although students perceived the growing of hemp to be more *crucial* than *trivial* on the posttest (*M* = 3.28, *SD* = 0.96), only a slight increase was observed from the pretest. Standard deviations decreased for all item responses in the posttest, with the exception of *necessary/unnecessary*, indicating less variability between student responses. Table 5 shows student response means for items on the hemp attitude scale.

Table 5. Paired-samples pretest and posttest attitude scale item means (*n* = 110)

	Pretest		Posttest	
Item	*M*	*SD*	*M*	*SD*
Good/bad	3.90	1.03	4.36	0.83

Positive/negative	3.93	0.99	4.38	0.76
Beneficial/not beneficial	4.06	0.86	4.34	0.82
Acceptable/unacceptable	3.84	1.03	4.21	0.92
Necessary/unnecessary	3.26	1.00	3.68	1.00
Important/unimportant	3.47	0.95	3.90	0.90
Essential/not essential	3.23	1.02	3.53	0.98
Crucial/trivial	3.02	0.75	3.28	0.96
Scale Average	3.59	0.78	3.96	0.69

Although students' attitudes toward the growing of industrial hemp were positive (M = 3.59; SD = 0.78) before the educational campaign, students appeared to view growing hemp even more positively (M = 3.96; SD = 0.69) after the campaign. A paired samples t test indicated that the .37 increase was significant (t = 5.795, p <.001).

Conclusions & Implications

The purpose of this research was to describe the effect of an educational campaign on students' knowledge of and attitude toward hemp. Overall, the study did support that both knowledge and attitudes improved after an educational campaign. Contrary to prior research (Morgan, 2014), respondents were unable to distinguish the difference between hemp and marijuana prior to the educational campaign. The pretest knowledge scores further indicated that students in this study generally held limited knowledge on laws, cultivation practices, and composition of hemp. An average of 40.7% of statements were answered correctly on the pretest, but a similar percentage of student admitted they didn't know the answer (42.0%) over answering incorrectly (17.4%). This uncertainty or lack of knowledge supports prior research concluding industrial hemp knowledge was low (Borkowska & Bialkowska, 2019).

The positive impact the educational campaign had on students' knowledge was clear, and in many ways justified the successfulness of the campaign. Students' hemp knowledge increased by an additional 30%. Due to student safety and greenhouse security, the knowledge item of most interest was the distinction that hemp cannot be smoked to get "high". After the campaign, 110 of 113 students correctly identified this fact. Furthermore, students scored higher in the posttest for every item but one, *hemp and marijuana are both classified as Cannabis*. Posttest knowledge results indicated students were receptive to information presented during the hemp educational campaign, even if information was contradictory to a prior held belief.

Previous literature has cited the public may hold skeptical attitudes toward hemp (Borkowska & Bialkowska, 2019; Hiller Connel, 2010; Luginbuhl, 2001), or may associate hemp with marijuana (Stevenson, 2017). While the general public has had mixed feelings toward marijuana legalization (Caulkins, Hawken, Kilmer, & Kleiman, 2012; Cruz, Queirolo, & Boidi, 2016), young people tend to be more accepting of marijuana and a majority are in favor of legalizing the drug (Fisher, 2018; Schmidt, Jacobs, & Spetz, 2016; Pew Research Center, 2014). Students in the study held fairly positive attitudes toward industrial hemp before the educational campaign. Although overall knowledge on hemp was low, and a majority of students were unable to distinguish major differences between hemp and marijuana, students still held a slightly positive

attitude toward the growing of hemp in the United States. These findings confirm previous reports that college students generally perceive hemp to be beneficial (Morgan, 2014).

After exposure to our hemp educational campaign, students demonstrated more positive attitudes toward hemp. This change in attitude supported prior research concluding new information could lead to more positive attitudes and decreased uncertainty/dissonance when prior attitudes were already supportive (Yim & Vaganov, 2003). The positive increase in attitude could be linked to students' improved understanding of hemp as a legal crop in the U.S. and in Nebraska, and being able to distinguish the difference between hemp and marijuana. This research indicates that campaigns can be used to influence attitudes, especially when cognitive dissonance may be a factor (Thompson & Rhoades-Buck, 2009).

Recommendations

As more institutions of higher education adopt hemp on their campuses for research and development, faculty and administrators must recognize the potential confusion or perhaps conflict that may arise as the result of a "marijuana-like" crop on campus. Despite the major differences in composition, cultivation, processing, and uses between hemp and marijuana (Congressional Research Service, 2019), the degree to which the general population understands and recognizes these differences is still widely unknown. Our hemp educational campaign, although limited to a concentrated student sample at a private university, shed light on students' limited knowledge about hemp and common misconceptions. Furthermore, this study demonstrated that through our educational campaign, students were receptive to new information and retained the newly found knowledge. Although students' attitudes toward hemp were already slightly positive, students' attitudes became more positive as a result of the campaign.

We recommend other institutions of higher education that are planning to incorporate hemp on campus to consider conducting a similar educational campaign to educate students about the crop. We acknowledge that characteristics of each institution can best determine appropriate procedures to educate students, and there is not a one-size fits all approach to conduct such a campaign. It is apparent that regional and cultural differences may garner more or less support for cannabis cultivation (Caulkins et al., 2012), and these factors should be considered. Yet, the future of hemp looks promising, as young people generally hold positive views toward all types of cannabis (Fisher, 2018; Morgan, 2014; Schmidt, Jacobs, & Spetz, 2016).

The successful integration of hemp as a mainstream agricultural commodity in the United States may depend upon the public's understanding and support of the crop. The history of hemp in the United States is a fascinating study in itself, riddled with legislative drawbacks and public stigma. Agricultural educators and communicators will play an integral role in shaping the future of hemp, and perhaps hemp can achieve similar significance as it once had in Colonial America. A historic gap in all hemp research exists, especially prior to the 2014 and 2018 Farm Bills. Future research on hemp education and public acceptance is widely needed. Understanding regional differences on the public's knowledge and attitude is a start. We also must consider the implications of hemp education within the public school system.

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¿Puedes verme? Latin ESL Youth in Secondary Agricultural Education

This study examines the inherent relationship Latino English as a Second Language students have with their agriculture teacher and the overall agricultural education program at four rural high schools. It is based upon a series of 11 focus group interviews with two U.S. born and 27 immigrant students from Central America and Mexico, all of whom were in at least their second year of enrollment in secondary agricultural education. The study also includes direct observations of classrooms and peer interactions. Four themes emerged that reflect White students creating an unaccepting dynamic, ignorance toward the Latino students passion for agriculture, high respect toward the agriculture teacher and a program culture that is currently not relatable to Latino youth. Recommendations for pedagogical approaches that encourage English comprehension be implemented into the agricultural education programs along with bold initiatives that gives voice for Latino students throughout the program, specifically the FFA organization. Additional research that further replicates this study is necessary as well as an understanding of teacher's current knowledge and skills for teaching Latino ESL youth.

Introduction

Until recently, Latino students have not been widely studied within career and technical education programs. Even so, a subgroup of students, English as a Second Language learners (ESL), have hardly been considered in vocational education. In the United States, the Hispanic population has risen dramatically since the 1970s (Ennis, Rios-Vargas, & Albert, 2011). With growth has come a drastic increase in the number of students, the vast majority of them Hispanic (Echevarria, Short, & Powers, 2006), with limited English proficiency. These students are often referred in disproportionate numbers to special education (Gunn, Smolkowski, Biglan, Black, & Blair, 2005). If not in a special education classroom, nearly 85% of the remaining students will spend time in mainstream classrooms without support for language development (Watts-Taffe & Truscott, 2000). Unfortunately, less than 30% of mainstream teachers are prepared to serve those students in their classes (Short, 2013; Echevarria, Short, & Powers, 2006). Because of these barriers to academic success, most ESL students underperform because they must take subject tests prior to English proficiency (Tong, Lara-Alecio, Irby, & Koch, 2014; Short, Fidelman, & Louguit, 2012).

Studies have examined English as a Second Language learners and their academic performance in mainstream classes based off the Sheltered Instruction Observation Protocol, or SIOP model, used by their teachers (Daniel & Conlin, 2015; Short, Fidelman, & Louguit, 2012; Echevarria, Short, & Powers, 2006). In addition, studies were conducted which looked at an interdisciplinary approach in mainstream classrooms to foster not only English, but content curriculum proficiency, which has shown to be successful (Tong, Lara-Alecio, Irby, & Koch, 2014; Valle, Diaz, Waxman, & Padron, 2013; Brown, 2007; Williams & Williams, 2000). However, these studies measured effective teaching strategies and student academic achievement through standardized testing over a period of time.

Limited involvement exist in the examination of Latino youth and their experiences within agricultural education. Of the most recent research, one study addressed the potential barriers to Latino student enrollment, which included social perceptions and patterns within the

classroom and FFA programs (Elliott & Lambert, 2018). In the 2018 study, the major barrier/hurdle was traditional agriculture students' perceived conceptions of Latino youth rather than the behavior of the teacher. Similarly, a 2009 study found participation in agricultural education and FFA membership are positively influenced by a variety of areas, but importantly, peer opinion (Roberts, Hall, Gill, Shinn, Briers, Larke, & Jaure, 2009). When exploring the recruitment of minority students into college agricultural programs, Wiley, Bowen, Bowen, and Heinsohn (1997) uncovered similar barriers to enrollment. Another study explored white student's perceptions of minority peers in a university college of agriculture where, "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" (Rodriguez & Lamm, 2016, p 115).

Additionally, while student demographics become more diverse, enrollment in career and technical education programs, such as agriculture, do not reflect school populations. While minority student populations in public schools have increased significantly (Valle, Diaz, Waxman, & Padron, 2013), the percent of minority students enrolled in agriculture programs is often disproportionately low compared to diverse school populations (Talbert & Larke, 1995). Furthermore, though student demographics continue to become more diverse, teacher diversity and concern for teaching the students are low, especially within agricultural education (Vincent & Torres, 2015; Luft, 1996). While there is a desire and need to produce culturally competent students, most universities still lack sufficient cultural diversity education. Without this exposure, agricultural 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 (Rodriguez, & Lamm 2016).

All things considered, there is a unique opportunity to study student academic progress in English and agricultural content proficiency, as well as the social dynamic of these learning environments by interviewing students directly, which has not been widely done in modern research efforts, especially within career and technical education.

Theoretical Framework

The foundational theories of Critical Race Theory and Latino Critical Theory assisted in designing the framework of the study. The overarching goal of Critical Race Theory (CRT) is to understand the oppressive aspects of society and work to alter them on an individual as well as societal basis. At its formulation in the 1970s, CRT was an evaluative approach to the legal system that has expanded into evaluating all lived aspects among people of color (Delgado & Stefanic, 2017). Eventually, scholars began its application to education in the 1990s as an approach to examining curriculum, instructional strategies, and assessment methods equitable for all students (Haskins and Singh, 2015). Scholars ultimately aim to transform the relationship among race, racism, and power through CRT.

According to Dixson (2017), there are five core principles of Critical Race Theory, in its application in education:

1. *Racism is ordinary, not atypical.* As it is permanently ingrained in the legal system, culture, and individual psychology. It intersects with sex, class, ethnicity and sexual

orientation. The principle asserts that institutionally prejudice can result in a loss of power and voice in some groups, and the intersectionality of multiple marginalized identities can generate further alienation (Soloranzo and Bernal, 2001) further hindering the educational experience of marginalized populations.

2. *Current bureaucratic systems advance the interests of elites.* The principle challenges the dominant ideology that the education system is race neutral and provides equal opportunities to all students (Villalpando, 2004; Freire, J., Valdez, V., & Delavan, G., 2017). Research shows that race-neutral or color-blind policies only harm communities of color and further advance the power-dynamics of White people versus people of color (Delgado & Stefanic, 2017).

3. *Races are categories that society creates, manipulates, or retires when convenient for the dominant groups.* Particular cultural groups have been historically notorious for establishing racial categories. The concept of race benefits make "others" feel marginalized for having skin color, hair flow and diets that don't reflect the dominant group (Delgado & Stefanic, 2017).

4. *The dominant group characterize minorities at different times convenient to the needs of the majority.* Unfortunately, the dominant group makes decisions and rules, with intentions of serving as beneficial, that create additional conditions and steps for marginalized groups. Within the context of schools, these rules affect the academic advancement and obtainment of ethnically diverse youth (Ladson-Billings, 1994).

5. *The act of storytelling is crucial for understanding how to create societal change*. A commitment to social justice in the form of the marginalized sharing of experiences as an act of empowerment and coping. These narratives can cause cognitive dissonance in those who listen and encourage them to examine and challenge their own ethnocentrism (Haskins and Singh, 2015).

From these five tenets, Latino Critical Theory (LatCrit) was created as an extension to Critical Race Theory. Encompassing issues experienced by Latino students that are more specific than the guiding principles of CRT provides, Latino Critical Theory can be thought of as a supplement to CRT. LatCrit is used to reveal the ways Latino students experience education according to their race, class and sex with the additional lens of their immigration status, native language, ethnicity and culture (Elliot & Lambert, 2018; Solórzano & Bernal, 2001). Researchers must challenge the current educational practices that marginalize Latino students and recognize the patterns of racial inequality that exist in classrooms. This intersection of CRT with LatCrit helps provide the context for Latino students in agricultural education. Identifying the relationship between race, racism and power, we can begin to change the experiences of Latino students, and other students of color, towards one of empowerment.

Although Latinos are regularly classified as the highest growing subpopulation in the United States (Schaeffer, 2019), minimal research has been done in regards to the Latino experience in agricultural education. Of the studies that have been conducted, researchers have slowly begun to use LatCrit as a method for helping to identify barriers for Latinos in agricultural education. Elliott and Lambert (2018) use LatCrit as a lens for examining Latino experiences in their agricultural education programs. The researchers identified the "inequities students perceive in their respective agricultural education programs between rural and non-rural

students" (p.198) in addition to three major findings revolved around the concept of rural privilege.

Other studies that focus on Latino students in agricultural education do not use LatCrit as a foundation. Researchers currently focus on engagement or disengagement of Latino youth and outline some barriers which include teacher engagement, parent involvement, and peer opinion, to their entry and retention in agricultural education programs and FFA (Suárez-Orozco, Gaytán, & Kim, 2008). Through a LatCrit view, researchers can begin identifying the larger relationships between race, racism, and power in the classroom that would lead to systematic change instead of small, incremental adaptations for agricultural educators.

The current study and research team will focus on LatCrit and CRT to examine the institutional policies, programs, and practices that may interfere with or empower Latino students' ability to receive quality agricultural education opportunities, while also considering their additional statuses of ethnicity, language proficiency, and immigrant status. Both theories provide a critique to the educational system in the continued challenges facing racially-diverse students.

Purpose

The broader purpose of this multiple-case design study was to explore the perceptions and lived experiences of Latino English as a Second Language students. More specifically, the overall agricultural education program which should aid in English language development, content learning, and social development. The objective of this study was to describe the perceived culture of agricultural education, including the classroom teacher. The research aligns with the guidelines set forth by the National Research Agenda, specifically addressing research priority area 4: *Meaningful and Engaged Learning in All Environments* (Edgar, Retallick, & Jones, 2016, as cited in Roberts, Harder, & Brashears, 2016) focusing the inquiry toward "How can delivery of educational programs in agriculture continually evolve to meet the needs and interests of students" (p. 39).

Methods

The multiple-case design study examined Latino English as a Second Language (referred to as ESL from this point forward) youth in four secondary agricultural education programs in various regions of [STATE]. In explaining what a case is, Yin (2018) suggests that the term refers to an event, an entity, an individual or even a unit of analysis. It is an empirical inquiry that investigates a contemporary phenomenon within its real life context using multiple sources of evidence. In the essence of the current study, the research team sought to explain the living experiences of ESL youth in rural secondary agricultural education programs within a non-bordering state. Because the study encompassed schools within multiple regions of the state, the multiple-case design was implemented (Patton, 2015).

By utilizing the most recent Census data, the research team obtained the top ten counties, identified as non-urban, with the largest Latino population. All schools were identified that had secondary agricultural education within each county (n = 17). First year teachers were removed

from the study as they were still in the process of developing rapport with their classes; thus three schools were omitted. One member of the faculty team contacted each school requesting their participation. Six schools responded. Two failed to obtain administrative consent and were omitted from the study. After receiving approval from the Institutional Review Board, consent was obtained from each school administrator and from the parent of each ESL student. Due to the possibility of non-English speaking parents, an approved Spanish consent was provided to all guardians. Of the four participating schools, the research team obtained consent from 100% (n = 29) of the ESL students enrolled in an agriculture course. Table 1 provides a summary of the participating school demographics. The student participants (n = 29) were primarily Juniors and Seniors, with varying levels of English comprehension, though the majority had less than 15% proficiency.

Table 1: *Background Data of School Participants*

	Total School Enrollment	Number of ESL Participants	% ESL population within the school
School 1	850	3	8.0
School 2	650	15	11.0
School 3	1165	4	7.0
School 4	1090	7	17.0

Interviews occurred in the form of focus groups no larger than three; thus 11 focus groups were formed. All interviews were conducted with two of the three research team members present. Although the research team had 20 questions designed to last an hour, the interviews resembled guided conversations rather than structured queries. Rubin and Rubin (2011) believed that the actual stream of questions in a case study is likely to be fluid rather than rigid, also referred to as “unstructured interviews” (Weiss, 1994, p. 207-208). The interviews ranged from 45 minutes to 90 minutes.

Since the research team visited each school, direct observations occurred as well. The team watched the social and environmental conditions that were available within the school visit. Such observations serve as another source of evidence in obtaining triangulation (Stake, 1995). The data collection, through observation, was more casual than formal. According to Yin (2018), casual direct observations occur through fieldwork, including those occasions during which other evidence, such as interviews, is being collected. The research team paid attention to student expressions on particular questions, nervous tendencies, and changes in mannerisms. Within the classroom, the team evaluated the approach of the teacher, the classroom environment, and the conversations among all students enrolled. The team spent 1-2 full days at each school.

After each school visit, the research team wrote in their reflective journal and then met the following day to debrief their findings. Following the first interview, the research team followed Yin’s (2018) approach to asking questions and did not expand the questions beyond Level 1 and Level 2. After the debrief meeting, questions were rearranged and reworded in order

to determine if a pattern within the responses would occur in multiple cases; hence, Level 3 and Level 4 questions emerged.

To assist in the trustworthiness of the student responses, one team member conducted all interviews while another team member took field notes and direct observations. Follow-up interviews and meetings occurred for member checking and to confirm triangulation between all meetings. Throughout the study, a trusted colleague with experience in Latin studies assisted in peer debriefing. All interviews were recorded and later transcribed for coding and interpretation. All transcriptions, direct observations and field notes were coded through the lense of LatCrit. Following the model set by Miles and Huberman (1994), the team first established specific primary codes through specific chunks of text. As the study continued, the research team engaged in revising codes followed by the naming of codes to create themes. Finally, the research team engaged in a series of code checking, followed by code revisions. Code checking continued until the code agreement score was above the 70% intercoder reliability set goal (Miles & Huberman, 1994).

The research team realizes that previously lived experiences play a role in the facilitation and interpretation of the study. In order to mitigate the effect that preconceptions can have to the research process, the team acknowledged personal biases in two forms of bracketing: a) research assumptions and b) hermeneutic (Fischer, 2009) throughout the research process. At the time of the study, one member of the team had over ten years of experience in research within the context of multiculturalism and underserved youth populations. Another member identified as a first generation US citizen with a family origin residing in Mexico. The final member was an upcoming classroom teacher with an interest in teaching agriculture to ESL youth.

Findings

The student interview responses combined to reveal broad themes regarding the experience of Latino English as a Second Language learners in the participating agricultural education programs. The themes that emerge stem from two major areas: the perceived culture of the program and the perceived role of the agriculture teacher. Within the context of the perceived culture of the program, the ESL students believe their White peers defined the culture of the program and as a result, the programs are unwelcoming to non-White students. In every focus group interview, the participants continued to proclaim a concern that established two themes: 1) traditional, White agricultural students do not acknowledge their presence, much less their role within the agricultural education program; and 2) the program culture led ESL students to believe that they were not valued as agriculturalist. The first theme was frustrating, yet comical to many of the students, but the second was upsetting as the ESL students took pride in their passion for agriculture.

Theme 1: Do you see us?

Latino ESL students perceived the culture of the agricultural education program as exclusive, untrustworthy, and lonely for Latino youth. Across the different agricultural education programs, students consistently spoke about the lack of interaction between themselves and the other (primarily White) students enrolled in the secondary agricultural classes. In an interview, one junior, Julian, spoke about how lonely his experience had been “The students see me

different, I'm the only Hispanic in the class, I'm kind of the outlier." Julian later spoke about feeling ignored in his classes, "There's always different groups in school. There are some groups I just don't connect with, so I sit on the outside." (What groups are those?) "Like country groups to be honest- the kids with lift kits, they hunt deer, I'm not that kind of guy." His other classmate agreed with these feelings of being ignored in the agricultural courses, saying, "Some of them don't like Hispanics because of their parents, and I'm alright with that, you know, I just don't talk to them." Further feelings of loneliness were discussed at a different school. When asked if the student had friends in his agriculture course, the student responded with "No, I only have friends like me… like, other Hispanics."

To analyze the feelings of mistrust between Latino ESL students and the White students, the researcher began to ask participants if they were facing discrimination and their agriculture classmates were around, would their agricultural classmates come to their defense? Most students agreed that the other, primarily White, agricultural students *might* say something but, "they would probably just watch… Actually, yeah, they would probably just ignore it honestly." One girl, who had stayed quiet for most of the interview, spoke up after hearing this question. From the back of the table, she said the agriculture students wouldn't come to her defense because "No nos conocen," which translates to "They don't know us". At another high school, the conversation went as follows.

> The researcher first asked, "¿Crees que los estudiantes de ag te defienden?" / "*Would the ag students defend you?"*
> Student immediately responds, "No."
> The other students chuckle.
> The first student argues, "No, es en siero." / "*No, I'm being serious.*"
> The researcher asks, "¿Qué quieres decir?" / "*What do you mean?"*
> The student states, "Se apoyan más entre Americanos que apoyar a uno como ti." / "*The Americans would rather root for each other than support someone like you* [referring to the researcher who was of Hispanic descent]*."*

Theme 2: We love agriculture, too.

Across all four high schools, ESL students knew their classmates did not see them as friends, and if they did, chose not to interact with them despite a mutual interest in agriculture. When asked what their parents thought of the student's decision to enroll in agriculture classes, most students spoke of the pride their parents had in the course selection. Luz, a junior wanting to one day be a veterinarian, said:

> "Latinos have more consideration and we respect it [agriculture] because it's something that provides jobs and our families do it and that's how we get food on the table. Because my father works on the farm, that's why I respect it and don't make fun of it because he didn't get the education we did. He still works on the farm, so I respect that and this class."

In another response to the question, Oscar told us, "En verdad, están en totalmente acuerdo porque mis padres allá en Guatemala tienen su rancho, producen leche. Me llama la atención porque me gustaría especializarme en algo así." ("*In truth, they're totally in agreement because my parents over in Guatemala have their ranch-- they produce milk. It catches my attention because I would like to specialize in something like that.*") Having his family active in

the Guatemalan agriculture industry inspired Oscar to enroll in his high school agriculture classes. There is a clear passion for the agriculture industry and it is reinforced by Oscar, Luz, and their Latino classmates. One summarized the Latino passion for agriculture among the students, “I think there’s more interest in the subject because us Latinos have survived off agriculture.”

Although some ESL students were randomly placed in their agricultural courses, nearly all of the students spoke positively about a personal experience or familial history with the agriculture industry. With this passion for agriculture, connections between all students should be easy to identify and enhance with class discussions. In one specific class period, this does seem to be the case when Julian said, “People look at it [agriculture classes] like it’s only for Whites, but Hispanics can join in, have fun, and enjoy it. Me personally, I enjoy it.”

The second major area where two additional themes emerged involved the ESL students’ perceived role of their agriculture teacher. Like in many cases, the personal, one-on-one relationship established by the agriculture teacher was positive. In every focus group interview, the participants continued to share similar messages about their agriculture teacher that the research team felt confident in two established themes. One of which, the participants truly believed their teacher had an interest in their personal well-being. They did not feel threatened, rather safe and respected. Secondly, although the agriculture teacher took the time to know many of the students, additional efforts did not exist that encouraged a welcoming infusion of Latin culture within the program.

Theme 3: You’ve got our back.

Across the four high schools, Latino ESL students had a good relationship with their agricultural education teacher. Visiting the campuses allowed the research team to see the positive interactions between the students and the teacher during passing periods, lunch, and the time before and after school. In one of the agriculture classrooms, the research team observed and reflected upon the flags of different countries representing the student enrollment, the attempts to speak Spanish with the students, and the genuine interest in the students’ lives outside of the classroom. In one setting, the agriculture teacher had proudly displayed a flag from a South American country by his desk-- a gift from one of his Latino students. Another student, Alejandro, spoke about his teacher, “Yeah he helps me out, he helps me when I don't understand; sometimes he tries in Spanish, he helps me out when he can.” Another student talked about his personal connection with his teacher and the investment the teacher had in his home life, “Me and [teacher] talked about problems in Mexico, like gang related issues. He asked about my family and tried to get to know me more from the beginning.” In both situations, the research team noted the sincerity each student took in explaining the compassion of the agriculture teacher and, besides their appointed ESL teacher, was more passionate than many of their core content teachers.

When asked if teachers would come to their defense if they were to ever face discrimination, 24 out of the 28 students agreed that their agriculture teacher would do so. In most focus groups, students spoke about instances in which the agriculture teacher defended them in the past. After asking the initial question, two students quickly replied, “Yeah,” and began to laugh. After the researcher asked why they were laughing, one student responded,

“There was a time where one of my friends called me a ‘beaner’ as a joke, and [teacher] did *not* like it. I feel like he wants to get more involved with the Hispanic culture. He knows how to speak Spanish and we talk sometimes.” Even in programs where the English proficiency of the students was almost non-existent, Latino students were quick to agree that their agriculture teacher would rise to their defense. After hearing the question in one interview, three soft-spoken girls all nodded and responded in unison, “Sí, el sí nos defende,” (“*Yes, he would defend us.”*).

In two of the high schools, distinct ESL coordinators were hired to help with the transition to English for the Latino student population. However, for students in programs where an ESL coordinator was not available, an importance was placed on one-on-one discussions with their agriculture teachers about English development. “Toma el tiempo además para explicarlo solo a mi y creo que está muy bien,” (“*He takes the time to explain it to me and it is really good.*”) replied Rodrigo, a junior taking his first Animal Science class. Latino ESL students in one program were expected to participate in group projects and speak in front of their peers too, “Yeah we get up there and do presentations, speeches, and if we pronounce something wrong he tells us afterwards. That really helps me.” Although it takes additional time and effort for the agriculture teacher, students see the effectiveness of separate office hours, in-depth tutoring, and supplemental translations of class work.

Theme 4: Build the culture.

Teachers throughout the study created positive interactions, supported their English development, and built relationships with their ESL students. However, the teachers failed to provide an environment where Latino ESL students and their White classmates could interact and begin to build a culture of inclusivity. In one high school, the Latino ESL students started off the semester sitting in desks directly next to the teacher’s desk, but as the semester progressed, the ESL students moved the furthest away - toward the back corner of the room, “Yeah we used to be right there where everyone would see us or whatever, but now we sit over there... it’s easier.” By selecting where they sat, the ESL students were selecting a location where the least amount of people would interact with them because it was “easier” to sit amongst other Spanish-speaking students who were assumed to already be their friends. The researcher team noticed this recurring pattern of Latino students sitting only with other ESL students in the furthest seats from the teacher’s desk at every school as well as in the hallways and common areas, like school cafeterias. Ten minutes into one interview, the agriculture teacher came into the room and began to apologize for the interruption. Beside her was another student qualified to be interviewed. The agriculture teacher had forgotten to send him because “[he] is so quiet and always sits in the back.”

A lack of community amongst the class was revealed by the student responses, “Sí casi nos tiene separados de los güeros.” (“*Yes, they usually keep us separate from the White students.*”) The separation from their White peers is preferred by the students and encouraged by their agriculture teacher. Other students spoke about the separation for group projects in their agriculture classes, “Nunca nos mezcla con otros estudiantes porque no entendemos la idioma y aun nunca nos hablan.” (“*He never mixes us with other students because we don't understand the language, and they don’t speak to us anyway.*”) When teachers fail to provide opportunities for all of their students to interact and engage in the classroom, students end up like Rafael who is described as “only talk[ing] when he has friends around.” In other departments on campus,

however, the problem of social peer engagement is non-existent; in fact, these friendships are being made, in spite of the language barrier, just not in the agricultural classes. Three students agreed that it's primarily "The country, really-white, all-they-do-is-farm kids… They never talk to us during lunch. Other Americans do, but those are my friends."

At the schools visited, students felt a disconnect between their agriculture teacher and the school's FFA chapter. Although students spoke highly of their agriculture teacher, students did not share these attitudes about the school's FFA program nor the FFA officers. Although, the finding may appear to be associated with the students, the teacher harnesses the culture of the program and the ESL students did not associate the teacher with the youth organization. None of the students interviewed were currently involved in the FFA program but two students were involved in the past. They left the program to join another, more inclusive club, "I mean I've seen posters, but I would just rather do other stuff, like the Latino Club ... I'm the Vice President right now and it's cool." The researcher then asked the student if he could see himself taking on the same leadership role in the school's FFA chapter; the student immediately responded, "Oh no… Most of the time it's the country kids that are the officers. All of the time, actually." Students reiterated feelings that they would not be welcomed to the FFA program, "My teacher talks about it in class, but the students haven't tried to get me to join. They've never talked to me." On another campus, Latino students spoke of the feelings of loneliness they would likely experience if they were to join FFA. The researcher asked the group of students, "Would you be in FFA if asked?"

Carmen hesitates but says, "Puede ser…" / *"I might be…"*

Emilio remarks, "Yo no." / *"Not me."*

Carmen explains, "Da como pena, todos son Americanos y uno es Hispano." / *"It's kind of shameful; everyone is American and one is Hispanic."*

The third student, Crystal, adds to the conversation, "Se siente sola." / *"It feels lonely."*

Conclusions, Inferences, and Recommendations

The findings were presented using excerpts from the collected data, then discussed further in the context of the selected theoretical framework. The upcoming conclusions are compared to previous, related research findings that are separated first by the culture of the classroom and then in regards to the classroom agriculture teacher. The research team recognizes the limitations of this case study - interviews were conducted with students from high schools where the teacher and school invited the team to talk with their students. Latino ESL students from other schools and states may share similar stories to that of the participants, particularly in regard to the culture established by their White peers (Elliott & Lambert, 2018); however, the following conclusions and inferences maintain considerations to the borders of the participating schools, and state. Nevertheless, the findings of the study lay a foundation for additional research into what appears to be a lack of attention on the fastest-growing population of students in our classrooms.

In Kentucky alone, the Latino population has grown 66% between 2007 and 2014, the second-highest growth rate for any state in the US (Stepler & Lopez, 2016). Unfortunately, the public schools are not prepared for the fast-growing population of Latino youth as they face the process of acculturation, assimilation to a different, more dominant culture. Acculturation for

high school students includes the challenges of learning a second language and adjusting to new social norms. For agricultural educators with Latino ESL students enrolled in their classes, positive social interactions and social acceptance can help immigrant youth deal with these acculturation challenges (Potochnick, Perreira, & Fuligni, 2012). Within the four schools, all the participants provided evidence of social acceptance with the agriculture teacher. The students and the teacher were engaged in one-on-one conversations and described acts where the teacher showed compassion. Knowing that each of the teachers replied to the request to participate, it implies that they see a need and desire to help Latino students. Better understanding of the teachers' stories and utilize their strategies would assist novice teachers in their approach.

It can be easy for Latino ESL students to self-categorize as "different" and isolate themselves from English-speakers, but it's imperative that agriculture teachers create experiences for their class that encourage Spanish-speakers to reach out and for English-speakers to make an effort too. Using the previously-mentioned SIOP model by Echevarria, Short, and Powers (2006) can be an effective way to incorporate teaching methods that advance the English development of immigrant youth without taking away from the content of the course. An inclusive classroom would encourage group work; vocabulary learning through identification and project-based learning; and explanation and synthesis building.

In all of the cases, the students had experience in agriculture, either from their family heritage or through working with a family member on a farm or warehouse that dealt with agriculture products. Unfortunately, most individuals in the school, primarily their agricultural education colleagues were unaware of the fondness each student had toward agriculture. The participants shed light that due to their lack of English and the clothing that didn't depict an agriculture students, they were assumed to be non-interested in the field. In each of the situations, the agriculture teacher should assist ESL students to make the transition of their agriculture work background to an SAE project. Furthermore, highlighting the ESL students' work on bulletin boards and in class discussions allows White students to see a different perspective of their peers and encourages engagement between the two student groups. With students as passionate about agriculture, involvement in FFA and SAE projects would be obvious for any English-speaker; but because these students are native Spanish-speakers, they were not informed on the opportunities the three-ring model provides. Only three of the 29 students interviewed could articulate what the FFA organization was; only two had ever attended an FFA meeting before; and none of the students considered themselves active in their FFA chapter.

With the knowledge of agriculture that the ESL students possess, it is recommended that the teachers develop a plan for involving Latino youth in their local FFA chapter by establishing meaningful peer engagement, recruiting Latino student leaders, and developing a position on the executive leadership team that is maintained by a Latino student. Not only would teachers see an increase in membership and students' English proficiency, but teachers would begin to create a culture where all students feel welcome to enroll, and participate, in the agricultural education program (Roberts et al., 2009). Teachers and student leaders need to start recruiting those with the most engagement and investment of the agriculture industry, both English and Spanish speakers alike.

Evidence continued to surface that Latino ESL students had an affinity for their agriculture teachers, yet they felt a disconnect from the rest of the agricultural program, specifically with the traditional, White agriculture students. These findings are consistent with Talbert and Larke's (1995) and Jones and Bowen's (1998) studies that find the main factor influencing minority youth to enroll in, or in this case not enroll in, introductory agriscience courses was the negative interactions with agriculture students. Addressing the culture established in the program begins with the teacher. Within six month from the composition of this manuscript, the research team will meet with the teachers to engage in how to build an inclusive culture. Some strategies being recommended are first identifying the existing culture; creating projects that encourage interacial communication and understanding; and obtainment of financial resources that would advocate participation of Latino ESL students. Such resources can be made available within the agriculture community. If the teacher desires to be a champion for the Latino students, they must advocate the students among the student peers, the rest of the school and the overall community. Agricultural education can lead the way in improving English comprehension, addressing racial tensions, and increasing academic achievement of Latino youth. New, innovative methods of teaching for all students who walk through our classroom doors is essential for not just our student populations but for the future of agricultural education.

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The Dimensions of Professional Development Needs for Secondary Agricultural Education Teachers Across Career Stages: A Multiple Case Study Comparison

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Abstract

This study sought to understand the professional development needs articulated by secondary agricultural education teachers across three career stages. To accomplish this, we collected data from secondary agricultural educators (N = 66) in Louisiana. Then, we performed a cross-case analysis to compare and contrast themes and axial codes. Through our analysis, three themes emerged in each case: (1) presage variables, (2) context variables, and (3) process variables. The themes represented the various dimensions of professional development that teachers expressed they desired to facilitate student success better. In particular, the Early Career Teachers' non-traditional backgrounds often limited their exposure to opportunities; therefore, they desired more knowledge and skills in technical agricultural concepts. Meanwhile, Mid-Career Teachers were more stable and confident in their roles as secondary agricultural education teachers; nevertheless, they were frustrated because of various contextual forces that complicated their job duties. Finally, Career Teachers were experiencing career wind-down and had unique professional development requests to help them cope better with contextual changes influencing their responsibilities. Findings from this study, therefore, suggested that although areas of commonality exist across career stages, it is critical to differentiate professional development across programmatic dimensions of agricultural education.

Introduction

Education has evolved dramatically throughout history due to an array of social, cultural, and policy-based forces that have driven or restrained the beliefs and practices of key decision-makers (Fraser, 2014; Urban & Wagoner, 2014). Despite such changes, however, the variable that has been most consistently reported to moderate student achievement is teacher effectiveness (Marzano, 2012; Stronge, Ward, & Grant, 2011). However, teachers' success in delivering quality instruction is affected by a number of presage, context, and process variables (Dunkin & Biddle, 1974). As a consequence, a plethora of research has been dedicated to distinguishing the key characteristics of effective teachers. However, defining such factors has proven to be complicated since the construct is primarily *context* and *academic discipline* specific (Fessler & Christensen, 1992; Larsen, 1992; Luft & Thompson, 1995; Miller, Kahler, & Rheault, 1989;). In response, Roberts and Dyer (2004) advanced 40 characteristics of effective agricultural educators that gained consensus through the use of a panel of experts. Of these characteristics, seven emerged with the highest level of agreement: (1) cares for students, (2) effectively plans for instruction, (3) effectively evaluates student achievement, (4) is honest, moral, and ethical, (5) has sound knowledge of FFA, (6) communicates well with others, and (7) effectively manages, maintains, and improves laboratories (Roberts & Dyer, 2004). The identification of such features provided a basis for the design and delivery of quality professional development for secondary

agricultural educators across several states (DiBenedetto, Willis, & Barrick, 2018; Figland, Blackburn, Stair, & Smith, 2019; Smalley, Hainline, and Sands, 2019)

Professional development has been defined as the learning activities and experiences that educators engage in, from preservice education to retirement, to increase their career-related performance (Fullan & Steigelbauer, 1991; Rhodes, Stokes, & Hampton, 2004; Ruhland & Bremer, 2002). Researchers have argued that professional development is a critical element of educational reform (Borko & Putnam, 1995; Desimone, 2009; Gusky, 2000). However, the literature has demonstrated that all professional development efforts are not created equal. For example, the preparation and experiences of secondary agricultural educators can vary greatly (Torres, Kitchel, & Ball, 2010). As a result, understanding the diverse needs of teachers has been a dominant theme in the literature.

For example, almost one-fourth of teachers in the U.S. reported their primary motivation to engage in professional development was to improve their content knowledge (Darling-Hammond, Chung, Andree, Richardson, & Orphanos, 2009). However, secondary agricultural educators' duties extend beyond traditional classroom teaching as they are also responsible for facilitating students' Supervised Agricultural Experiences (SAE) and leadership development through the National FFA Organization (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008). Further, they are also responsible for navigating complex local, state, and federal policy as well as diverse community norms and traditions (Phipps et al., 2008). Because of such complexities, Easterly and Myers (2018) called for the discipline to examine ways to help secondary agricultural educators to mature in critical dimensions of personal resilience as a way to improve their engagement in professional development and ultimately enhance their students' learning. As such, professional development needs in agricultural education continue to diversify and become more complex. To this point, Grieman (2010) called for additional research to better assess the quality and impact of professional development in agricultural education as teacher needs continue to grow and evolve. So far, the literature on professional development has illuminated several critical areas of need for secondary agricultural educators across multiple states. In particular, Smith and Smalley (2018) reported secondary agricultural educators who participated in the National Association for Agricultural Education's eXcellence in Leadership for Retention (XLR8) conference ranked *program planning and evaluation* as well as knowledge about facilitating *experiential learning* as their primary need areas for professional development. Meanwhile, Smalley et al. (2019) found that secondary agricultural educators in Iowa expressed a variety of needs in regard to teaching, classroom management, and technical skills.

It is important to note that multiple investigations have also examined the professional development needs of secondary agricultural educators from the perspective of their years of teaching experience (DiBenedetto et al., 2018; Figland et al., 2019; Layfield & Dobbins, 2002; Washburn, King, Garton, & Harbstreit, 2001). As a result of such work, we now understand that early career teachers warrant additional support because of crucial personal and educational differences, and as a result, their needs span areas such as: (a) behavior management, (b) content knowledge, (c) lesson planning, (d) FFA programming, and (e) SAE management (Layfield & Dobbins, 2002; Mundt, 1991; Shippy, 1981; Talbert, Camp, & Heath- Camp, 1994). Meanwhile, secondary agricultural educators with 10 or more years of experience perceive their needs are more programmatic and technology-based (Layfield & Dobbins, 2002; Washburn et al., 2001). For instance, career teachers reported that they would prefer professional development on topics

that included: (a) computer-based programming assistance, (b) FFA award and degree applications, and (c) recording keeping (Layfield & Dobbins, 2002; Washburn et al., 2001). As such, secondary agricultural educators' conceptualizations of their needs remain varied, complex, and evolving until they establish a stable professional identity (Shoulders & Myers, 2011). However, Easterly and Myers (2019) and Figland et al. (2019) cautioned that many professional development efforts have failed to differentiate activities based on the needs and experiences of teachers across career stages. Therefore, a need existed to understand better how secondary agricultural educators' discourse about their needs regarding teaching and learning converged and diverged across career stages.

Conceptual and Theoretical Framework

Fessler's and Christensen's (1992) teacher career cycle model served as our conceptual lens in the development of this investigation. The model suggested that professional development needs must be understood as an interdependent system that involves a complex interaction between teachers' career stages, personal attributes, and the institutional context (Fessler and Christensen, 1992). In particular, Fessler and Christensen (1992) argued that teachers advance through a series of eight non-linear stages throughout their career: (1) preservice, (2) induction, (3) competency building, (4) enthusiastic and growing, (5) career frustration, (6) career stability, (7) career wind-down, and (8) career exit. Meanwhile, personal dimensions that influence teachers' career stages include variables such as: (a) family support, (b) critical incidents such as marriage, birth of children, or religious experiences, (c) life crises such as illness, death, financial loss, or legal problems (d) teachers' unique traits, aspirations, and values, (e) avocational outlets including hobbies and travel, and (f) life stages (Greiman, Walker, & Birkenholz, 2005). In addition to myriad personal variables, teachers must also navigate distinct institutional contexts (Fessler & Christensen, 1992) in the form of school regulations, administrative management styles, public trust, and societal expectations. In this study, therefore, we used Fessler and Christensen's (1992) model to conceptualize how secondary agricultural educators in Louisiana's needs may be similar as well as distinct across career stages.

In our analysis of such factors, we then employed Dunkin' and Biddle's (1974) model of teaching and learning (see Figure 1) as an a posteriori lens to interpret our emergent findings. The model refined constructs first proposed by Mitzel (1960) to offer four variables that influence teaching and learning: (a) presage, (b) context, (c) process, and (d) product. The first variable, presage, refers to the personal characteristics that influence the teaching and learning process such as certification type, teacher preparation, and other unique individual needs and experiences. Context variables reflect the unique factors and conditions that influence the teaching and learning environment such as educational policy, school climate, and any specialized expectations that affect how teachers approach their career. The third variable, process, is defined as the specific activities that affect achievement such as methods of instruction, classroom management, and student motivation strategies. Dunkin and Biddle (1974) theorized the combination of the aforementioned variables influence the final *product, i.e., student success*. Our lenses, therefore, helped interpret the dimensions of professional development needs for teachers, across career stages, in regard to the factors – presage, context, and process – that most profoundly influence student success in secondary agricultural education.

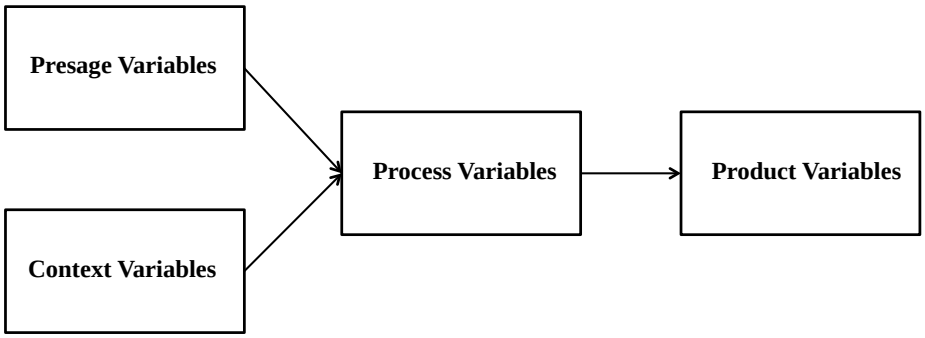

Figure 1. Adapted from Dunkin's and Biddle's (1974) model of teaching and learning.

Statement of Purpose and Research Question

The purpose of this study was to compare and contrast the professional development needs articulated by Louisiana secondary agricultural education teachers across three career stages: (1) early career, (2) mid-career, and (3) career teachers. Because this study was positioned to build the capacity of the agricultural education profession, it addressed the American Association for Agricultural Education's Research Priority Area 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016). One research question framed the investigation: In what ways did secondary agricultural education teachers experience similar, but diverse professional development needs across career stages?

Reflexivity

In addressing this study's purpose, it is important to reveal how our experiences and biases influenced this investigation. First, we want to acknowledge that each investigator is a former secondary agricultural education teacher. Therefore, our beliefs about teaching and learning and priorities regarding professional development for inservice teachers were distinct biases that although we attempted to minimize, could have impacted the design and interpretation of data. We also believe it is essential to recognize that we have strong professional relationships with many secondary agricultural educators in Louisiana. For example, several of the participants in this study were our former students. We also have close professional bonds with many of the other participants through our previous service and outreach efforts. Although such relationships provided some advantages, such as participant recruitment, they also introduced susceptibilities. In our methodology section, therefore, we explain how we imbued rigor and trustworthiness throughout this investigation to provide quality conclusions.

Methodology

In framing this study, we situated our assumptions and investments through the epistemological position of constructionism (Crotty, 1998). Using this worldview, we pursued our *quintain* (Stake, 2006), or central issue, in regard to how professional development needs could foment, interact, or clash when examined as a social construct. It was through this lens that we also grounded the study, methodologically, in Stake's (2006) multiple case study design. Such an approach is appropriate when attempting to construct an understanding of a phenomenon from diverse perspectives to obtain a more complete understanding (Stake, 2006). To accomplish this, we collected data from secondary agricultural educators (N = 66) in Louisiana to develop a

profile of each case. Then, we performed a cross-case analysis to compare and contrast themes and axial codes across cases to better understand their collective dimensions (Stake, 2006).

Description of Cases, Participant Recruitment, and Data Collection

To study teacher professional development needs across career stages, we bounded cases by location and years of teaching experience. For example, all participants were secondary agricultural educators in Louisiana. We also categorized participants into distinct cases based on their years of experience: Case #1 – *Early Career Teachers* – zero to five years of teaching experience; Case #2 – *Mid-Career Teachers* – six to 15 years of teaching experience; and Case #3 – *Career Teachers* –16 or more years of teaching experience. We then purposefully recruited participants who (a) met the bounds of each case, and (b) were attending one of three Louisiana FFA Leadership Camp sessions. Based on Louisiana Education Bulletin all agricultural educators in Louisiana are required to attend one camp session and engage in professional development facilitated by the Louisiana Agricultural Teachers' Association. Therefore, the camp served as an optimal site to facilitate data collection. After Internal Review Board (IRB) approval, we then conducted focus groups, ranging from 65 to 85 minutes in length, for cases at each session of camp, i.e., a total of nine interviews. Of note, three research team members facilitated each of the nine focus group interviews using the same semi-structured interview protocol. We also collected the following forms of data from participants to triangulate findings: (a) demographic questionnaires, (b) quantitative instruments assessing participants' professional development needs on Likert-type scales, and (c) other supporting documents. In total, 11 females and 12 males (n = 23) represented the *Early Career Teachers* and had an average of 2.5 years of teaching experience. The *Mid-Career Teachers* were comprised of 26 participants (11 female; 15 male) who reported a mean of 12.3 years of teaching experience. Finally, six females and 11 males (n = 17), who had 22.7 years of average teaching experience, represented the *Career Teachers*. We next provide our techniques to analyze data (Stake, 2006).

Data Analysis

After data collection, we transcribed interviews verbatim. Then, data were uploaded to NVivo® qualitative analysis software to facilitate analysis and understand the data's complexities. In particular, our analysis procedures were facilitated using Corbin's and Strauss' (2015) constant comparative method through three phases of coding: (1) open, (2) axial, and (3) selective. For example, in the open coding phase, we labeled data into distinct units using participants' words (Corbin & Strauss, 2015). During this process, we also created memos to capture our thoughts and assertions (Corbin & Strauss, 2015). Thereafter, we engaged in axial coding in which we scrutinized relationships of our open codes through concept mapping, code weaving, and data displays to reduce the data into categories and create evidentiary warrants for each case (Corbin & Strauss, 2015; Saldaña, 2012). Example axial codes from our analysis included: (a) advocating for agricultural education, (b) building a culture for agricultural education, (c) facility restoration and management, (d) industry-based credentials, and (e) teaching diverse students. During this phase, we were also able to explore discrepancies in our data and consider rival explanations. The evidentiary warrants were then mobilized using horizontal analysis techniques to construct an analytic storyline for each case, i.e., our *case reports* (Stake, 2006). In the third phase of analysis, we employed selective coding to our case reports and axial codes to *think with theory* (Corbin & Strauss, 2015). Through this inductive process, three themes emerged in each case by

interpreting our preliminary findings a posteriori through Dunkin's and Biddle's (1974) model of teaching and learning. Then, to describe the dimensions of the professional development needs across career stages, we performed a cross-case analysis of the study's themes and axial codes. Before offering our interpretation of this investigation's findings, however, it is critical to examine how quality was built into each phase of this investigation.

Building Quality into the Study

In this investigation, we used Lincoln and Guba (1985) four standards of trustworthiness to build quality in our design and procedures: (1) credibility, (2) transferability, (3) dependability, and (4) confirmability. The first standard, credibility, refers to whether findings and conclusions ring true within the context in which data were collected and when compared against existing evidence and theory (Lincoln & Guba, 1985). To achieve credibility, we explored uncertainties, provided context-rich descriptions, triangulated findings across sources, and compared our conclusions to relevant research. Transferability, the second standard, indicates the utility of the investigation's findings for other contexts (Lincoln & Guba, 1985). To ensure that our findings were transferable we: (a) accurately described our participants and setting, (b) provided diverse perspectives on the phenomenon, and (c) explained how participants were selected and recruited. The third standard, dependability, refers to whether the investigation was conducted in a consistent way over time (Lincoln & Guba, 1985). As such, we developed a clear statement of purpose, illuminated our role in the study, and maintained a thorough audit trail. The final standard, confirmability, reflects researchers' explicitness about their decisions, biases, and other influences that could have affected the investigation (Lincoln & Guba, 1985). We upheld confirmability by: (a) offering a researcher reflexivity, (b) provided a full description of our procedures, and (c) only provided conclusions that were clearly linked to data (Lincoln & Guba, 1985). Next, we provide a discussion of our emergent themes.

Findings

Through our analysis, three themes emerged in each case: (1) presage variables, (2) context variables, and (3) process variables (Dunkin & Biddle, 1974). The themes represented the various dimensions of professional development that secondary agricultural education teachers expressed they desired to better facilitate student success, i.e., *product variables* (Dunkin & Biddle, 1974). Through case comparison and contrasts, we weaved salient axial codes and the voices of within case participants into a rich description of each theme. At the conclusion of the report, we then provided meta-inferences using cross-case analysis procedures (Stake, 2006).

Case #1: Early Career Teachers

The *Early Careers Teachers* were largely focused on building their competencies (Dunkin & Biddle, 1974) to better prepare them for a career as a secondary agricultural education teacher. For example, because many of the teachers in this career phase came from non-traditional backgrounds, they desired more training in content agriculture and knowledge of pedagogical strategies to enhance student learning. Next, we offer the dimensions of the *Early Career Teachers'* needs as interpreted through the lens of Dunkin's and Biddle's (1974) model of teaching and learning: (1) presage variables, (2) context variables, and (3) process variables.

Theme #1: Presage Variables

During focus group interviews, the *Early Career Teachers* articulated how their unique backgrounds, i.e., *presage variables*, influenced their professional development needs. For example, ten of the 23 participants interviewed in this case revealed they were alternatively certified. To this point, Participant #1 added, "I'm guessing some of you went through teacher education programs where they taught you how to utilize your student leadership. But I came to teaching ag straight from 20 something years in the air force. So it's been a challenge." Participant #8 also explained that her non-traditional background limited her ability to keep students engaged, "I graduated in animal science. I've relied on PowerPoints and things like that. And kids don't respond as well." Another pattern that emerged from our analysis of *Early Career Teachers'* interviews was that a majority expressed a need for additional content knowledge. Participant #16 explained, "I was raised on a dairy so I had a lot of the animals, had some plants, but the problem [is] like with food safety and agricultural mechanics…I don't have that background." Participant #14 added, "Like for me, I came from a different state. I didn't have my education necessarily from here. I'm learning something completely different and all my kids complain because they hated [my class] because it was so much bookwork." The *Early Career Teachers* also articulated that their backgrounds and training complicated their ability to navigate work-life balance. Participant #2 explained, "my husband and I have just had to stop talking about work. I guess I just don't know what's best." Participant #9 added, "in my education classes, we just never really talked about how to turn it off [being a teacher] after the bell rings."

Theme #2: Contextual Variables

The *Early Career Teachers* also described how unique *contextual influences* affected their ability to fulfill aspects of their career. A salient axial code from our analysis, for example, were needs regarding how-to fulfill community and administration expectations while also building a culture supportive of agricultural education. Participant #15 explained, "I need help communicating with my community and administration, I can't get [everyone] on the same page." As a result of such challenges, 16 *Early Career Teachers* voiced the need for additional "networking" or "mentorship" opportunities in the future. The early career teachers also spoke to how their school districts served students with diverse needs. Therefore, they needed more guidance on how to support such students. Participant #19 explained, "I have lots of kids with different needs." And, Participant #23 added, "I had one kid that could not talk. I wanted to help him all I could, but it just made things so difficult. That's the hardest thing." Another contextual factor that affected the *Early Career Teachers* interviewed was the importance placed on Industry-based Credentials (IBCs) in their school districts. Participant #19 explained, "I did not realize how big of a deal IBCs were, so, I really need some help understanding how to certify my students in different areas." Finally, several of the Early Career Teachers also described the need to learn how to "restore" (Participant's #2, #9, #13, #16, & #20) and "manage" (Participant's #4, #6, #7, #13, & #21) their facilities and laboratories because of a lack of resources in their school systems.

Theme #3: Process Variables

The final theme, *process variables*, that emerged for the *Early Career Teachers* case reflected their need for professional development to ensure student success (Dunkin & Biddle, 1974). For example, participants, in this case, expressed an interest in learning more pedagogical skills that

would allow them to “keep students engaged” (Participant #8). To accomplish this, they also emphasized the need for more “behavior management techniques” (Participant #2, #6, #7, #9, #10, #11, #17, & #22), strategies for “motivating students” (Participant #1, #3, #5, #7, #15, #16, & #20), and facilitating “Supervised Agricultural Experiences (SAEs)” (Participant #1, #2, #4, #7, #13, #15, #16, & #20). Further, 14 of the participants expressed the desire for more professional development in regard to FFA competitions and award applications.

Case #2: Mid-Career Teachers

The *Mid-Career Teachers* appeared more confident in their abilities (Fessler & Christensen, 1992). However, they also expressed frustrations in the career. Therefore, they desired professional development to gain more stability and proficiency in performing their job duties. We next offer an interpretation of the *Mid-Career Teachers’* professional development needs through the lens of Dunkin’s and Biddle’s (1974) model of teaching and learning.

Theme 1: Presage Variables

The Mid-Career Teachers expressed more stability and were eager to acquire knowledge to support their students. However, their life situations, i.e., *presage variables*, appeared to influence particular aspects of their work. For example, 18 of the *Mid-Career Teachers* spoke about their struggle to maintain “work-life balance.” As an illustration, Participant #27 explained: “I get frustrated because I'm in a one teacher department and it's a large school. How am I supposed to take care of everything and still have time for family?” This issue of work-life balance also appeared to influence other aspects of *Mid-Career Teachers’* family life negatively. According to Participant #40: “You start looking at ag teachers as a whole and I'm willing to bet in most schools you start seeing a lot of teachers that are becoming single. Apparently, it's a trend.” As a result, the *Mid-Career Teachers* desired more professional development in this area. However, they also voiced a need to learn more strategies to overcome personal struggles such as coping with “stress” (Participant’s #26, #27, #32, #36, #39, #41, & #49).

Theme 2: Context Variables

The second theme, *context variables*, illuminated the situational elements in which *Mid-Career Teachers* desired to develop more professionally. For example, a hurdle faced by nearly all of *Mid-Career Teachers* was their school district’s emphasis on IBCs. As Participant #49 claimed: “The problem [at my school] is all they care about is that students get a credential at the end. Our guidance counselors, they just want to find the quickest way to get a kid graduated and out of here.” Because of increasingly complex contextual factors, the *Mid-Career Teachers* also saw value in professional development that focused on “teaching diverse students” (Participant #24, #27, #31, #34, #37, & #46), “advocating for agricultural education” (Participant #32, #35, & #38), securing additional “funding support” (Participant’s #33, #39, #42, & #47) and “grant writing” (Participant #24, #26, & #29). Also, because of the lack of resources in most school districts, the *Mid-Career Teachers* desired more professional development about facility restoration and management. For example, Participant #50 revealed, “We just do not have a lot of money in my [school], our facilities are run down and getting old. So, maybe just some ideas and strategies to help keep them up would help me.”

Theme 3: Process Variables

The final theme for the *Mid-Career Teachers*, process variables, represented their professional development needs concerning facilitating student success. For example, the *Mid-Career Teachers* voiced a need for more opportunities to acquire knowledge and skills in regard to using "educational technology" (Participant's #29, #37, #38, #40, & #44) and improving "student motivation" (Participant's #25, #29, #28, #37, & #41). As Participant #29 explained, "we have access to a lot of technology. I just do not know how to use it." In addition to technology, 16 of the participants spoke about the need for advanced training to facilitate "SAE projects" as well and "FFA competitions and applications."

Case #3: Career Teachers

Overall, the *Career Teachers* articulated they were *winding down* in their career and beginning to make plans for retirement (Fessler & Christensen, 1992). Throughout their career, they explained how they had witnessed an evolution concerning the priorities of education as well as the types of students in their programs. They also voiced a desire for more opportunities to promote camaraderie, networking, and fellowship to improve the culture of secondary agricultural education. As a result, their professional development needs were unique when interpreted through Dunkin's and Biddle's (1974) model of teaching and learning.

Theme 1: Presage Variables

During interviews, the *Career Teachers'* provided anecdotes of how they overcame many challenges throughout their work lives. However, they were also experiencing new personal challenges, i.e., *presage variables*, that affected how they approached work. For example, several of the *Career Teachers* mentioned how their health and other *personal struggles* affected the way they approached their career. As a consequence, Participant #65 suggested the need for professional development on maintaining a "healthy lifestyle." However, the *Career Teachers* also spoke about more support on how-to balance "family and relationships" (Participant #46, #48, #51, #54, #55, #61, #64, & #65) while maintaining a successful program.

Theme 2: Contextual Variables

A prominent concept that emerged in our analysis of *Career Teachers* was their struggle to cope with shifting *contextual* forces that influenced their work. In response, nearly all of the *Career Teachers* called for more professional developments opportunities to build relationships and network so that secondary agriculture teachers in Louisiana could traverse such issues as a united front. The *Career Teachers* also articulated problems facilitating quality instruction for the diverse needs of their students. Participant #62 explained, "there have been a lot of societal changes, which means there is a big difference in the kids that we're getting in today. It's been a struggle. They need this and that, I just have trouble keeping up." Another contextual shift the *Career Teachers* mentioned they had witnessed was the emphasis on "industry-based credentials." As a result, 16 of the *Career Teachers* wanted more programming on strategies to certify students in various IBCs in the future. After witnessing multiple economic downturns and budget cuts during their tenure, the *Career Teachers* also noted they required more training on how to effectively "advocate for agricultural education" to decision-makers (Participant's #45,

#46, #59, #60, & #61). They also saw value in learning more ways to acquire “grants” and other “financial support” (Participant #41, #49, #52, & #58).

Theme 3: Process Variables

The last theme, *process variables*, reflected the procedural aspects that *Career Teachers* perceived restricted them in achieving student success. As an illustration, one of the greatest frustrations expressed by *Career Teachers* was their lack of knowledge concerning technology. Participant #59 explained, “I think we need to have [professional development] on the electronics and how to use them. The SmartBoards and online learning… it is intimidating, especially for someone who's been around before computers were in the classroom.” In addition, the Career Teachers also noted they struggled with how to motivate today’s students. Participant #65 revealed, “for me the last 15 years, student motivation has been on the decline as far as students wanting to do things, and be involved. I need some help on understanding what makes them tick.” Finally, nearly all *Career Teachers* interviewed maintained they needed more assistance learning how to “engage students” and facilitate “SAEs.”

Conclusions

The purpose of this study was to compare and contrast the professional development needs voiced by Louisiana secondary agricultural education teachers across three career stages: (1) early career, (2) mid-career, and (3) career teachers. As a result, findings from this investigation suggested that secondary agricultural education teachers’ professional development needs in Louisiana were *nuanced* and *varied*. For example, when interpreted through Dunkin’s and Biddle’s (1974) model of teaching and learning, presage, context, and process variables emerged in each career stage. However, the dimensions of each variable were diverse.

In particular, the *Early Career Teachers*’ non-traditional background often limited their exposure to opportunities available through agricultural education; therefore, they desired more knowledge and skills in technical agricultural concepts. Meanwhile, *Mid-Career Teachers* were more stable and confident in their roles as secondary agricultural education teachers; nevertheless, they were frustrated because of various contextual forces that complicated their job duties. The final case, *Career Teachers*, were experiencing career wind-down and, therefore, reflected on the many changes they had witnessed to agricultural education. As a consequence, they had unique professional development needs to help them cope better with personal, contextual, and process changes that were affecting their career. As a consequence, findings from this investigation not only align with the literature on professional development, but also add new developments regarding the relevance of understanding teachers’ needs across career stages to ensure student success in agricultural education (Dunkin & Biddle, 1974; Fessler & Christensen, 1992).

For example, our cross-case analysis (Stake, 2006) of this investigation’s themes and axial codes revealed key converges and divergences. Such differences helped define and describe the professional development needs through and between cases. However, it is essential to recognize that across cases, four axial codes regarding professional development needs were constant: (1) industry-based credentials, (2) teaching diverse students, (3) SAEs, and (4) student motivation strategies. Such factors have been previously identified by research in the agricultural education literature (Figland et al., 2019; Layfield & Dobbins, 2002; Washburn et al., 2001).

However, data from this study provided new insights into ways that work-life balance and personal struggles may manifest in the various career stages of secondary agricultural educators. Further, our findings also illuminated how career experience may uniquely frame the ways in which secondary agricultural education teachers interpret and react to various contextual forces – such as resources, support, expectations, and changing student profiles – and as a result require additional support in understanding how to navigate such changes. Finally, key differences regarding process needs (Dunkin & Biddle, 1974) speak to the need for differentiated professional development in each programmatic dimension of agricultural education's comprehensive three-circle model: (a) classroom and laboratory, (b) FFA, and (c) SAE, a finding supported by previous literature (Easterly & Myers, 2019; Figland et al., 2019). Table 1 provides an overview of the cross-case comparison of the study's themes and axial codes.

Table 1

Cross-Case Comparison of Professional Development Needs by Themes and Axial Codes

Themes and Axial Codes	Early Career Teachers	Mid-Career Teachers	Career Teachers
Presage Variables			
Content knowledge	✔	✖	✖
Expectations for alternatively certified teachers	✔	✖	✖
Personal struggles	✖	✔	✔
Work-life balance	✔	✔	✖
Contextual Variables			
Advocating for agricultural education	✖	✔	✔
Building a culture for agricultural education	✔	✖	✖
Community and administration expectations	✔	✖	✖
Facility restoration and management	✔	✔	✖
Grants and financial support	✖	✔	✔
Industry-based Credentials	✔	✔	✔
Networking	✔	✖	✔
Teaching diverse students	✔	✔	✔
Process Variables			
Behavior management	✔	✖	✖
Facilitating SAEs	✔	✔	✔

Themes and Axial Codes	Early Career Teachers	Mid-Career Teachers	Career Teachers
FFA competitions and applications	✔	✔	✖
Pedagogy	✔	✔	✖
Student motivation	✔	✔	✔
Technology	✖	✔	✔

Note. Not present = ✖; Present = ✔.

Recommendations, Implications, and Discussion

In this investigation, we provided an amplified view of the professional development needs of secondary agricultural education teachers in Louisiana across career stages. As a consequence, our findings appear to illuminate new implications for future research, theory, and practice. We recommend, therefore, that the results from this study be shared with Louisiana Agriculture Teachers' Association. By providing insight into teachers' discourse, perhaps professional development opportunities can be tailored to target their needs better as they transition into various phases of their career (Easterly & Myers, 2019; Figland et al., 2019). And, because teachers were provided opportunities to voice their concerns if state leaders respond by delivering their desired programming needs, perhaps greater teacher buy-in can be achieved (Fessler & Christensen, 1992; Knowles, 1980). In agricultural education, Greiman (2010) described professional development as a *one size fits all* approach. In accord, the findings of this investigation illuminated some areas of commonality in regard to secondary agricultural education teachers' professional development needs. For instance, professional development on industry-based credentials, teaching diverse students, SAEs, and student motivation strategies would be appropriate programming for secondary agriculture education teachers in all career phases in Louisiana. We recommend that such professional development sessions be featured at the annual meeting of the Louisiana Agriculture Teachers' Association in the future.

However, our findings also provided evidence that the *one size fits all* approach (Greiman, 2010) will not work in all areas of professional development. For instance, *Early Career Teachers* warrant additional support in content knowledge, understanding expectations for alternatively certified teachers, building a culture for agricultural education, meeting community and administration expectations, pedagogy, behavior management, among others factors. Therefore, we recommend that an *Early Career Teacher* induction series be created in Louisiana by which novice teachers engage in regular professional development to better support their growth and development. Meanwhile, *Mid-Career Teachers* and *Career Teachers* voiced they would prefer additional support regarding how-to navigate personal issues and work-life balance as well as contextual influences and technology (Layfield & Dobbins, 2002; Washburn et al., 2001). To accomplish this, perhaps state leaders could embed opportunities to address these topics during statewide events such as Louisiana FFA Convention or FFA Leadership Camp.

Although we recognize that the professional development needs of secondary agricultural education teacher vary from state to state, this study's findings point to additional areas for future research. As an illustration, the emergence of the need for advocacy training, teaching diverse students, and support in grant seeking could serve a basis for professional development

exploration for *Mid-Career* and *Career Teachers* in other regions of the United States. Further, although previous research has reported that differences exist between traditional and alternatively certified teachers (Roberts & Dyer, 2004; Swafford & Friedel, 2010), our findings provided voice to how such differences may stimulate unique frustrations and result in alternatively certified teachers leaving the profession more frequently than their traditionally certified peers. And finally, because Dunkin's and Biddle's (1974) model for teaching and learning served as a productive lens in this study, we recommend that future theory-building efforts be dedicated to distilling the dimensions of professional development needs for secondary agricultural education teachers across the U.S. regarding the factors – presage, context, and process – that most profoundly influence student success in secondary agricultural education.

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Millennial and Generation Z Consumers' Perceptions and Attitudes of Clean Label Foods

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Abstract

As consumers have become increasingly concerned about the ingredients and processes used in food manufacturing, they have started to demand foods that are free from artificial ingredients, natural, organic, and non-GMO. Thus, the clean label trend emerged. This study examined Millennial and Generation Z consumers' perceptions and attitudes toward clean label food items. Four variations of a clean label were designed to emphasize visual and textual elements of a label, and placed on two researcher-developed products. Results from this study demonstrate a lack of awareness surrounding the clean label trend, even as participants shared a desire to consume foods that fit the clean label description. Participants indicated higher perceptions and more favorable attitudes toward labels with the descriptive textual elements. The results of this study can be applied toward the evolution of the clean label trend, as well as provide an avenue for food labeling research. Overall, the findings of this study contribute to ongoing research to develop a definition for clean label foods, as well as determine how consumers perceive and interact with these labels.

Introduction and Literature Review

A trip to the grocery store can often be an overwhelming and confusing experience, as multiple label claims adorn food packages, attempting to persuade consumers to purchase products (Bond, Thilmany, & Bond, 2008). Label claims have risen in popularity as consumers have become increasingly concerned with the transparency and ingredients in their food (Asioli et al., 2017; The Nielsen Company, 2017). Nearly 43% of new products appearing on the market carry at least one health- or nutrition-related claim (Kuchler et al., 2017), while 39% of U.S. consumers are willing to switch brands based on better ingredient transparency (The Nielsen Company, 2017). As consumers search for products with certain attributes, the labels must include adequate information for the claims to be verified without additional research (Kuchler et al., 2017). Many do not feel they are getting the full story from food labels, as 44% of consumers do not trust processed foods and the ingredients they contain (The Nielsen Company, 2017). Without sincere labeling tactics, consumers have a diminishing desire to trust the information meant to influence purchasing.

Ingredient concern tops the list for many consumers as 75% assess ingredient statements when making purchasing decisions (Label Insight, 2017). In addition, 75% of consumers avoid specific ingredients such as high fructose corn syrup, artificial sweeteners, preservatives, colors, flavors, (Label Insight, 2017). Many consumers are shifting their shopping focus to look for specific product attributes, rather than concentrating on the overall nutrition of the product (The Nielsen Company, 2017). They are generally more concerned with products excluding certain ingredients, rather than including beneficial ingredients. For example, consumers tend to favor beverages that are free from artificial sugars, rather than beverages that include extra

antioxidants (The Nielsen Company, 2017). With greater pressure for ingredient transparency, manufacturers have developed new food labels in an effort to alleviate consumer concerns.

Rise of the Clean Label

One front-of-package (FOP) label that has increasingly made its way onto many grocery store shelves is termed the "clean label" (Aschemann-Witzel, Varela, & Peschel, 2019). Items within the category are typically organic, natural, and "free from" any artificial ingredients; however, a mutually agreed-upon and straightforward definition of clean label food items does not exist (Aschemann-Witzel et al., 2019; Asioli et al., 2017). Research has revealed the clean label marketing appeal acts as a powerful enticement for consumer purchasing habits, although 45% of consumers have no understanding of what the label means (Gelski, 2016). The International Food Information Council (2019) found clean eating to be the most reported diet by consumers in 2019. Those who seek out clean label foods are generally motivated by health, wellness, sustainability, or production concerns (Schmitz-Hubsch, 2018). As these concerns become more prevalent, the clean label trend shows no signs of slowing or stopping.

With consumer demand for clean label food items increasing, many companies are adapting products to fit the new marketing term (Lefferts et al., 2017). Most clean label products are not new to the market—they are reformulations of existing products with the unwanted ingredients removed (Aschemann-Witzel et al., 2019). This can be seen with the introduction of Hersey's "Simply 5" chocolate syrup (The Hershey Company, n.d.) or Panera Bread's promise to only serve food deemed "100% clean" (Panera Bread, 2019). Marketers can follow the clean label trend by creating new and reformulated products, although there is little accountability for companies to stick to a set standard or definition. There is minimal government influence in the meaning and regulation of clean label items, in addition to limited research on consumer perceptions of clean label (Cheung et al., 2016). By exploring consumer interaction with clean label products, future use of the label can be modified to better fit the needs of grocery shoppers.

Even with little understanding of the clean label concept, consumers are still demanding the product attributes encompassed by the clean label. For example, previous research has found consumers prefer to avoid artificial ingredients and heavily processed foods (Katz & Williams, 2011). Hughner, McDonagh, Prothero, Schultz, and Stanton (2007) found preference for organic foods to be increasing due to media influence about the potential health and environment impacts of consuming conventional products. Similarly, natural food consumption has expanded as the term becomes increasingly synonymous with healthy eating and somewhat comparable to early human diets (Moscato & Machin, 2018). With the popularity of these attributes on the rise, most findings point toward a future of clean products across categories, as consumers are becoming increasingly concerned about the ingredients in their food (Label Insight, 2016, 2017; The Nielsen Company, 2017). The clean label trend is viewed as more than just removing unwanted ingredients from a product—it comes with the promise that companies are being transparent in their marketing to ensure consumers are getting the full story from the items they purchase (Schmitz-Hubsch, 2018).

Millennial and Generation Z Food Consumption Trends

Trends in food labeling have proven to be a significant factor in how food products are marketed as companies must shift their focus to fit the consumer desire. Younger generations have taken a

strong interest in the purchasing and consumption of their food. The Millennial generation is the driving factor behind many of the food trends dominating the market today, as they are increasingly interested in how their food is produced—focusing on ingredient transparency, sourcing, and specialty products (Hoffman, 2012; Mushkin et al., 2012; Rosenbloom, 2018). They are willing to pay a higher price to consume a product with specific attributes, whether that includes organic, natural, or from a specific brand (Hoffman, 2012; Mushkin et al., 2012). For Millennials, leading a healthy lifestyle is key "because ultimately it's about one health for all—a healthy animal, a healthy person as well as a healthy environment" (Armstrong, 2017, as cited in Gerdes, 2017, p. 22).

Following behind Millennials, Generation Z is predicted to uphold and expand the same desire for healthy foods containing specific product attributes (The NPD Group, 2018). This generation is starting to reach the age where they are responsible for their own food choices and they are purchasing products that are fresh, transparent, and align to their image of health (The NPD Group, 2018). This generation has grown up with health in mind, as they follow the healthy ways of their Generation X parents (Shoup, 2018). To maintain a healthy lifestyle, Generation Z consumers are devoted to clean eating, specifying that it enhances their quality of life (The NPD Group, 2018). Being the most diverse generation yet, they are also more open than previous generations to international foods (Mintel Press Team, 2018). As Generation Z matures, their focus on clean eating and a healthier lifestyle will continue to shape the food production industry and encourage an increased need for products that fulfill these needs.

Conceptual Framework

Asioli et al. (2017) proposed FOP clean label claims are more likely to be processed peripherally as consumers are using text and visual cues to process the meaning of the claim. Therefore, this study used Heuristic Systematic Processing Model (HSM) as a foundation for how consumers understand information found in label claims on the front of packaging. In a heuristic view of persuasion, individuals rely on easily accessible information to make a decision, while in the systematic view, a greater level of cognitive processing is used (Chaiken, 1980). Low levels of issue involvement result in heuristic processing, while high levels of issue involvement elicit systematic processing (Chaiken, 1980). Factors such as perceived consequences, communicator likability, topic and position advocated, and number of arguments directly influence an individual's decision to accept a persuasive message when processing through the heuristic view (Chaiken, 1980).

Individuals can only process information heuristically if they have heuristics available in their memory (Chen & Chaiken, 1999). Those who frequently use heuristic processing may begin to rely on it as a means for judgements, which can lower their perception of the need to systematically process information (Chen & Chaiken, 1999). Individuals may also rely on schemas or decision rules, which lead to an automatic use of heuristic processing (Chaiken, 1987). In the case of food labels, individuals assume the FOP claim information on a package is correct, leading to the use of heuristic processing instead of thinking more systematically about a product's attributes by reading the nutrition panel and ingredient statement (Walters & Long, 2012). Ultimately, this leads to the use of food labels as heuristic cues—elements of a package that provide a "shortcut" toward information processing because there is less need for complicated cognitive processing (Hoek, Roling, & Holdsworth, 2013; Walters & Long, 2012).

Including both visual and textual elements in a label design allows for a more precise measurement of how consumers' utilize both heuristic and systematic processing strategies, especially in an environment with many choices, such as the grocery store (Townsend & Kahn, 2014).

Purpose and Research Questions

With no standard definition or government regulation, companies are free to develop their own meaning for the clean label claim, which may not align with consumer understanding of clean label products. To effectively convey the attributes of clean label foods, agricultural communicators and food marketing professionals will need to remain informed of the current consumer understanding of clean label food items. As such, the purpose of this study was to measure perceptions and attitudes surrounding clean label food items. Four research questions guided this study:

> **RQ_1:** What were participants' pre-existing attitudes regarding food consumption and packaging?
> **RQ_2:** What were participants' attitudes regarding clean labeled products?
> **RQ_3:** How did participants' perceptions of the clean label design vary between label design and product type?
> **RQ_4:** What are the participants' perceptions and attitudes regarding the use of clean labels?

Method

This study was accomplished through a quantitative, experimental design that examined the effects of label format and statements—which encompass the meaning of clean labels as they are displayed on food packaging—and explored how consumers perceive the clean label in regard to their food purchasing decisions. This experiment followed a 2 (visual: yes vs. no) x 2 (textual: yes vs. no) x 2 (product type: chips vs. granola bar) within- and between-subjects factorial design with a control. Visual label design and textual statements were selected as independent variables because previous research has shown the design and appearance of a label to contribute to information processing, and ultimately, purchase decisions (Wansink, Sonka, & Hasler, 2004). Visual elements of a label are more likely to be processed heuristically, while textual elements correspond with a systematic method of processing (Silayoi & Speece, 2004). Delivering information in a manner that fits with each consumers' processing style impacts their desire to purchase a product (Silayoi & Speece, 2004). Product type was selected as an additional independent variable because messaging effectiveness has been shown to vary between products (Jeong & Lundy, 2015). Chips and a granola bar were chosen as the two product types to determine if a difference existed between the perception of the label among products that elicit distinct biases from the consumer. Product type served as the within-subjects variable, while the between-subjects variables were visual label design and textual statements.

As this study was part of a larger study, the experiment included a pre-test questionnaire, followed by exposure to eye-tracking stimuli and a post-test questionnaire. Participants saw both of the product packages with one of the label types, depending on their randomly-assigned treatment group. The label types were: 1) visual only, 2) visual and textual, 3) textual only, or 4) a control with no label claim information. Participants' perceptions and attitudes were assessed through the pre- and post-test questionnaires. Measuring participant responses immediately following their interaction with the stimuli helped to understand how exposure to the stimuli

affected their understanding, perceptions, and attitudes toward clean label food items. Specific questions about clean labels were asked in the post-test survey in order to minimize any priming effect.

To measure perceptions and attitudes of the label presented on packaging, participants were asked a series of Likert-type questions (1 = *Strongly disagree* to 5 = *Strongly agree*). The first group of questions addressed the credibility, design, and informational aspect of the label they were assigned to view. An additional group of statements about the clean label separated into two constructs—clean label practices and clean label risk perceptions. Questions about clean label practices asked whether clean label products are safer, healthier, and more nutritious compared to traditional products. Clean label risk perception questions asked participants to provide their perceptions of artificial ingredients and whether they present a risk for developing health issues, serious diseases, or food allergies.

Participants

The population for this study was Millennial and Generation Z consumers between the ages of 18-38. This population was selected due to the current rise in these generations' interest in food ingredient transparency (Rosenbloom, 2018). For the purpose of this study, the Millennial age range was defined as individuals born from 1981 to 1996, while Generation Z was considered as anyone born from 1997 to 2012 (Dimock, 2019). The Millennial generation considers the source of their food more than previous generations, and their definition of healthy food likely includes natural, organic, locally sourced, or sustainable (Hoffman, 2012; Rosenbloom, 2018; The Nielsen Company, 2017). As Generation Z begins to reach the age of making their own food purchasing decisions, they are focused on clean eating, as they believe it is a factor in improved quality of life and aligns with their image of health (The NPD Group, 2018). Current college students fall into these two generations, carefully considering the extrinsic qualities of their foods, which may lead to concern about their food following clean label guidelines.

A total of 120 participants were recruited from multiple colleges within Texas Tech University. Participants were recruited through the university announcement service and awarded a $20 cash incentive for their participation. Three participants were removed from the overall sample due to not meeting the age requirement, resulting in a final sample of 117. Females accounted for the majority of participants at 70.1% (n = 82), with many falling in the 18-22 age range (52.1 %, n = 61). A majority of participants indicated they follow an omnivore diet (76.9%, n = 90). Eighty-six percent (n = 101) of participants specified they were the primary grocery shopper in their household, while 44.4% (n = 52) of participants visited the grocery store once a week. When making their purchase decisions, 43% (n = 40) indicated they often utilize FOP labels, while 32.5% (n = 38) sometimes utilized FOP labels.

Procedure

In individual sessions, participants were asked to sit at a computer and directed to complete the pre-test questionnaire, which assessed their food purchasing habits, level of issue involvement, pre-existing attitudes, and demographic information. After completing this, participants were instructed to sit in front of a monitor where they viewed the 10 product package stimuli while their eye movements were being tracked. Participants were randomly assigned a treatment group, which determined the set of 10 images they viewed. Each set of images contained the same eight

foil images with the only changes being the label condition included on images of the potato chips and granola bar. Foil images of other food packages were randomized between the stimuli to ensure participants were not focusing directly on the label when viewing each package. Participants were instructed to take their time when viewing the images. Following completion of the eye tracking element, participants completed a post-test questionnaire to measure their perceptions and attitudes toward the images they viewed.

Data Collection and Analysis

Once collected, data from the questionnaires were exported from Qualtrics into IBM SPSS v.25 for analysis. Descriptive statistics, including frequencies and percentages, were used to analyze the demographic survey responses. One-way ANOVA tests were conducted to measure the effect of the clean labels on consumer perceptions of the tested packaging. As part of the ANOVA analysis, group means and standard deviations were calculated. A paired samples *t*-test was calculated to determine if any differences exist between perceptions of the two product types.

Results

Research Question 1

RQ_1 aimed to describe participants' pre-existing attitudes regarding food consumption and packaging. Participants were asked several questions about their food consumption attitudes, packaging elements, whether they use label claims, and factors that contribute to their overall purchase decisions. Participants were asked to rate their concern regarding ingredients when selecting foods for consumption, using a 5-point Likert-type scale (1 = *very concerned*, 5 = *don't know*). Overall, a majority of participants indicated they were either fairly concerned (n = 68, 58.1%), or not very concerned (n = 37, 31.6%) about the ingredients in their food.

In regard to what is important when making food choices, participants most strongly agreed they select foods that are free from pesticides, chemicals, and toxins (M = 3.99, SD = 1.01) and minimally processed (M = 3.91, SD = .788), while natural foods (M = 3.78, SD = .732), foods that are free from artificial ingredients (M = 3.40, SD = .992), and local foods (M = 3.32, SD = .891) resulted in lower agreement from participants. Foods that were non-GMO (M = 2.96, SD = 1.07) and organic (M = 2.91, SD = .851) had the lowest means, indicating participants were less likely to seek out foods with these characteristics. When making food consumption decisions, participants most strongly agreed they look for a simple/short ingredient list (M = 4.03, SD = .77). This was followed by food origin (M = 3.90, SD = .81), transparent packaging (M = 3.61, SD = .93), sustainability messages (M = 3.59, SD = .88), and food company branding (M = 3.53, SD = .93).

Research Question 2

As RQ_2 aimed to understand attitudes regarding clean label foods in general, a one-way ANOVA was conducted to analyze any difference in attitudes that might have existed between the four label conditions. The alpha level for each ANOVA was set *a priori* at .05. The ANOVA showed significant differences among the attitudes toward clean labels between the four conditions ($F_{3, 113} = 14.15$, $p < .001$, $\eta^2 = .273$). The group means showed participants who viewed the textual only condition reported the highest consideration for the safety, healthiness, and nutrition of the clean label products (M = 3.47, SD = .441), while those who viewed the visual and textual label had similar opinions (M = 3.43, SD = .591) (Table 1). A Bonferroni comparison showed a

significant difference between the package without a label (control) and visual only ($p = .009$), visual and textual ($p < .001$), and textual only ($p < .001$).

Table 1
Group Means of Attitudes Between Label Conditions (N = 117)

Label Condition	*M*	*SD*
Visual Only	3.16	.372
Visual and Textual	3.43	.591
Textual Only	3.47	.441
No Label	2.77	.384

Research Question 3

RQ_3 sought to understand participants' perceptions of the clean label between label types and product type. Reliability for the 4-item scale was established as $a = .856$. A paired samples *t*-test was run to determine if differences existed in the perceptions of the label between product types. The *t*-test showed a statistically significant difference in perceptions of clean labels between the two products ($t_{116} = -4.73$, $p < .001$). The mean perceptions score for the granola bar was 2.87, compared to chips with a mean perception score of 2.64.

As the *t*-test found a statistically significant difference between the two products, individual one-way ANOVAs were run for each product. Overall, group means for the granola bar were higher among all four label conditions (Table 2). For chips, the highest mean came from participants who viewed the label with textual only ($M = 2.96$, $SD = .816$), while those who viewed the label with visual and textual elements had the highest mean for the granola bar ($M = 3.35$, $SD = .877$).

Table 2
Group Means of Perceptions Between Product Type (N = 117)

	Chips		Granola Bar	
Label Condition	*M*	*SD*	*M*	*SD*
Visual Only	2.44	.558	2.71	.594
Visual and Textual	2.89	.850	3.35	.877
Textual Only	2.96	.816	3.11	.759
No Label	2.21	.556	2.27	.713

The one-way ANOVA for the chips found a statistically significant difference between the four label conditions ($F_{3, 113} = 7.38$, $p < .001$, $\eta^2 = .164$). A Bonferroni comparison showed significance between visual only and textual only labels ($p = .035$). In addition, significance existed between the control and the visual and textual ($p = .003$) and textual only labels ($p = .001$). The one-way ANOVA for the granola bar also found a statistically significant difference between the four label conditions ($F_{3, 113} = 11.75$, $p < .001$, $\eta^2 = .238$). A Bonferroni comparison showed statistical significance between the visual only and the visual and textual labels ($p = .007$). In addition, the control had statistical significance with the visual and textual ($p < .001$) and the textual only labels ($p < .001$).

Research Question 4

RQ_4 sought to understand participants' perceptions and attitudes regarding the use of clean labels. Reliability for the clean label practices scale was established as $a = .795$ and the grand

mean was 3.30. Reliability for the clean label risk perception scale was established as $a = .745$ and the grand mean for this construct was 3.51. A one-way ANOVA was calculated for each construct to compare the differences in responses between the four label conditions.

A one-way ANOVA showed no significant differences between clean label perceptions among the four label conditions ($F_{3, 113} = .851$, $p = .469$, $\eta^2 = .022$), meaning the label type had no effect on participants' perceptions of clean label practices. Group means for perceptions of clean label practices revealed equal perceptions for participants who viewed the label with visual and textual elements ($M = 3.40$, $SD = .708$) and those who viewed the packages without a label ($M = 3.40$, $SD = .818$) (Table 3). Participants who viewed textual only ($M = 3.30$, $SD = .845$) and visual only labels ($M = 3.11$, $SD = .788$) had similar perceptions of clean label practices.

Table 3
Group Means of Clean Label Practices Perceptions Between Label Conditions (N = 117)

Label Condition	*M*	*SD*
Visual Only	3.11	.788
Visual and Textual	3.40	.708
Textual Only	3.30	.845
No Label	3.40	.818

A one-way ANOVA showed no statistically significant differences between risk perceptions among the four different label conditions ($F_{3, 113} = 1.179$, $p = .321$, $\eta^2 = .030$), resulting in the label type having no effect on risk perceptions held by participants. Group means were also calculated for the clean label risk perceptions (Table 4). Participants who viewed the visual only label had the highest risk perception ($M = 3.69$, $SD = .604$), while the visual and textual label ($M = 3.52$, $SD = .746$), control with no label ($M = 3.50$, $SD = .809$), and textual only ($M = 3.33$, $SD = .743$) followed closely behind.

Table 4
Group Means of Clean Label Risk Perceptions Between Label Conditions (N = 117)

Label Condition	*M*	*SD*
Visual Only	3.69	.604
Visual and Textual	3.52	.746
Textual Only	3.33	.743
No Label	3.50	.809

In addition, participants were asked to provide their attitudes regarding the use of this clean label for current and future food packages. A one-way ANOVA showed no significant differences between the four label conditions and participants' attitudes toward making this label mandatory ($F_{3, 113} = 2.28$, $p = .083$, $\eta^2 = .057$), implying the label condition had no effect on the implementation of a mandatory label for clean products. Group means showed those who viewed the clean label with visual and textual elements reported the highest attitudes toward use of the clean label ($M = 3.63$, $SD = 1.10$), while those who viewed the control without a label had the lowest attitudes toward use of the clean label ($M = 2.89$, $SD = 1.67$) (Table 5).

Table 5

Group Means of Clean Labeling Use and Policies Between Label Conditions (N = 117)

	Labeling Use and Policies		No Artificial Ingredients		Contains Artificial Ingredients	
Label Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*
Visual Only	3.21	1.15	3.55	1.18	2.72	1.16
Visual and Textual	3.63	1.10	4.00	0.83	3.00	1.17
Textual Only	3.33	0.96	3.50	1.11	2.63	1.06
No Label	2.89	1.67	2.71	1.08	2.64	1.03

Note: 1 = *Strongly disagree*, 5 = *Strongly agree*

An additional ANOVA was conducted to determine whether differences existed between the four label conditions and the use of this label for products that do not naturally contain artificial ingredients. This one-way ANOVA revealed a significant difference between the four label conditions ($F_{3, 113} = 7.33$, $p < .001$, $\eta^2 = .163$), indicating the participants' attitudes toward using the label on products that do not naturally contain artificial ingredients was influenced by the label condition. A Bonferroni comparison revealed significance between the control without a label and the visual only ($p = .033$), visual and textual ($p = .021$), and textual only labels ($p < .001$). Table 5 shows those who viewed the visual and textual label had the highest agreement toward using the clean label for products that do not natural contain artificial ingredients ($M = 4.00$, $SD = .083$), while the visual only ($M = 3.55$, $SD = 1.18$) and textual only labels ($M = 3.50$, $SD = 1.11$) resulted in similar agreement.

Finally, a one-way ANOVA was conducted to determine whether differences existed between the four label conditions and attitudes toward using the label only for products that might otherwise contain artificial ingredients. This ANOVA revealed no significant differences between the four label conditions ($F_{3, 113} = .710$, $p = .548$, $\eta^2 = .019$), implying the label condition had no effect on the use of the clean label only for products that might otherwise contain artificial ingredients. Participants who viewed the visual and textual label had the highest agreement toward the use of clean labels for products that do not natural contain artificial ingredients ($M = 3.00$, $SD = 1.17$). Those who viewed the visual only label ($M = 2.72$, $SD = 1.16$), control without a label ($M = 2.64$, $SD = 1.03$), and textual only label ($M = 2.63$, $SD = 1.06$) had similar agreement.

Conclusions, Implications, and Recommendations

As clean label products gain increased market share across grocery categories, this study established the need for a thorough understanding of how consumers perceive and interact with these products. Limited research has been conducted on consumer perceptions of the clean label, which is complicated by the lack of a standard and mutually agreed-upon definition for the claim. Food labels are an important heuristic cue for consumers to make quick purchase decisions at the grocery store, thus, determining how consumers perceive and interact with the clean label provides insight into the current status and future of the trend.

As this study sought to understand consumers' perceptions and attitudes toward clean label food products, their pre-existing attitudes toward food labeling and food consumption provided an important foundation for further results. Participants indicated a desire to consume foods that were free from pesticides, chemicals, and toxins, as well as categorized as minimally processed,

natural, and free from artificial ingredients. These characteristics comprise nearly all of the terms associated with clean label foods, as previous research has indicated (Asioli et al., 2017; The Nielsen Company, 2017). Although participants sought foods with those characteristics, they provided the lowest support for foods that were organic and non-GMO, suggesting these attributes may not be as important for companies to focus on when developing clean label products. A majority of participants indicated they were either fairly concerned or very concerned with the ingredients in their foods, providing support for previous research that argued food label claims are rising along with a trend toward higher ingredient concern (Asioli et al., 2017; The Nielsen Company, 2017). Previous research indicated that both generations surveyed were becoming increasingly concerned with the ingredients in their foods, as Millennials sought foods that were natural, organic, locally sourced, and sustainable (Rosenbloom, 2018), while Generation Z consumers aligned their image of health with clean eating (The NPD Group, 2018). This study found a diverse amount of ingredient concern among consumers in these generations, and suggest this group of Millennial and Generation Z consumers are not as attuned to the desire to seek clean foods based on ingredients, which could be influenced by the geographic location where the study was conducted.

Participants provided strong support for several packaging elements as part of their purchase decision process. They indicated they look for packages that include a simple/short ingredient list, food origin, transparent packaging, as well as sustainability messages and food company branding. Each of these package elements had strong support from participants, suggesting companies should carefully consider how each is incorporated into a clean label package design. As the clean label manifests itself in front-of-package (FOP) label claims, these claims represent a crucial packaging element for consumers to attend to when making purchase decisions (Asioli et al., 2017). Label claims were found to be most influential when participants had time to read them while grocery shopping, indicating that label claims help promote food purchase decisions and that participants generally understand the meaning of claims. These findings provide support for the use of label claims as heuristics, as well as validate the use of label claims for marketing clean label products (Hoek et al., 2013).

Following exposure to the stimuli, participants answered several questions to evaluate their attitudes toward the products. Findings showed a significant difference in attitudes toward clean labels between the four label conditions, indicating participant attitudes shifted depending on the label type they viewed. The descriptive analysis showed participants who viewed the label conditions 1-3, which included the visual and/or textual elements, held fairly similar attitudes regarding the health, safety, and nutrition of clean label foods, while those who viewed the control had the lowest attitudes. These findings suggest the information included with the clean label influences consumers as they form attitudes about products with these labels. Descriptive statements included alongside the label provide context for the consumer to form heuristic cues about clean label foods, leading to a greater understanding of the trend and requiring less processing in order to make a purchase decision (Verbeke, 2008; Zuckerman & Chaiken, 1998).

This study also sought to understand participants' perceptions of clean label products and determine whether label type and/or product type had any influence on perceptions. Participants who viewed the textual only label had the highest mean perception for chips, while those who viewed the visual and textual label had the highest mean perceptions for the granola bar. As 45%

of consumers have little understanding of the meaning of clean labels, including descriptive statements becomes imperative for cultivating further understanding of the trend (Gelski, 2016; Teisl & Levy, 1997). Both of these conditions included the statements, indicating the inclusion of explanatory statements resulted in more positive perceptions of the clean labels. The mean perception score for the granola bar was higher than the chips, signifying participants held more positive perceptions for the clean label when it was featured on the granola bar compared to when it was featured on the chips. This could be attributed to participants believing the granola bar is fundamentally healthier than the chips, due to pre-existing perceptions and overt marketing of granola bars as nutritious snacks. Ultimately, this could signal the clean label is more apt to be featured on products that previously possess a "healthy" connotation.

As clean labels make their way onto various consumer food products, many companies are adapting and reformulating their products to meet the clean label criteria (Aschemann-Witzel et al., 2019). The marketing tactics used to promote clean labels must satiate a range of consumer preferences, as the formation of their quality perception ultimately leads to a purchase decision (Jacoby, Olson, & Haddock, 1971; Olson & Jacoby, 1972). This study sought to understand perceptions and attitudes associated with clean label practices, including labeling tactics and risk perceptions. No significant differences were found for clean label practices between the four label conditions. Even with this finding, the group mean for each label condition indicated participants had positive perceptions toward the use of the clean label in regard to the product being more nutritious, healthier, and safer when compared to conventional products. No significant difference between risk perception was found, signifying the label type had no influence on participants' risk perceptions. Similar to perceptions of clean label practices, the group means for each label condition were above the scale's midpoint for risk perceptions. Essentially, participants agreed that artificial ingredients can pose health risks and may increase the likelihood of developing food allergies and/or serious diseases.

In order to further understand how consumers would like to see clean labels implemented on current and future packaging, participants were asked to provide their attitudes toward making the label mandatory. No significant difference was found between the four label conditions, indicating no label condition was particularly influential to participants' desire for a mandatory clean label. To measure attitudes regarding the use of the clean label for products that do not naturally contain artificial ingredients, participants in each of the label conditions were asked to indicate their agreement with several questions. A statistically significant difference in attitude was found between the four label conditions, indicating the label type influenced participants' attitudes regarding the use of the clean label for products that do not naturally contain artificial ingredients. Similarly, participants were asked to indicate their attitudes toward the use of the clean label only for products that might otherwise contain artificial ingredients. No significant differences were found between the four label conditions in this analysis. Comparing these findings previous finding, these results show participants who viewed one of the visual and/or textual labels were not influenced toward limiting the use of clean labels for products that would normally contain artificial ingredients; whereas, they supported the use of the label for products that do not normally contain artificial ingredients. This signals the clean label is suited for use with products that are already free from artificial ingredients, colors, and preservatives.

Overall, this study demonstrates the lack of understanding Millennial and Generation Z consumers have of the clean label trend, even as the trend is being driven by members of their generation. Including descriptive textual elements with the label allowed participants to gain a better understanding of the meaning and increased their perceptions and attitudes of the clean label products. While including these textual elements strengthened participants' views in some aspects, it had no effect on perceptions toward labeling tactics and risk perceptions. This finding suggests all participants felt clean labels are accurately describing the attributes associated with clean label products, without contributing to misinformation surrounding food labeling as Nielsen (2017) and Schmitz-Hubsch (2018) previously found.

Because this study sought to understand how consumers interact with clean labels, it provides several areas where food production companies can strengthen their marketing of clean label products. It is clear that consumers prefer a label that includes descriptive statements, which also led to more positive perceptions. Including these statements on the label will also add to creating a standard definition because the meaning of the claim would then be immediately associated with the term "clean label." This study showed participants were more interested in purchasing foods that were free from artificial ingredients and natural, indicating practitioners should focus on these attributes as they develop clean labels. Overall, participants in this study did not seek out organic and non-GMO product; therefore, these claims could likely be treated as separate product attributes instead of being included within the definition of the clean label.

Ultimately, a mutually agreed-upon and regulated definition would provide the most stability for the future of the clean label trend. Without a standard definition, companies may group attributes together that may not necessarily fit the understood meaning of a clean label. Companies that produce clean label foods should push for a government definition of the claim, with the intention of keeping the trend from steering in alternate directions. A standard definition would allow consumers to be more confident in their clean label purchases as they would be able to ensure the attributes of the product align with their consumption preferences. It would also prevent certain companies from pandering to consumers who are concerned with pesticides, chemicals, and other toxins in their foods. While it may seem like a substantial goal to create a regulated definition for clean label foods, it would provide a much needed constant for consumers who face an onslaught of FOP label claims that must be deciphered when making purchase decisions. As regulation of FOP labels is a goal of the FDA in the near future (Hamburg, 2010), the creation of a definition for clean labels closely aligns with their plans.

While this study focused on perceptions and attitudes toward the clean label within the Millennial and Generation Z age range, incorporating a nationally representative sample would provide a look at how the clean label trend is accepted across generations. Although younger generations are driving the trend, it does not rule out the desire for older generations to consume clean label foods. A key theme woven throughout this study is the need for regulation of FOP label claims, including the clean label. As indicated by previous research, consumers are more likely to trust labels that government agencies support (Golan, Kuchler, Mitchell, Greene, & Jessup, 2001). Conducting a similar study with an emphasis on the label being regulated may provide a better insight into consumer trust of the label. Similarly, if the FDA or USDA do begin to regulate the clean label, this study should be conducted again to assess how opinions change when government regulatory oversight is involved.

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Interpreting the Influence of Heuristic and Systematic Cues on Visual Attention to Food Label Claims

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Abstract

An increase in consumer concern surrounding food ingredients has triggered a rise in label claims as an attempt to communicate salient product attributes in order to influence a purchase decision. Previous research has established the use of food label claims as heuristic cues, facilitating quick decisions without the need for complicated cognitive processing. Design of a label claim becomes an important concern as research has indicated distinct design elements promote further processing. This study sought to understand the role of visual and textual elements of a label claim toward dual processing routes through the use of eye-tracking measures. The results indicated label claims that included both visual and textual elements elicited the highest visual attention allocation from consumers, and suggested that label claims are processed systematically in addition to heuristically as previously specified. Future label claims should include both visual and textual elements as way of promoting further cognitive processing among all consumers. The findings from this study provide an avenue for greater understanding of dual processing modes within the context of food label claims and other agriculturally-relevant concepts.

Introduction and Literature Review

Food label claims are included on product packaging as a heuristic cue for consumers, providing valuable information to evoke a purchase decision without requiring much cognitive processing (Asioli et al., 2017). As such, the design of food label impacts visual attention to a label, which can influence the route of information processing a consumer engages in (Orquin & Loose, 2013; Silayoi & Speece, 2004). Measuring visual attention to a food label allows for a greater understanding of how individual product attributes are processed in order to interpret what components lead to a purchase decision (Van Loo, Grebitus, Nayga, Verbeke, & Roosen, 2018; Wansink, Sonka, & Hasler, 2004). Previous research has suggested visual heuristic cues sway consumers toward heuristic processing, while textual cues are associated with systematic processing (Townsend & Kahn, 2014). Thus, this study sought to understand how visual and textual elements of a food label claim influenced consumer visual attention and guided them toward one of the dual processing routes, with the ultimate goal of determining how the label claims relate to a purchasing decision.

Labeling Trends

Consumers are becoming increasingly concerned with the ingredients included in their food, which has provided an opportunity for a multitude of label claims to be featured on virtually every product in the grocery store (Kuchler et al., 2017). Nearly 43% of new foods include at least one health- or nutrition-related claim, while 75% of consumers rely on these label claims to avoid specific ingredients such as high fructose corn syrup, artificial sweeteners, preservatives, colors, flavors, and more (The Nielsen Company, 2017). One specific trend that has developed

out of this widespread desire for ingredient transparency is termed the “clean label.” This label claim asserts foods are free from artificial ingredients, and often simultaneously occurs with organic, natural, and non-GMO claims (Aschemann-Witzel, Varela, & Peschel, 2019). As this trend rapidly gains market share, understanding its influence becomes crucial for communicators as it overlaps with many established agricultural issues and has the possibility to shape future conversations.

As consumers search for specific products, it is crucial that label claims provide adequate information to supply the necessary pieces that constitute a purchase decision for each individual (Kuchler et al., 2017). Providing sufficient, factual information also equips consumers with the tools to engage in attitude formation regarding an unfamiliar label claim, as well as future claims within the same realm that may be encountered (Lähteenmäki, 2013). Ultimately, label claims represent a crucial information source for communicators to elicit consumer attention. Label claims are extrinsic cues—elements of a food product that do not affect the physical product, which includes attributes such as price, branding, and packaging (Szybillo & Jacoby, 1974). The average consumer tends to focus on extrinsic cues when forming their attitudes, due to low issue involvement (Walters & Long, 2012). As such, the visual and textual design elements of a food label become an important consideration as low involvement consumers tend to rely on these claims for a majority of their information (Silayoi & Speece, 2004). A package design that incorporates visual elements caters to low involvement consumers, while high involvement consumers tend to employ the use of textual elements (Silayoi & Speece, 2004). Incorporating both of these elements provides an avenue for low and high involvement consumers to process label claim information, further emphasizing the need for label claim design as an essential consideration in the communication process.

Visual Attention Allocation

Eye movements are routinely directed toward areas that capture an individual’s attention with a desire for further cognitive processing (Duchowski, 2017). As such, measuring visual attention becomes a powerful signal for understanding how media messages are consumed (Wedel & Pieters, 2008). Measures of visual attention are commonly understood to serve as a proxy for cognitive processing, as longer fixations and a greater overall amount of visual attention demonstrate increased processing (Duchowski, 2017). Visual attention commonly manifests in fixations, when the eyes pause over an area to allow for further scrutiny, and which makes up nearly 90% of an individual’s viewing time (Duchowski, 2017). Movements between fixations are referred to as saccades—subconscious movements that shift attention from one area to another (Duchowski, 2017). Together, fixations and saccades form a scanpath, which describes the complete journey of an eye between areas of interest (AOIs). Areas of interest are researcher-determined elements of a stimuli that represent the construct under scrutiny (Duchowski, 2017). Ultimately, the assessment of eye movements through eye-tracking measures provides insight beyond traditional explicit measurement strategies.

In the realm of food label claims, consumers must have a desire to purchase healthy foods, as well as adequate time in order to direct attention toward health-related label claims (Fenko, Nicolaas, & Galetzka, 2018; Hoek, Roling, & Holdsworth, 2013). As such, the design of a label claim presents an additional factor in eliciting visual attention. Simpler designs prompt consumers to divert their attention toward nutritional information, while designs with an

increased amount of front-of-package information require processing before shifting focus to nutritional information (Visschers, Hess, & Siegrist, 2010). Time constraints also have an impact on visual attention as many consumers feel they do not have enough time to fully process label claim information, increasing the need for label claims that are easily processed by all types of consumers (Fenko et al., 2018; Silayoi & Speece, 2004; Tanner, McCarthy, & O'Reilly, 2019). Using eye-tracking to understand the label claim design elements that elicit the most visual attention facilitates further messaging development that will aid consumers in making effortless purchase decisions (Van Loo et al., 2018).

Conceptual Framework

As food label claims are generally understood to be used as heuristic cues, the Heuristic-Systematic Processing Model (HSM) served as the conceptual framework for this study. HSM states that a persuasive message is processed using information an individual already possesses (i.e. heuristically) or through extensive cognitive measures (i.e. systematically) (Chaiken, 1980, 1987; Zuckerman & Chaiken, 1998). Previous research has indicated nutritional labels are processed systematically, while front-of-package food label claims are more likely to be processed heuristically (Verbeke, 2008). This model assumes individuals have a limited capacity to process information, which effectuates the use of heuristic processing as less cognitive effort is required (Gigerenzer & Gaissmaier, 2011; Zuckerman & Chaiken, 1998). Limited capacity for cognition can stem from factors such as a time constraint, scarce knowledge of a subject, or other stimuli that must be simultaneously processed—each of which could arise during any typical grocery shopping trip (Zuckerman & Chaiken, 1998).

An individual's attitude is ultimately determined through their route of information processing and is mediated by three factors: issue involvement, message characteristics, and source characteristics. High issue involvement and thorough processing of message characteristics typically results in systematic processing, while heuristic processing tends to occur in low involvement individuals who maintain a distinct focus on the source of a persuasive message (Chaiken, 1980). High involvement individuals have a greater investment in the outcome of their decision; therefore, they allocate more cognitive resources to determining their attitude concerning a message (Chaiken, 1980). Systematic processors rely on the composition of a message, specifically tonality, directionality, and appeal to risk prospect as they heavily scrutinize each aspect to determine their attitude toward a message (Chaiken, 1980). As food is a basic need with a relatively low price point compared to other goods, many consumers retain a low involvement in their food purchasing decision (Verbeke, 2005). These low involvement consumers avoid complicated cognitive processing of a message, rather focusing on the source of a message and evaluating the credibility of said message (Chaiken, 1980). Consumers' evaluation of a label source as trustworthy plays a big role in the use of heuristic processing as they do not need to allocate significant cognitive resources to determine if the label is providing reliable information (Verbeke, 2008).

With food label claims commonly being processed through the heuristic route, measuring visual attention to these package elements allows a greater understanding of how these attributes are used toward processing and purchase decisions (Van Loo et al., 2018). As the grocery store is a distracting environment, consumers are compelled to make quick decisions under time pressure, further encouraging the use of heuristic processing (Hoek et al., 2013). Visual heuristic cues

have been found to be more influential compared to textual cues as visual cues lend themselves toward expedited decisions, although textual cues can be more powerful when a consumer has no predefined product preference (Townsend & Kahn, 2014). As such, Orquin and Loose (2013) found a relationship between a consumer's visual attention and the choice they make during a decision task. Eye movements are directed to heuristic cues when an individual must reduce their cognitive strain, positing that heuristic elements of a package influence visual attention of an individual and, thus, shape their purchase decisions (Orquin & Loose, 2013).

Purpose and Hypothesis/Research Question

Persuasive food label claims are highly salient for a consumer's purchase decision and inform their route of cognitive processing. Specifically, design features of a label claim influence consumers' visual attention toward a stimuli, which can impact the amount and type of cognitive processing. Creating label claims which draw the consumer's visual attention and easily guide cognitive efforts can provide a strategy for communicators developing new label claims with the purpose of eliciting a purchase decision. To understand the impact of label claim design, the purpose of this study was to determine how consumers' visual attention to food labels was influenced by a combination of visual and textual elements. As such, the following hypothesis and research question were used to guide this study:

> **H_1:** Visual attention allocation will differ significantly based on label design.
>
> **RQ_1:** How much visual attention is directed at the clean label when viewing different food products?

Methodology

This study used a 2 (visual: yes vs. no) x 2 (textual: yes vs. no) x 2 (product type: chips vs. granola bar) within- and between-subjects factorial design with a control to determine the influence of visual and textual elements of a label on visual attention. A factorial design was chosen as it allowed a comparison of the visual and textual elements through multiple label designs (Duchowski, 2017). Visual and textual elements served as the between-subjects variable, while product type was the within-subjects variable. As consumers are becoming increasingly consumed with ingredient transparency of their food and the clean eating trend has made its way into the diet of many Americans, a "clean label" was developed to measure the influence of visual and textual label elements within the context of this widespread trend. The label contained the term "clean label" and statements that emphasized several commonly associated attributes of the trend. Four label conditions were developed to test both the visual and textual elements, as well as the interaction between the two. The four label conditions were: 1) visual only - designed clean label without statements, 2) visual and textual - designed clean label with statements, 3) textual only - statements only, and 4) a control with no label claim information. Eye-tracking was used to measure visual attention allocation to the label claim as visual attention signals elements that require processing, which can determine the power of a persuasive message (Wedel & Pieters, 2008).

Independent Variables

Visual Elements. The visual element of a label claim was selected as an independent variable because previous research has indicated the design of a label claim is highly influential the toward information processing route, as well as purchase decisions (Townsend & Kahn,

2014; Wansink et al., 2004). Visual elements are more likely to be processed heuristically as they require less cognitive effort to fully understand and provide a route for a quick decision (Silayoi & Speece, 2004). To understand the influence of visual elements, a circular, green label claim was designed, which included a plant to emphasize the natural attribute of clean label products. This label claim was prominently displayed on each of the experimental package designs.

Textual Elements. Much like visual elements, textual elements contribute to the route of information processing an individual completes (Wansink et al., 2004). Textual elements of a package are typically processed systematically as they require comprehensive attention to read (Silayoi & Speece, 2004). The included statements were derived from previous research surrounding clean label products: free from artificial preservatives and colors, all natural, organic, and non-GMO. These textual statements were incorporated into the visual logo to understand the influence of both elements, as well as tested as their own element to determine if they were persuasive by themselves.

Product Type. Product type was selected as an independent variable because messaging effectiveness has been found to vary between product types (Jeong & Lundy, 2015). Potato chips and a granola bar were selected as two contrasting products to test the effects of the label claim elements. Specifically, these products were selected due to possessing a higher level of processing and the consumer expectation that they would not normally be associated with clean eating. The label claim was prominently featured on each package, on the upper right corner for the potato chips and in the middle of the granola bar. The product package designs included only minimal information compared with typical products in order to elicit more attention to the label claim being evaluated.

Dependent Variable

Visual attention allocation served as the dependent variable for this study, which was operationalized through total fixation duration (seconds) to an AOI containing the label. Attention is a necessary component of information processing, as an individual must direct visual attention toward a message in order to fully understand its contents and purpose (LaBerge, 1995). As visual attention serves as a proxy for cognitive processing, measuring the amount of time an individual spent viewing the label claim allowed a greater understanding of resources allocated to forming an attitude regarding the claim and its messaging (Duchowski, 2017).

Individual Difference Variables

Age, gender, ingredient concern, and pre-existing packaging attitudes served as individual difference variables to determine if they were influential in affecting visual attention. These four factors were assessed through a pre-test questionnaire, with one Likert-type question determining each individual difference variable.

Validity and Reliability

As it has become more accessible, eye-tracking has become a common method to incorporate into studies focusing on attention (Orquin & Holmqvist, 2017). Lab experiments allow for increased control over each variable, thus increasing internal validity (Duchowski, 2017). To account for any differences between sessions, participants were randomly assigned to each label claim which resulted in a large enough sample to explain effects that may occur from external

factors such as amount of light (Orquin & Holmqvist, 2017). By controlling certain the independent variables of the experiment, the researcher maintained the ability to produce valid results. The reliability of eye-tracking is highly dependent on maintaining consistent measurement among participants. Each participant completed a calibration procedure to ensure the eye-tracking hardware was properly following their point of gaze (Duchowski, 2017). Those who were unable to complete the calibration procedure or produce data which fell below a 70% threshold for weighted gaze sample were removed from the final data sample.

Participants

The population for this study was Millennial and Generation Z consumers who were between the ages of 18-38. This population was selected due to a rise in desire for food ingredient transparency seen within these two generations (Rosenbloom, 2018). Millennials have established their desire for increased information when making food purchase decisions, and they instinctively associate healthy products with attributes such as natural, organic, locally sourced, and sustainable (Hoffman, 2012; Rosenbloom, 2018; The Nielsen Company, 2017). Generation Z consumers have only recently reached a point where they are making their own food purchase decisions and have emerged with a focus on clean eating, which aligns with their definition of health (The NPD Group, 2018). As such, consumers within both of these generations are at a pivotal time in their attitude formation of food products and rely heavily on heuristic cues.

A sample of 117 Millennial and Generation Z consumers from Texas Tech University were recruited through a university-wide announcement system. Participants were awarded a $20 cash incentive for their participation. A total of 30 participants were randomly exposed to each label condition with data collected from a total of 120 participants. After data reduction, 29 participants were exposed to the visual only label condition, 30 were exposed to the visual and textual, 30 were exposed to the textual only, and 28 were exposed to the control, resulting in the final sample of 117. No participants were removed from the sample due to their eye-tracking data as all participants were above the 70% threshold for weighted gaze sample.

The majority of participants were female (70.1%, n = 82) between the ages of 18-22 (52.1%, n = 61). Most of the participants indicated they purchase their food from a grocery store (84.6%, n = 99) and were the primary grocery shopper in their household (86.3%, n = 101), which established these participants as highly involved in making their own food purchase decisions. Even so, these consumers had varying levels of concern over ingredients, with participants indicating they were either very concerned (10.3%, n = 12), fairly concerned (58.1%, n = 68), or not very concerned (31.6%, n = 37), which established the majority of participants as low involvement consumers when considering food ingredients.

Procedure

Those who expressed an interest in participating were sent a screening questionnaire to assess their eligibility for the study. Those who met the age requirement were provided a time slot for their individual session, which was conducted in an eye-tracking laboratory. Although a laboratory setting decreases the ecological validity associated with such an experiment, it allows for increased control in an eye-tracking study, thus strengthening internal validity (Duchowski, 2017). Once participants arrived at the laboratory, they were instructed to sit approximately 24

inches in front of computer screen, which was outfitted with a Tobii X2-60 Eye-tracker unit. The Tobii eye-tracker and its accompanying software recorded gaze data at 60Hz. This hardware allowed for the collection of eye movement data to provide information such as fixation duration, fixation count, and scanpath as participants looked through the product stimulus.

Participants completed a pre-test questionnaire to assess their pre-existing attitudes associated with food consumption, as well as their demographic information. Following completion of the pre-test questionnaire, participants performed a calibration procedure where they were asked to follow a moving dot with their eyes, which traveled to five fixed points on a screen. During the calibration procedure and while viewing the product stimuli, participants were asked to refrain from moving their head and the rest of their body so the eye-tracker could accurately capture gaze data. Following successful calibration, participants were directed to look through 10 images at their own pace, although they were instructed to take their time and not rush through the images. The set of 10 images contained the two product packages with the participant's respective label claim condition. An additional eight distractor images were used that contained no reference to clean labels. These images ensured the participant was not looking directly at the label claim when clicking through the images and was not cognizant of the area being measured. As this study was part of a larger study, a post-test questionnaire was utilized which assessed participants' perceptions and attitudes toward the products they viewed.

Data Collection and Analysis

Data from the pre- and post-test questionnaires were captured through Qualtrics and exported to SPSS v.25 for analysis. Descriptive statistics were used to analyze the demographic information. Eye-tracking data were collected through the Tobii Studio software system and exported into SPSS for analysis. AOIs were added to each product package where the label was placed, or would have been placed in the case of the control package. Inferential statistics were used to analyze eye-tracking data in order to gain insight into the effect of the independent variables on the dependent variable (Duchowski, 2017). Specifically, a paired samples *t*-test was used to determine if any statistically significant differences existed between visual attention to the two products. One-way ANOVAs and ANCOVAs were used to determine statistically significant differences between the visual and textual elements of the label claim, while taking into consideration demographic information that may influence visual attention. As part of the ANOVA and ANCOVA processes, group means and standard deviations were calculated.

Results

Through an eye-tracking experiment, visual attention allocation to the visual and textual elements of a label claim design was measured. The alpha level was set *a priori* at .05 for all statistical tests. H_1 predicted that visual attention would differ significantly based on label design. A one-way ANOVA showed a large significant difference in visual attention between the four label conditions ($F_{3,113} = 23.70$, $p < .001$, $\eta^2 = .386$); therefore H_1 was accepted. A Bonferroni comparison revealed significance existed between the label with both visual and textual elements and the textual elements listed by themselves. Participants who viewed both the visual and textual elements spent the most time fixated on the label with an average of 3.22 seconds ($SD = 1.93$), while those who viewed the textual elements only spent an average of 2.62 seconds ($SD = 1.43$) fixated on the label (Table 1). Figures 1 and 2 display the differences in visual attention between the products and four label conditions.

Table 1

Group Means of Total Fixation Duration Between Label Conditions

Label Condition	*N*	*M*	*SD*
Visual Only	29	1.66	1.82
Visual and Textual	30	3.22	1.93
Textual Only	30	2.62	1.43
No Label	28	0.06	0.08

Note: Fixation duration is reported in seconds

Figure 1. Heat map of visual attention allocation the granola bar between label conditions (L to R, visuals only, visual and textual, textual only, control)

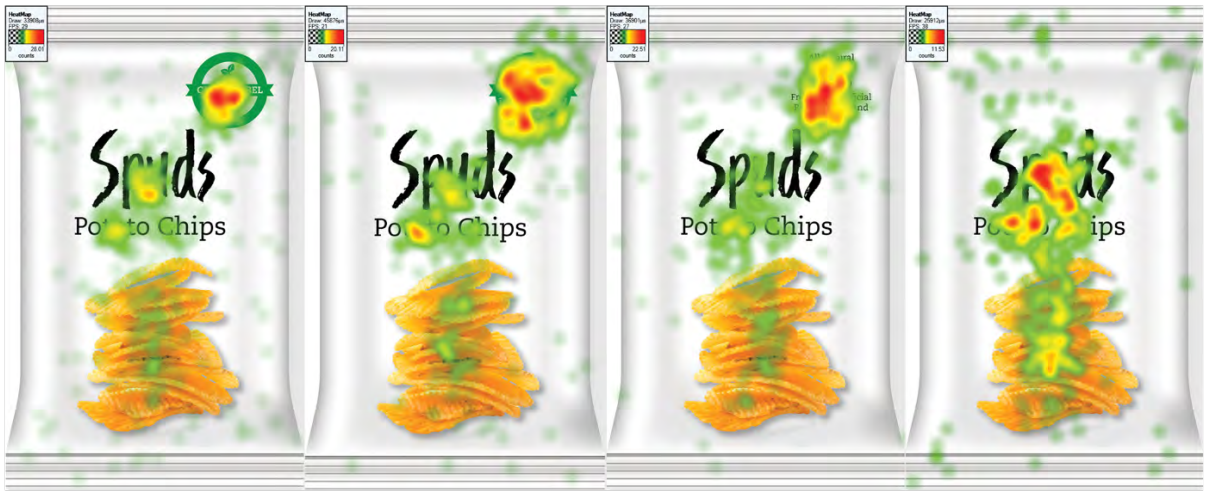

Figure 2. Heat map of visual attention allocation the potato chips between label conditions (L to R, visuals only, visual and textual, textual only, control)

RQ_1 sought to understand differences in visual attention allocation between the two product types. A paired samples *t*-test showed no significant differences in visual attention allocation between the two product types ($t_{116} = 1.10$, $p = .272$). Participants who viewed the visual and textual elements spent the highest average time fixated on the label, specifically 3.30 seconds (*SD* = 2.39) for the potato chips and 3.14 seconds (*SD* = 1.97) for the granola bar (Table 2).

Table 2
Group Means of Visual Attention Allocation Between Product Type

	Potato Chips			Granola Bar		
Label Condition	*N*	*M*	*SD*	*N*	*M*	*SD*
Visual Only	29	1.68	1.72	29	1.64	2.21
Visual and Textual	30	3.30	2.39	30	3.14	1.97
Textual Only	30	2.86	1.69	30	2.37	1.49
No Label	28	0.01	.062	28	0.11	.166

Note: Fixation duration is reported in seconds

Two one-way ANCOVAs were conducted to determine if any differences in visual attention allocation existed between the visual and textual elements for each product. The one-way ANCOVA for the potato chips revealed a statistically significant difference in visual attention allocation between the who viewed the visual elements ($F_{1, 109} = 10.52$, $p = .002$, $\eta^2 = .088$) and the textual elements ($F_{1, 109} = 46.99$, $p < .001$, $\eta^2 = .301$) (Table 3). The four covariates of age, gender, ingredient concern, and pre-existing packaging attitudes were not statistically significant in influencing visual attention to the label claim on the potato chips packaging.

Table 3
Analysis of Covariance of Visual Attention to the Potato Chips with Individual Difference Variables as the Covariates (N = 117)

Item	*df*	*F*	*p*	η^2
Visual	1	10.52	.002*	.088
Textual	1	46.99	.000*	.301
Age	1	0.02	.880	.000
Gender	1	0.49	.491	.004
Ingredient Concern	1	0.85	.359	.008
Pre-existing Packaging Attitudes	1	0.08	.778	.001

Figure 3 displays the interaction between the visual and textual elements, emphasizing the effect of the textual statements toward visual attention, as visual attention to the labels that included textual statements was significantly higher compared to the labels that did not contain these statements. In addition, visual attention increased when a visual element was added, with the label containing both the visual and textual elements accumulating the most visual attention allocation for the potato chips.

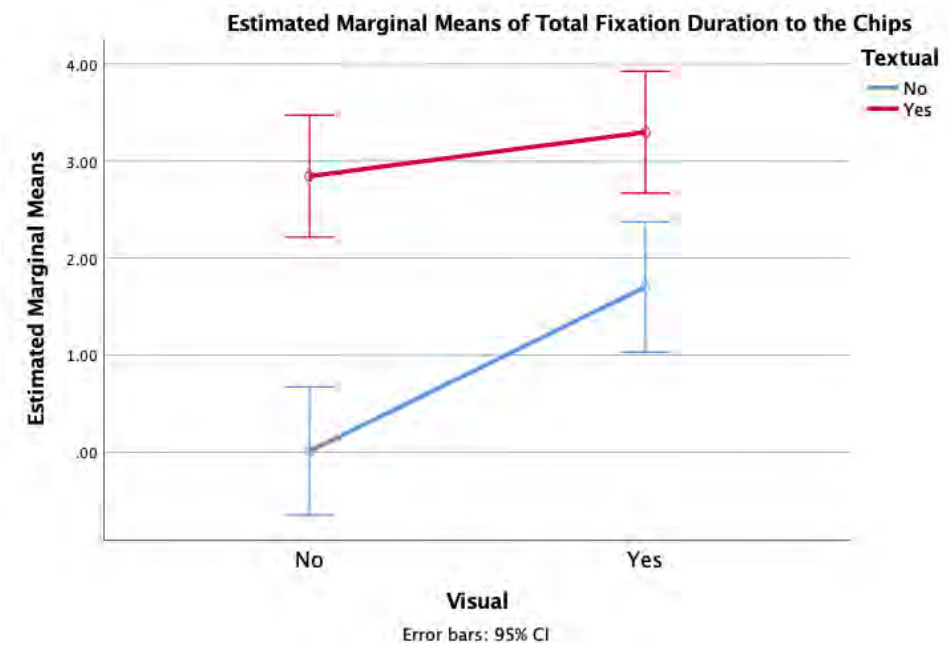

Figure 3. Means of fixation duration to the chips between visual and textual elements

The one-way ANCOVA for the granola bar revealed similar results regarding visual attention to the visual and textual elements of the packaging. A statistically significant difference was found between visual attention to the visual ($F_{1, 109}$ = 11.14, p = .001, η^2 = .093) and textual ($F_{1, 109}$ = 36.55, p < .001, η^2 = .251) elements of the package (Table 4). Again, the four covariates were not statistically significant in influencing visual attention allocation.

Table 4
Analysis of Covariance of Visual Attention to the Granola Bar with Individual Difference Variables as the Covariates (N = 117)

Item	*df*	*F*	*p*	η^2
Visual	1	11.14	.001*	.093
Textual	1	36.55	.000*	.251
Age	1	0.44	.510	.004
Gender	1	0.34	.559	.003
Ingredient Concern	1	0.45	.503	.004
Pre-existing Packaging Attitudes	1	0.01	.964	.000

Figure 4 displays the interaction between the visual and textual elements for the granola bar. These results were similar to the potato chips, where visual attention to the textual elements of the package was significantly higher overall. In addition, further support exists for combining the visual and textual elements as it resulted in the most visual attention.

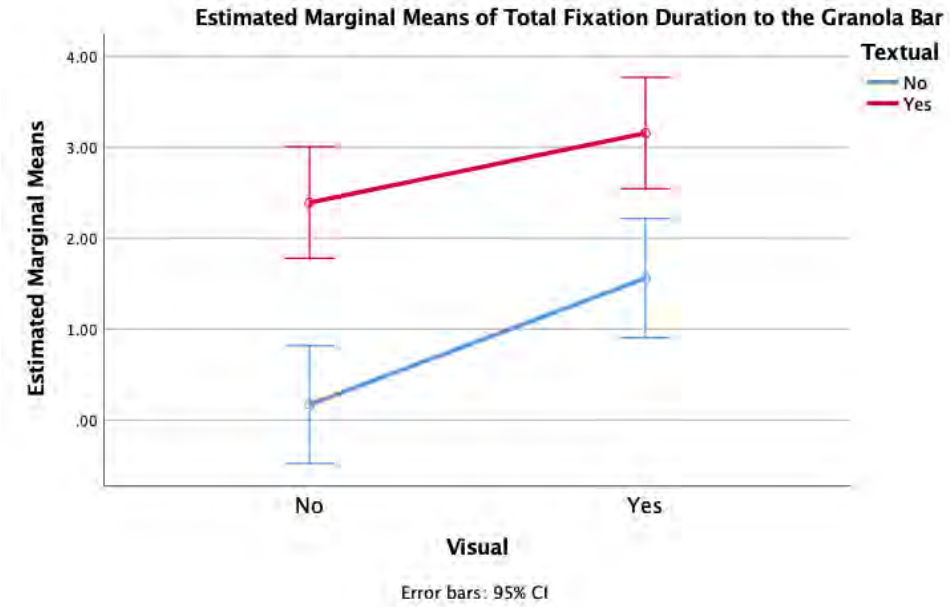

Figure 4. Means of fixation duration to the granola bar between visual and textual elements

Conclusions, Implications, and Recommendations

As consumers push for increased ingredient transparency in their food choices and label claims become more prolific across the grocery store, further understanding of the impact of these label claims is needed. This study sought to understand how visual and textual heuristic cues of a label claim influenced consumers' visual attention allocation. Using visual attention allocation as the dependent variable in this study allowed the researchers to explore total fixation duration, which serves as a proxy for measuring cognitive processing. An individual's visual attention indicates areas which they perceive a need for further cognitive processing (Wedel & Pieters, 2008). By understanding the influence of message formats that elicit the most visual attention, guidelines for future label claim development can be formed (Van Loo et al., 2018). Subsequent messages that utilize these tactics would facilitate further processing for both low and high involvement consumers, as they process information through different means. The results of this study provided support for literature indicating label claims were processed heuristically, while it also yielded support for systematic processing, as participants spent significantly more time viewing the textual elements.

As longer fixation durations were associated with the label claims that included a textual element, it is clear that participants were reading the statements and engaging in further processing of the information. Including a textual element, in the form of descriptive statements, provided an opportunity for participants to process the information systematically, in addition to heuristically as anticipated (Silayoi & Speece, 2004). The findings were consistent among products, indicating longer fixation durations for the textual elements, which demonstrated that the product type had no influence on visual attention allocation to the label claim. An additional analysis between visual and textual elements of a label claim revealed a statistically significant difference in visual attention, although the four covariates of age, gender, ingredient concern, and pre-existing packaging attitudes had no influence. These findings indicate the textual elements of a label claim continue to have a significant influence on visual attention among all demographics. Previous literature suggested consumers without a predefined product preference

rely on textual information, even when visuals are available that would facilitate an expedited decision (Townsend & Kahn, 2014). By including these textual elements on the label claim, consumers are able to make an initial judgement for unfamiliar claims and use their retained knowledge heuristically when the claim is known.

The findings of this study provide a contribution to literature associated with processing modes and food label claims. Label claims are inherently used as heuristic cues, although including textual elements provides a method for systematic processing. Appealing to both facets of processing allows alternate routes toward a purchase decision, as consumers are able to participate in the processing mode best suited to their involvement level. This finding could have implications beyond label claims, as visual and textual elements are incorporated throughout various messaging strategies, which could provide alternate routes for dual processing in countless situations.

As this study provided notable findings regarding consumers' cognitive processing modes, it presents an opportunity to further investigate dual processing modes in the context of food label claims and beyond. Much of the research associated with food label claims indicates they are processed heuristically, while little research expands on initial attitude formation of a label claim and how it has the potential to be processed systematically. Further research associated with dual processing modes would allow for a better understanding of consumers' entire cognitive process toward selecting food for consumption, including how design differences lend themselves to distinct processing routes.

Eye-tracking provided insight into differences in visual attention allocation among label elements, and, ultimately, the amount of cognitive processing harnessed to completely understand the label claim information and form a pertinent attitude. Conducting a similar study in a field-based setting using eye-tracking glasses would provide a better idea of how a label claims draw consumers' attention when situated among other products with similar attributes. Additionally, measuring visual attention to other aspects of a package, including price or nutrition claims, would reveal some insight into how much visual attention and processing is associated with label claims when compared to other salient elements of a food product. This would also allow for opportunities in multidisciplinary research with those in the economic or nutrition disciplines. One of the distinct goals of marketing a food product is to influence a purchase decision, with an understanding of how all package elements are processed. The development of a cohesive package design leads to increased use of label claim information, which ultimately impacts purchase decisions. Determining variations in visual attention to each area of a package would aid in creating food packaging with an appropriate ratio of elements that engage consumers. This type of experiment would also improve ecological validity, as a lab-based setting increases participants' awareness that they are participating in a research study.

The design of a label claim has proven to be influential toward the type of processing an individual undertakes, as a combination of visual and textual elements elicit more visual attention from consumers. Providing label claims with the opportunity for different processing routes allows all facets of consumers to comprehend prominent information and use it toward a purchase decision.

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Agricultural Communications in Australia: Identifying Stakeholders' Needs for Higher Education Curriculum

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Agriculture is a vital part of the Australian economy. With an industry poised for growth, and a growing disconnect between consumers and agriculture, additional communication efforts are needed. The purpose of this study was to complete a curriculum visioning process to inform agricultural communications curriculum development in Australia. This study used a qualitative research design consisting of face-to-face, semi-structured interviews with individuals from 14 agricultural organizations and two universities. The results indicated the industry is addressing a number of challenges, but also has opportunities that would benefit from strategic communication efforts. Participants provided suggestions regarding the specific communication skills and agriculture knowledge future employees should possess. Recognizing these competencies informed the curriculum visioning process for agricultural communications as an academic discipline within Australian higher education. Recommendations for both practice and future research are provided.

Introduction/Need for Study

Agriculture is a staple of the Australian economy. Similar to the U.S., the production of agriculture provides wealth and employment throughout the continent (Worsley et al., 2015). Since the country originated from agricultural roots (Geoffrey, 2001) during the 19th and early 20th centuries, its location on the southern hemisphere is known for having old, weathered, infertile soils, with minimal rain fall, as drought is also a significant concern for the Australian agriculture industry (Bellotti & Rochecouste, 2014). However, these characteristics have shaped the Australian agricultural industry by allowing producers to become productive, profitable, and sustainable innovators (Bellotti & Rochecouste, 2014).

In 2019, 85,000 farms in Australia contributed $60 billion to Australia's gross domestic product (National Farmers' Federation [NFF], 2019). Each Australian farmer feeds 600 people – 150 at home and 450 overseas (NFF, 2019). A large portion of the agricultural sector is beef production. Australia is the seventh largest beef producing country, producing more than 2 million tons of beef or veal annually (Meat & Livestock Australia, 2018). The animal agriculture spectrum (i.e. cattle and calves, milk, wool, sheep and lambs, poultry, pigs, and other livestock), makes up 44% of the value of agriculture production (Australian Bureau of Agricultural and Resource Economics and Sciences [ABARES], 2018).

Similar to the United States, the Australian agriculture industry faces many challenges including economic sustainability, the ability to provide the growing worldwide population with healthy, wholesome food, and environmental conditions (Campbell, 2009). Factors such as population growth, urbanization, and rising global meat consumption increase, are leading to greater demand for animal protein and ethical concerns about animal production (Buddle et al., 2018).

Beyond animal welfare concerns, extreme floods and drought in recent years have caused major damage in Australia and drawn media attention. In 2018, Australia faced one of the worst droughts in its history. Dry conditions destroyed communities across Australia as the extreme heat ruined crops and forced farmers to decrease their livestock herds (Scarr et al., 2018).

Climate conditions, economic sustainability and international trade competition, together with the obligation to provide the population with safe, healthy food, are ongoing challenges for the Australian agriculture industry. This is compounded by a lack of consumer understanding about the industry. Fifty-seven percent of Australian consumers said they have never been in contact with a farmer within the last year (Lush, 2017). A study of more than 1,000 respondents who represented each state and territory in Australia found respondents had little knowledge of even the basic aspects of the agricultural industry (Worsley, 2014). Because the public with a direct connection to agriculture is declining, there is an increasing opportunity to inform more people about the issues surrounding Australian agriculture and how the industry is responding to them (Worsley, 2014).While the role of communication has become more significant, many Australian agriculture organizations lack the capability to communicate and engage with the community about the work they do (Vidot, 2017). The disconnect between agricultural producers and consumers (Irani & Doerfert, 2013) supports the need to equip agricultural communicators with the skills to identify information needs and appropriate solutions, and communicate those solutions properly to the audience (Telg & Irani, 2005).

Australia higher education has academic offerings in areas related to media analysis, media production, journalism, professional writing, public relations, and advertising (Irwin, 1993). A recent study examined undergraduate students' perceptions of science communication skills at Australian research-intensive universities (Mercer-Mapstone & Matthews, 2017). This study found higher education institutions are recognizing the need for communication skills in science graduates as the majority of students perceived scientific writing and oral scientific communication skills as an important asset and useful for their future careers (Mercer-Mapstone & Matthews, 2017). Australia's agricultural science sector needs to improve its collaboration and communication efforts in order to meet the challenges farmers will face in the future (Vidot, 2017). Thus, the future of agriculture in Australia may depend on the ability for individuals to communicate effectively to various audiences.

Although there is great deal of literature about the agricultural communications discipline in the U.S. (Irlbeck & Akers, 2009; Miller et al., 2015; Morgan, 2010), there is limited research exploring agricultural communications needs in other countries such as Australia. Vidot (2017) said the Australian agricultural science sector needs to do a better job of collaboration and communication to meet the needs of farmers for future generations. To satisfy the changing communication needs of the agriculture industry, educators need to consider industry trends, issues, and problems as they prepare new communication graduates with the knowledge and skills to enter the workforce (Doerfert & Miller, 2006). Knowledge obtained through this qualitative study provided insights for initial curriculum development efforts to establish agricultural communications as an academic program area in Australian universities.

Conceptual Framework

Many factors, including an increased emphasis on success skills, "have made it necessary for many teaching faculties to become more deliberate about continuous curriculum assessment and improvement" (Hill, 2007, p. 33). Curriculum development is an opportunity to reconnect programs with core strengths of the faculty and provide fresh perspective when training professionals (Devine et al., 2007). The conceptual framework for this study was the curriculum development model (Wolf, 2007). Wolf described curriculum development as a continuous process that serves as a link "between student perceptions, student learning and assessment approaches, faculty goals for students and their program, alumni success, and employer and society needs" (Wolf, 2007, p. 16).

The model has three primary stages: 1) Curriculum Visioning, 2) Curriculum Development, and 3) Alignment, Coordination, and Development. For this study, we focused on curriculum visioning, the first stage of the curriculum development model. This stage begins with curriculum assessment. The main focus of curriculum assessment is to "examine and reexamine program objectives developed in the language of the attributes of the ideal graduate" (Wolf, 2007, p. 17). This begins by completing a SWOT (strength, weakness, opportunities, and threats) analysis. Data can be collected for the curriculum assessment through focus groups, surveys, and interviews with stakeholders, faculty, student alumni, and graduate programs. According to Wolf, the main tasks for the education developer (i.e. an individual outside of the institution) are to "bring awareness of local and broader issues or opportunities, offer expertise in a broad range of curriculum and education approaches, and provide access to research literature" (p. 19). The other steps to complete within the curriculum visioning stage are to identify program objectives, specifically the attributes of an "ideal graduate", and to describe the program focus. The program focus should identify foundational content and desirable educational experiences (Wolf, 2007).

Purpose & Research Questions

The purpose of this study was to complete a curriculum visioning process to inform agricultural communications curriculum development in Australia. The following research questions guided the study:

RQ1: What are the challenges and opportunities facing the Australian agriculture industry?
RQ2: What communication methods are used in the Australian agriculture industry?
RQ3: What skills and knowledge will be required for future agricultural communicators?
RQ4: What should be included in agricultural communications curriculum in higher education?

Methods

This qualitative study was completed using the tenets of phenomenology. Phenomenological studies allow the researcher to describe shared experiences found during an interview and disregard pre-conceived opinions (Van Manen, 1990). According to Marshall and Rossman (2015), the purpose of phenomenology studies is to understand the experiences of a small group of people. The target population of this study was communication practitioners in Australian

agricultural commodity groups and agriculture educators in Australian universities. Texas Tech University's Institutional Review Board approved the study's procedures before data collection commenced.

We used purposeful sampling method to identify participants. First, we choose organizations that represent the Australian agricultural industry and universities that offer agricultural sciences curriculum. We also had to take geographic area into account as we focused efforts on Australia's eastern coast due to travel costs. Through a Google search, appropriate individuals were identified within each organization in eastern Australia resulting in 14 organizations and two universities. Within each organization, individuals who worked within the communications or marketing department were contacted via email to seek their participation. Two university participants were identified based on advice of key informants and that these universities offered academic programs in agricultural science. These individuals were also contacted via email. Once the interviews were scheduled with each participant, the researcher sent a follow-up email one week before each scheduled interview to confirm time and meeting location.

We conducted face-to-face, semi-structured interviews to collect the data needed to address the research questions. At some organizations, more than one representative participated in the group interview resulting in 29 individuals participating in the study. A separate questioning guide was created for the organization and for the university groups to provide some structure in the interview process. The questioning guide for organizations was created to help gain a better understanding of the challenges and opportunities facing the Australian agricultural industry and the communication skills needed to work within each organization. The questioning guide for universities was developed to help gain a thorough understanding of the curriculum development opportunities as well as current industry support and partnerships.

A faculty member trained in interviewing and focus group moderation served as the lead interviewer to conduct 16 in-depth, face-to-face interviews between July 1-12, 2019. With the consent of all participants, each interview was audio recorded and detailed notes were taken to ensure accuracy during transcription. Participants were also informed that pseudonyms would be assigned to ensure the confidentiality of their identity.

After transcribing the interviews verbatim, we used NVivo 12 data management software to assist data analysis. NVivo was used to help store and organize the data, but we read and coded information for common themes (Morse & Richards, 2002). In this study, the lead researcher read each of the 16 interviews then coded the information to identify dominant themes. Initial themes were identified from the first transcription, and remaining information was placed into the previously determined themes that emerged throughout the transcripts. As needed, additional themes were created.

To ensure trustworthiness, Creswell (2013) recommended credibility, transferability, dependability, and confirmability as aspects of establishing research rigor in qualitative studies. Conducting interviews in a professional setting can help add credibility to a study (Foster, 2004). The setting for the interviews in this study were conducted in the individuals' place of business. For transferability, the context of the study is described while maintaining participants' confidentiality. An audit trail was utilized throughout the study to ensure dependability (Ary et

al., 2010). For this study, one-on-one interviews are dependable because the information can be credited to only one source. Finally, to ensure confirmability, the research organized the information found and reported the findings while recognizing biases during the bracketing process. The lead researcher wrote a personal statement *a priori* to describe personal opinions about the topic area. From this statement, the researcher is able to set aside personal biases toward the research topic or participants (Creswell, 2013).

Results

RQ1: What are the challenges and opportunities facing the Australian agriculture industry?

Research question one sought to gain a better understanding of the challenges and opportunities and challenges facing the Australian agriculture industry. Several themes emerged within each of these areas.

Protecting the Social License to Farm. The topic of animal welfare and activism was discussed as a major challenge among those who work in agricultural organizations. Riley described social license as "the responsibility to the consumer and stakeholder to implement safe methods of food production."

Because consumers are paying for the products and becoming more vocal about the type of meat they prefer to eat, Ryan said consumers are demanding "this assurance that you're all totally above board." William said discourse about animal welfare is more prevalent in Australia than other countries such as the United States. He said a growing number of Australians are eating less meat due to environment or animal welfare concerns, so it is getting more difficult as an industry to continue doing what they do.

Cultivating Sustainable Agricultural Practices. Violet said her organization is in a constant battle of trying to communicate to urban dwellers that their production practices are sustainable. She said conversations about sustainability will continue to strengthen and grower louder. "We look at sustainability as the next animal welfare," she said.

Charlotte said the sustainability outcry could be from misinformation that exists about the industry. One example is the misrepresentation that cotton is a water-intensive crop and harmful for the environment. Due to negativity surrounding the chemicals used to protect and enhance the growth of the crop, Charlotte said there is a communication challenge to show that "Roundup Ready cotton and things like that has enormously changed the way cotton is produced."

Mending the Gap Between Farm and Fiction. Another challenge facing the Australian agricultural industry is the urban-rural divide. Participants recognized that many people in Australia are now two, three, or more generations removed from agriculture. William said there was, at one point, a real connection between agriculture and people because more people lived closer to the agrarian lifestyle, a connection by proximity. However, he said that is no longer the case, as many people have no idea where their food comes from and "have lost a bit of affinity" toward the Australian farmer.

Protecting Agriculture Against Detrimental Circumstances. Participants noted drought is an ongoing battle for Australian agriculture. Lauren said the drought is a major challenge specifically for the Australian red meat industry and there have recently been more bad years than good years. She said: "It's the drought that is having the most pronounced impact for us as an industry."

Aside from drought, participants said biosecurity is a major challenge within the agriculture industry in order to protect agricultural commodities from diseases brought in from other countries. Maddison said people are constantly bringing things across the Australian borders that could decimate the industry. One example she mentioned was FMD (Foot and Mouth Disease) found in products that were brought into the country. However, the issue currently for the industry is the gap in communication and helping "the general public to understand the role they play around biosecurity." She said her organization is working overtime to manage biosecurity on the farm, state, and country level.

Telling Agriculture's Story is a Challenge. Participants mentioned the capability to communicate their organization's story in a clear, concise, and consistent manner can be difficult. Some organizations said they do not have an unlimited budget to conduct extensive communication activities across Australia so finding the most effective communications strategies to reach the most people is fundamental in opposing the negativity surrounding the industry.

Daisy said her organization's communication efforts are geared more toward producers and making sure the information is in a language they can understand because different groups of producers require different types of information and at different levels of engagement. Daisy added that targeting the intended audience with different information and making sure the information is in "nice digestible chunks that makes sense to them" is an important part of their communication efforts. She said: "You're not throwing an 80-page research report at them and expecting them to digest it on their own."

Uncertain Future for the Agriculture Industry. This theme addressed how the Australian agriculture industry is facing an aging worker demographic – farmers' and ranchers' average age continues to increase. Additionally, participants stated it was an ongoing challenge to obtain and retain skilled agriculture workers. Summer said labor shortage is regularly affecting producers and processors across the Australian agriculture industry. She said: "Some of the big challenges I am seeing is about finding and securing labor, and then training and maintaining them for the longer-term perspective."

Scarlett said the aging farm population is a challenge for her organization since about 8% of the organization's membership is under the age of 35. A concern she said goes back to attracting younger individuals to the agriculture field and retaining them for years to follow. Scarlett said: "The kind of culture shift of younger people coming through and not joining up. It's not what they do like their parents did."

Increasing Demand for Australian Agricultural Products. Particularly for the live export markets, Quinn said the opportunity for the industry is an increasing demand for protein globally

as incomes rise. She said: “There's a lot of demand for protein. Our animals are seen - whether slaughtered here, boxed and chilled, or whether that's the live animals - they're seen as quality.”

Even though participants said Australia is a strong component of the red meat market, Lauren added Australian producers only account for 4% of the global production scale, leading to opportunities to find niche markets.

Emerging Technologies Enrich the Industry.
Another opportunity for the agriculture industry is the integration of technology systems and science development that can help decrease the cost of production and increase each producer’s ability to raise safe, affordable food. Rick said: “There's all sorts of emerging technologies as to how we can do biosecurity and traceability in particular better.” Violet said innovations in the technology and systems around traceability will allow new avenues for producers and consumers within the red meat industry. She said: “I think once we can start traceability that is adopted by producers, we can actually trace our products from paddock to plate.”

Campaigns to Address Environmental and Agricultural Concerns. A major opportunity for the Australian agricultural industry is to create campaigns to enhance the agricultural industry. One campaign announced was the vision to be a $100 billion industry by 2030. Ultimately, this means the industry will need to grow by 70% in order to meet the goal, something industry partners said will begin by engaging the industry in conversation about the future and taking initiatives to capture available opportunities. Another campaign and opportunity for the industry is to be carbon neutral by the year 2030. Sofia said a red meat organization has announced the carbon neutral campaign, and “that's definitely a big opportunity. Obviously, there's an appetite for that product already out in the market.”

RQ2: What communication methods are used in the Australian agriculture industry?

Emphasis on Digital Communication. Almost all participants said digital communications allows them to reach their intended audience and share information easily about agricultural issues. Riley said his organization is utilizing more digital communication to target stakeholders because social media allows a particular audience to be targeted. However, Riley said he sees the need for more printed materials, but it is easier to maintain digital resources based on the organization’s budget. He said: “There's always a spot online where you would actually get more information, because that's something that we can update and distribute much more easily.”

Part of digital communications is utilizing a website for stakeholders to easily find information about the organization. Daniel said his organization sees the need for a functional website and, during the time of the interview, they were in the process of revamping the website to further reach stakeholder’s needs. He said: “We're revitalizing the website because that's the centerpiece of how we deliver communication these days.”

Essentials of Visual Storytelling. Visual storytelling allows an organization to uniquely share its narrative through photography, visual graphics, and videos. Lauren said producers within her organization find videos that feature other agriculturalists as credible because they are “more likely to lean in and listen to a short video from another producer.” Since many videos can use

supporting images of Australian farmers, Layla said her organization utilizes these videos "during social campaigns to better tell their story." In addition to videos, infographics were a common tool used to share information in an engaging, distinctive manner. Quinn said her organization needed items that would be noticeable and valuable throughout various work locations, such as work cafeterias. She said: "We do some infographics and those sorts of things that are really simple."

Write an Engaging Narrative. Participants noted most of their communication efforts involves providing text-based publications for stakeholders and members to receive information about the industry trends and issues. Violet said her organization utilizes newsletters to provide its members with information. She said: "As an organization, we focus on delivering information for our research, or guidelines" for operating an agricultural cooperation "as opposed to warm and fuzzy information." Lauren said her organization utilizes print media to target specific audience segments, and Sofia, a colleague at the same organization, said: "We've actually got a few different e-newsletters. We are trying to become more targeted."

Utilize Strategic Communications. Participants mentioned that having a strategic communication strategy – which allowed key messages to be clear, concise, and transparent – was important for telling a captivating story. Sienna said her organization's communication strategies revolve around "smart" objectives that are measurable, strategic, achievable, results driven, and time bound. She said: "The smarter and [more] targeted your objectives are, the easier you can evaluate towards the end of your communications campaign."

According to Lauren, her organization's strategic communication objectives are to foster and prosper the red meat industry, and one particular objective is to ensure her organization's members are confident in how the organization is investing their funds. Lauren added that an ongoing communications challenge for her industry is helping foster consumer support of their products through effective communication strategies.

RQ3: What skills and knowledge will be required for future agricultural communicators?

Journalistic and Verbal Competencies. Many participants said strong written and oral communication skills are crucial competencies in the workplace. The ability to write for multiple audiences and objectives is a necessary skill within communications, Quinn said, because "you need to be able to write the annual report, as well as write a Facebook post or an e-newsletter article or whatever." Regarding verbal communication skills, Sienna said individuals need to be able to write well in order to communicate effectively. Quinn said communication practitioners need to be able to structure their written and oral communication skills to incorporate more of the storytelling piece. She said: "I do think that's why so many journalists get into communications, and I think do quite a good job, because they know what people are looking for."

Multi-Skilled Media Experiences. Most participants said they need multi-functional, multi-skilled individuals who can display a broad range of skills beyond written communication. Specifically, in media production, Ryan said if he could add one person to the team "video and audio production would be who I would be looking for." Summer mentioned that design and visual communications are both important aspects to a communication team, which she has

struggled to find when looking for individuals to hire. She said: “You know very quickly what good communication looks like and despair when you're faced with something that you know just isn't good, that is inaccessible because of the way that's presented, or because of its length.”

Understanding the Agricultural Industry. Even though a few participants said agricultural knowledge is not necessarily an expertise needed within their organization, most participants said knowing basic agricultural terminology can help the individual better understand the organization’s key messages and communicate those more effectively to the intended audience. Quinn said when she is looking for new staff, a communication background is necessary but an individual who understands that the agricultural industry, “whether that was growing up on a farm or in regional Australia or actually working in agriculture more specifically,” better equips the communication practitioners for the challenges the organization faces.

Thinking About the Big Picture. Another important skill for agricultural communicators to have was the ability to think critically and analyze information for the “bigger picture,” a skill Chelsea said adds value because her organization can actually “connect areas for a better experience for our audience.”

Sienna said the biggest gap she experiences at the moment is finding someone who can sit down and think about the different perspectives of a project. She said:

> What I see a lot of is people get a task and they just run with it, do it quickly and it's done without really actually sitting down thinking about the big picture and the different perspectives. And then finding the best way of solving the issue.

Presenting Research in Understandable Ways. Participants from organizations and universities alike said it is imperative for agricultural communicators to read a research paper, understand it, and make it coherent for the lay audience. The ability to “understand the research and understand what it is about” is a major skillset, Quinn said that allows an individual to read a research report and relay the findings in a user-friendly and adoptable form.

Lauren said the industry has participated in beneficial research over the years, but she currently sees a boundary of translating the findings into something practical and useful. She said: “Sometimes I feel if I could only appoint one more person, [it would be] someone who's really skilled in that translation of the science to the application.”

RQ4: What should be included in agricultural communications curriculum in higher education?

Research question four aimed to identify a potential plan for what agricultural communications curriculum should be incorporated in Australian higher education. Overall, there is a need to incorporate more communication skills within agricultural courses at Australian universities. Multiple university participants said a model is needed to understand where graduates are lacking and how to solve the problem with curriculum. Henry said: “Trying to produce what the industry needs sometimes can be difficult if you can't actually understand the target. And when you realize the target is not just one thing, but it's this catacomb of different ideas.”

Jack said there is a demand for agricultural communicators in the industry because many students from rural backgrounds, with an interest in agricultural communications, pursue courses within the media and communications department. In the absence of an agricultural communications course, he said: “You might find kids with an ag background will go and do media and communications course or a journalism course or something like that.”

Conclusions, Discussions, and Recommendations

As the percentage of people with a direct connection to agriculture in Australia continues to decline, there exists an opportunity to inform more people about the issues surrounding Australian agriculture and how the industry responds to them (Worsley, 2014). Vidot (2017) noted it is important for the Australian agricultural sector to do a better job of collaboration and communication efforts in order to meet the needs of farmers and consumers. Research question one sought to gain a better understanding of the opportunities and challenges facing the Australian agriculture industry. Overall, these themes acknowledge the scope and scale of issues the Australian agricultural industry faces. Although an agricultural communications practitioner alone cannot address the challenges of each organization, communication efforts can lead to positive advancements and collaboration within the industry.

Research question two dealt with communication methods that are currently being implemented throughout the Australian agriculture industry. The findings indicated that Australian agricultural organizations currently use multiple communication channels to reach their intended audience segments. This finding complements earlier studies that a need exists for a variety of communication efforts in order to reach the organization’s audience segment (Irani & Doerfert, 2013). Research question three was to identify the skills and knowledge participants future agricultural communicators need to have. Consistent with Irlbeck and Akers (2009), Miller et al. (2015), and Morgan (2010), this study found that participants need agricultural communications graduates who have strong written skills for various types of print media and have the ability to tailor a message for the intended audience. Future agricultural communicators need to be multi-skilled individuals with strong written, oral, and digital media competencies. Additional findings suggest individuals need a basic knowledge of the agricultural industry and the ability to think critically.

Research question four was to gather initial data to inform agricultural communications curriculum development in Australian higher education. The increasing need for agricultural advocacy coupled with a desire for enhanced communication efforts from agricultural organizations are encouraging growth in agricultural communications discipline (Miller et al., 2015). This study’s findings provide insights for the development of agricultural communications curriculum in Australian higher education that could address some of the challenges the agriculture industry encounters. This can be achieved initially by implementing communication classes within existing agricultural degree plans. What is currently not available is the crossover between agricultural sciences and communication to provide an integrated area of academic study. When discussing the future of agricultural communications curriculum in Australian higher education, university participants said they are in complete support of the idea and are not concerned about recruiting students for this academic area.

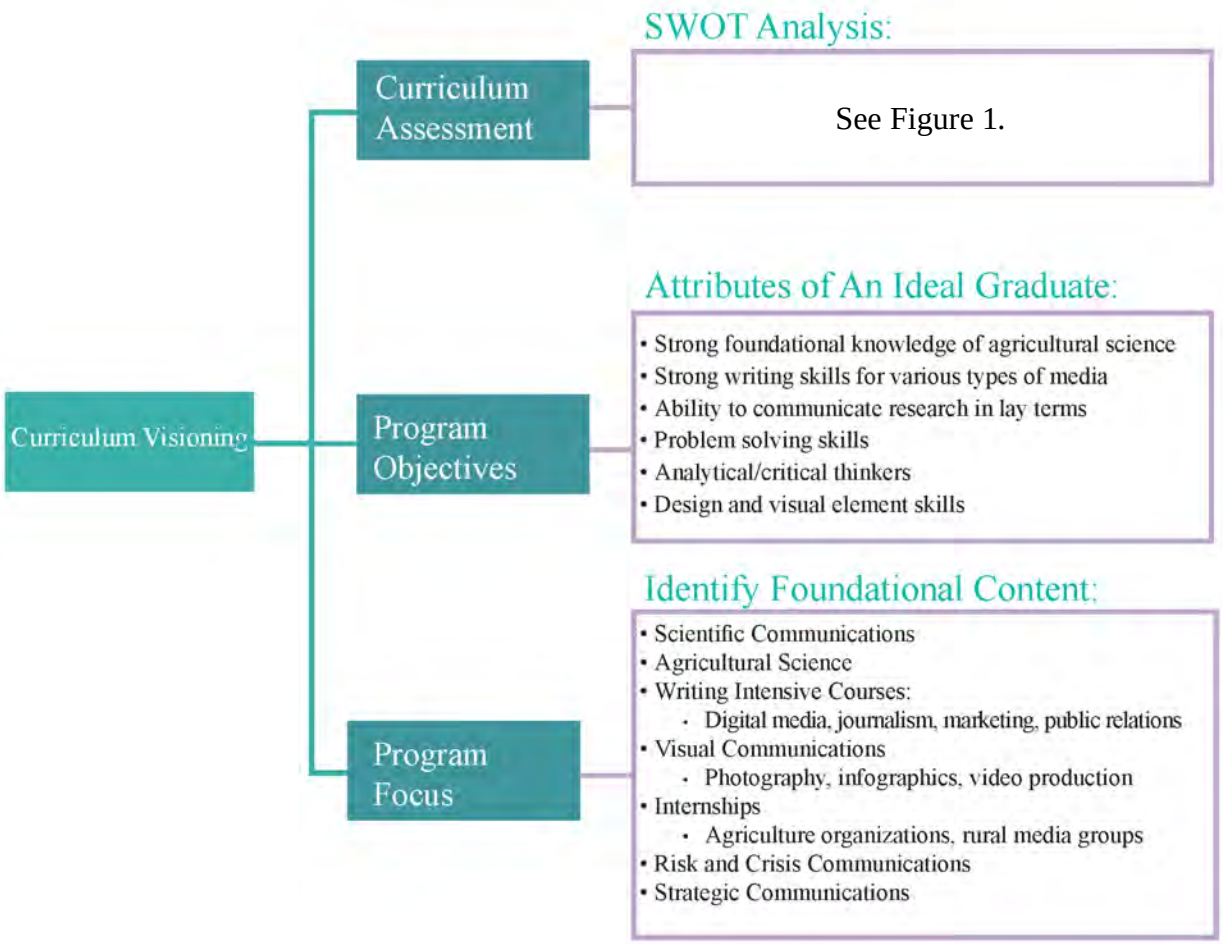
After drawing conclusions to address the research questions, we were able to complete the initial steps in the curriculum development model (Wolf, 2007) that guided this study. The first step of the curriculum visioning phase of this model is to complete a SWOT analysis (Figure 1). As the Australian agricultural industry has grown, one strength is the ambition for innovative ideas to further expand the industry. In terms of weaknesses, the industry has a limited number of practitioners who have both an agriculture and communications background. An additional weakness is the potential lack of support for communication efforts within an organization when other factors are competing for time and resources. As the industry continues to grow, there will be more opportunities for communication practitioners to share those advancements. However, the current lack of pre-existing agricultural communications skills is an apparent threat, and as the industry is currently trying to address certain challenges, there is a threat from organizations as not seeing the value of concentrated communication efforts being able to solve these issues.

Figure 1
SWOT analysis for agricultural communications curriculum development in Australia

S Strengths	W Weaknesses	O Opportunities	T Threats
• Agriculture industry supports innovation. • Industry recognizes potential growth. • Industry values communication efforts. • Consumer-centered communication is appreciated. • Industry is engaged in curricular efforts.	• Few professionals have both communications and agriculture educational backgrounds. • Industry is working to fill voids in communication efforts. • Some individuals in industry may not value communication efforts.	• Need for effective communication materials. • Agricultural sciences students recognize value of strong communication skills. • As industry grows, need for skilled communicators will also increase. • Australian higher education recognizes need to equip graduates with communication skills. • Agricultural communications is another career option.	• Lack of pre-existing agricultural communications. • Industry is trying to address challenges and may not value the communicator's role. • Organizations may want to hire graduates from established program areas.

After conducting a SWOT analysis, the next step in the curriculum visioning process is to recognize the program objectives, program focus, and attributes of an ideal graduate (Wolf, 2007) (Figure 2). In this study, these include a strong knowledge of the agricultural industry, strong writing skills, research communications, visual communication skills, and problem solving and analytical skills.

Figure 2
Curriculum visioning for agricultural communications in Australia



From the university perspective, it is recommended that higher education incorporate more communication coursework into agricultural science degrees. Participants recognized the need for agricultural students to possess diverse skills in oral and written communications. In order for students to gain valuable real-world experience before graduation, universities should create partnerships with agricultural organizations to provide opportunities for students through field trips, guest speakers, internships, service learning, and research projects.

Additional research to inform agricultural communications curriculum development in Australian higher education is also necessary. This would benefit universities that express an interest in implementing agricultural communications curriculum. If Australian agricultural organization representatives will share their communication needs with those who work in higher education institutions, these insights could influence the decision to incorporate more agricultural communication courses within Australian higher education. More research is necessary to develop curriculum for teaching, and to further align the program and course learning experiences. Because curriculum development is a continuous improvement process (Wolf, 2007), additional research is necessary to explore student learning approaches, faculty goals for students within their program, and industry needs.

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Navigating Transparent Pork Production: Analyzing Visual Attention of The Maschhoffs Website

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Abstract

When it comes to food, consumers are increasingly concerned with the welfare of the livestock used to produce it. In an effort to display transparency and build trust with patrons, businesses such as The Maschhoffs, a pork production company, have created online tools to answer questions about production processes. This study implemented eye tracking and survey methodologies to attain insight regarding the visual attention of website visitors. While results revealed no discernable pattern of navigation among respondents, the findings illustrated a sector of the pork industry consumers expressed interest in was the breed-to-wean section of the farm. Researchers encourage agricultural communicators to develop messaging surrounding this specific process to continue building trust with consumer audiences as well as make recommendations for utilizing eye tracking to assess visual attention to websites.

Introduction

The birth of the internet paired with the globalization of trade has ushered a new era of international awareness, enabling the world to be profoundly linked like never before. Generations today are growing up riding in cars with parts assembled from dozens of countries, wearing shoes stitched over conversations in foreign tongues, and tasting foods ripened in faraway lands. The online transformation of media has placed both the riveting beauty and complex problems of the world at our fingertips, enrapturing public attention toward trash accumulating on foreign coastlines, terrorized streets in war torn cities, or slowly shrinking glaciers. Every day we are held as witnesses to the impact of our consumption (Castells, 2014). This connection has incited a society increasingly expressive of a fundamental concern with the social, economic, and environmental climate of the world. Among the areas of foremost trepidation to the public is the ethical nature of the food supply (Ficko & Boncina, 2019; Strong, 1996).

Not only do eating habits reflect how an individual seeks to nourish themselves and loved ones as an essential act in sustaining life, but the nuances and care taken in the preparation of meals can also serve as a remarkable expression of identity and culture. Food represents a broadly universal yet uniquely intimate cornerstone of our lives; commanding an importance fostering an innate curiosity of food production (Wandel, 1994). Consumers have asserted elevated apprehension in aspects of the food system, concerned with food safety standards, unheeded additives, the ecological footprint of industry practices, and animal welfare (Strong, 1996).

The vast majority of Americans today are two to three generations removed from the farm, a statistic signifying the scarcity of direct experience with agriculture presently observed in our society (Hoppe, 2016). The distance consumers bear from the food industry has initiated

complexities in information seeking, consequently spurring distrust of industry practices (Center for Food Integrity, 2018). While safety, taste, and appearance all contribute to a consumer's perception of meat quality, another factor rising in importance is animal welfare (Blokhuis et al., 2008). Conclusions from previous research suggest the growing concern for livestock welfare is intensifying in the hierarchy of societal issues, becoming increasingly salient for consumers (Issanchou, 1996; Napolitano et al., 2010).

In an effort to address these concerns among consumers, agricultural organizations have turned to transparency as a communications strategy (Rumble & Irani, 2016). Communicative transparency was quantified and defined by Rawlins (2008) as follows:

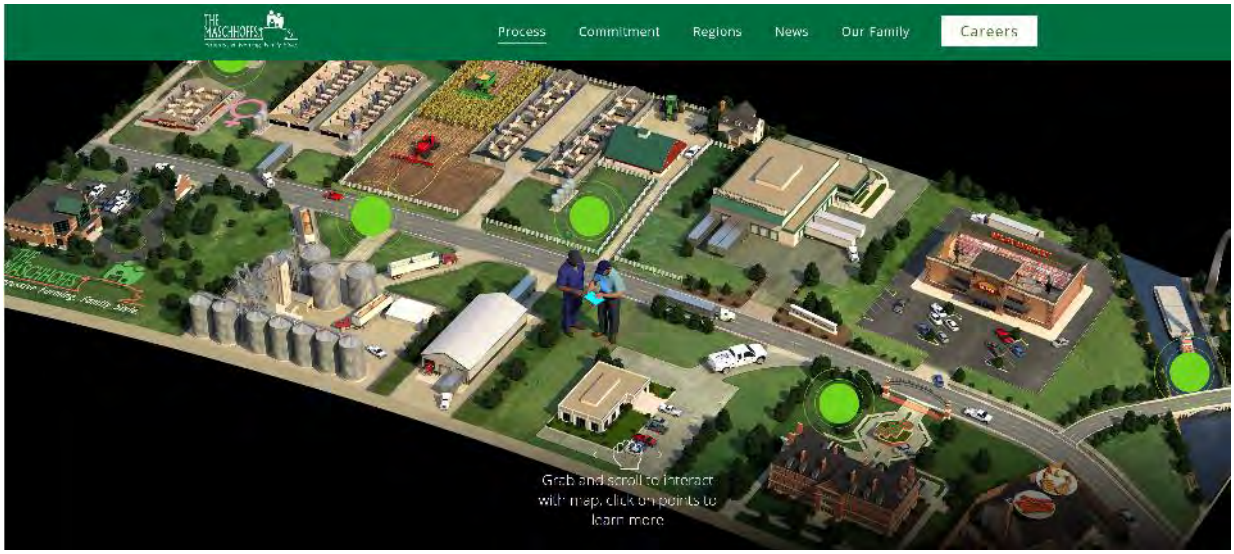
> Transparency is the deliberate attempt to make available all legally releasable information – whether positive or negative in nature – in a manner that is accurate, timely, balanced, and unequivocal, for the purpose of enhancing the reasoning ability of publics and holding organizations accountable for their actions, policies, and practices. (p. 75).

Communicative transparency is marked by substantial information, participation and accountability as perceived by the consumer (Rawlins, 2008). Means of accomplishing this in the agriculture include tours of production processes (Specht et al., 2014) and sharing testimonials (Rumble & Irani, 2016), both of which can be presented via the web by the various segments of the industry.

The pork industry has experienced heightened scrutiny over the past decade, facing a plethora of concerns from abuse of antibiotic treatments, the confinement of gestation stalls and farrowing crates, and practices perceived as both unnecessary and inhumane such as tail cutting (Deemer & Lobao, 2011). In pursuit of alleviating concerns and educating consumers, the pork industry has actively sought ways to increase transparency by detailing the processes of swine production. However, while transparency is a term heralded by both commodity organizations and consumer activist groups, a streamlined approach to evoke this concept has yet to be defined (Amos & Sullivan, 2018). While consumer attentiveness to animal welfare is clearly evidenced, little research has been conducted to distill the segments of the pork production chain generating the most unease. Identifying such components may offer timely information regarding message topics most powerfully resonating with consumers.

In pursuit of establishing transparency, one pork company has integrated a detailed map of the farm to fork processes regarding swine production into their corporate website (Figure 1). The Maschhoffs is family-owned and headquartered in Carlyle, Illinois, yet they have global reach as the fourth largest hog production company in North America (The Maschhoffs, n.d.). Their corporate website includes an interactive map of how they raise five million pigs each year. This webpage offers an opportunity for researchers to identify the specific aspects of the pork production process consumers invest time and energy attending to.

Figure 1
Screenshot of the Interactive Map of the Pork Production Process on The Maschhoffs Website



The recognition of the processes of pork production consumers deem most salient will inform communication practitioners as they continue to design websites and online media in an effort to educate consumers. Eye tracking serves as an appropriate measure for this inquiry because of the tool's ability to discern viewers' attention to definite elements of a message. Eye tracking enables researchers to distinguish the pieces of the message the audience visually attends to, exacting a unique precision differentiating it from other forms of measurement (Gong & Cummins, 2016). The capability of the technology to ascertain the decisive characteristics of an individual's attention renders this method as an auspicious approach to deducing the salient attributes of websites and online content.

Conceptual Framework

Selective attention is a coping mechanism utilized when people face mass amounts of information in their environment, including what they are exposed to on the internet. Consumers are constantly bombarded with competing information elements and must decide to which elements to give their attention in order to function in such information-rich environments. Selective attention is a helpful concept for researchers to use for exploring how people allocate attention to rival messages within a given stimulus, such as The Maschhoffs website used in this study (Cummins et al., 2016; Treisman, 1969). The use of eye tracking allows for quantitative, granular collection of data points connected to a person's selective attention to information elements within a stimulus (Cummins et al., 2014).

A combination of message-level and individual-level factors influence any given person's selective attention to information. Automatic and controlled processes are utilized by a person when selectively attending to messages. Previous research has detailed automatic, or bottom-up, processes to be utilized when message elements provoke or guide attention, such as the onset of a new message element or messages presented in sequence (Bucher & Schumacher, 2006; Fox et al., 2004; Lang et al., 2005; Pieters & Wedel, 2004). Alternatively, individual-level factors have

been shown to affect selective attention in a more controlled, top-down, manner. These factors include sensation seeking, salience of an information element, affect regulation, and age (Cummins et al., 2016). Message-level and individual-level factors combine when "people develop sophisticated selection mechanisms to rapidly prioritize aspects of a complex message and guide attention towards specific message elements" (Gong & Cummins, 2016, p. 4).

Selective attention to information elements in a stimulus is a interaction between the viewer's goals and the visual stimulus (Buswell, 1935). Previous research suggests that automatic, bottom-up responses come first, followed by controlled, top-down responses. Therefore, even if a message provokes initial attention from the viewer, the message must be consistent with the viewer's goal or it will be ignored (Folk et al., 1992). Ho (2018) investigated participant response to various levels of complexity with regards to interactive features on a website. The researcher found participants tended to give attention to webpage features indicating information important to the participant's motivational goals.

Purpose and Research Questions

The purpose of this study was to explore visual attention regarding different aspects of The Maschhoffs website. Four research questions guided the study:

RQ 1: What scanpath patterns emerge from individuals' initial evaluation of the website?
RQ 2: What areas of interest do participants attend to in the website?
RQ 3: Are there differences in visual attention to the website between individuals with high agricultural involvement and low agricultural involvement?
RQ 4: How do participants perceive the trustworthiness of The Maschhoffs organization?
RQ 5: What improvements do participants perceive can be made to the website?

Methods

Participants

This eye tracking study engaged the participation of undergraduate students at a Southern university. These students are classified as Generation Z consumers, born between 1995-2010 (Pribis et al., 2010). As these shoppers become the prime consumer purchasing demographic of ages 25-54, the generation will influence the structure of the market based upon their preferences (Dimock, 2019). Additionally, previous research has evidenced this generation may be more inclined to consider meat alternative diets due to the perceived adverse environmental impacts of the livestock industry.

Participants from this study were recruited through the daily email-based university announcement platform. Those interested in participating emailed the researchers, who then asked the participants to complete a poll regarding their availability, followed by an email assigning individual appointments in the lab with one of the researchers. Participants were compensated $20 cash for their time. A total of 74 participants were recruited for the study. The academic classification of participants consisted of 35% seniors (n = 26), 26% juniors (n = 20), 24% sophomores (n = 17), and 14% freshman (n = 10).

Stimulus

This study featured an interactive webpage developed by the pork production company The Maschhoffs as the introduced stimuli. Interactive webpages, "allow consumers to change online content in real-time with mouse-based actions such as clicking, dragging, hovering and flipping" (Xu & Sundar, 2016, p. 621). The interactive features of The Maschhoffs webpages meets the qualifications of this definition by giving viewers an opportunity to take such actions within the site.

The study stimulus, designated under the "Process" tab in The Maschhoffs website navigation, explicated each process of the pork supply chain from farm to table. The webpage featured a birds-eye view of the facilities central to the production process. Viewers could grab and scroll to view different areas of the map, and also have the ability to click on a facility to learn about specific processes regarding the precise step in the process. Eight "production" processes and seven "support" functions were available for viewers to learn more about throughout the map. The website identified the eight production processes as: boar stud, gilt developer, breed-to-wean farm, finishing farm, packing facility, grocery store, consumer home, and export and barge. The seven support functions were identified as: headquarters, feed mill, truck wash, resource loop, regional office, production manager/production partner interaction, vet truck, and Maschhoffs university. Each process or function was represented by graphic imagery regarding the facility where the practices take place. Once selected, the graphic gave way to supplemental information including videos and text explanations of that step in the pork production process.

Measurement

The degree of an individual's agricultural involvement was measured in this study as the independent variable. To determine their level of involvement in production agriculture and their attitude toward the industry, participants were asked to rate their level of agreement or disagreement (1 = *Strongly disagree*, 5 = *Strongly agree*) on a 5-point Likert scale. Participants were prompted to rate the following statements: "I am involved in production agriculture," "I am emotionally connected to the agriculture industry," "I strongly identify with the agriculture industry," "I trust the livestock production industry," "I have concerns about the safety of meat-based food products," and "I believe livestock producers in the U.S. are dedicated to producing safe products." This scale was adapted from a thesis study by Bigham (2017) with a high reliability determined by a Cronbach's alpha of 0.971 (Tarpley et al., 2019).

Visual attention acted as a dependent variable of the study. A Tobi X2-60 eye tracker was paired with Tobi Studio software (Version 3.4.8) for integration of stimuli and collection of gaze data. This program is noninvasive and does not assert any differences from typical computer use. Points of gaze were sampled at 60 Hz. Each step of the pork production process defined an area of interest (AOI). These regions were drawn around the facilities as well as the text generated when a participant clicks the region to view more. This study also observed fixations, characterized by brief instances of time when the eye is relatively inactive for at least 60 milliseconds. The Tobii I-VT fixation filter algorithm was implemented to process raw gaze data.

Trust was also evaluated as a dependent variable. To assess participants' level of trust in the company after viewing the webpage, individuals were prompted to rate their level of agreement

or disagreement (1 = *Strongly Disagree*, 5 = *Strongly Agree*) on a 5-point Likert scale. The following statements were rated: "This organization is qualified to provide information from where food is coming from," "This organization can be trusted to provide factual information about where food is coming from," "This organization is concerned with the public's well-being," "This organization is concerned with making profits above all else," and "This organization has something to gain from making this website." This scale was adapted from LaGrande (2018) and yielded a Cronbach's alpha of .96.

Data Collection

The procedure of eye tracking necessitates participants to first be seated in a stationary chair with their head approximately 12 inches from the computer screen. Once seated, researchers administered a pre-test questionnaire to the participant using the web-based questionnaire delivery platform, Qualtrics. Once they completed the pre-test, participants were informed the eye-tracking hardware needed to be calibrated to properly gauge the accurate assessment of eye movements. Individuals were prompted to follow a moving dot with their eyes as it moved around the perimeter of the screen and fixated on nine points. The calibration process enabled the software to calculate the angle of the participants' gaze. As the Tobii system records gaze data from the bottom of the monitor, the procedure is noninvasive and conducive to a natural environment. After calibration was complete, the participant were presented with the stimuli and asked to freely navigate the webpage for five minutes. The eye tracker recorded each participants' eye gaze path as well as the length of time spent looking at different aspects of the screen. These eye tracking procedures are regarded as accepted practices by eye-tracking scholars (Duchowski, 2017). Once the participant completed viewing the webpage, we administered another questionnaire to gather reflecting thoughts and characteristics of trustworthiness garnered from their experience with the website.

Data Analysis

The researcher recorded the questionnaire responses using Qualtrics and exported the data to SPSS v. 24. The eye-tracking data were compiled through the Tobi Studio system, exported into Microsoft Excel, then imported into SPSS. To correctly match participant data between the self-report and eye-tracking measures, each individual was assigned a numerical ID. To answer the research questions, this study employed both descriptive and inferential statistics.

To answer research question one regarding the detection of a scanpath pattern, data from the first 15 seconds of participants viewing the website was recorded in the order of AOIs. The Sequential Pattern Mining (SPM) algorithm was implemented to distinguish commonalities in website navigation (Eraslan et al., 2016). SPM pattern detections are useful when seeking to identify repeated structures correlated with visual elements, such as a webpage (Fournier-Viger et al., 2016). Researchers then report patterns or the absence of a pattern.

The fulfillment of research question two was achieved with a two-part approach, an eye-tracking measure and a self-report measure. To determine the salient attributes of the webpage, the site was coded with the Area of Interest (AOI) tool in the Tobii Studio Eye Tracking software. Researchers drew a shape around an aspect of any information or image to select the parts viewed by an individual. Each step of the production process was coded as a separate AOI, rendering 15 distinct areas. The Tobii system also provided data concerning the total time fixated

on an AOI as well as the number of fixations occurring within the defined space. By way of a post-stimuli questionnaire, participants identified the production process they allocated the most time toward during the website navigation procedure

The third research question, which sought to examine differences in visual attention to the website between individuals with high agricultural involvement and low agricultural involvement was addressed by separating groups based upon responses to the agricultural involvement scale questions and discerning differences in self-report measures.

Research question four, which posited how trustworthy participants would consider The Maschhoffs organization was ascertained through the self-report measures concerning the trust scale.

Research question five, which sought to gather suggested improvements to the website from participants, was achieved through the implementation of an open-ended question. Researchers analyzed and coded the data for themes in response to the question: "If you could change anything about this website, what would it be?" Qualitative findings were used to supplement the quantitative analyses and provide additional information for website developers.

Results

RQ 1: What scanpath patterns emerge from individuals' initial evaluation of the website?

The first research question sought to identify scanpath patterns emerging from individuals' initial evaluation of the website. The sequential patterning mining algorithm did not render any significant patterns of spacio-temporal visual allocation during the first 15 seconds of participants' website navigation.

RQ 2: What areas of interest do participants attend to in the website?

The second research question sought to identify what production processes participants visually attend to, which was gathered through eye-tracking AOIs and a self-report question. Due to the interactive, multi-page nature of the website, data regarding AOIs was indiscernible for analysis. The self-report measure revealed the production step to which participants reported allocating the most attention. Of the participants, 40.5% said they allocated the most time to the breed to wean farm while 15.5% of participants said the gild developer. Another 15.5% of participants said the packing facility was where they allocated the most time while exploring the website.

RQ 3: Are there differences in visual attention to the website between individuals with high agricultural involvement and low agricultural involvement?

Depicted in Table 1, results from the third research question explicate both groups of high and low involvement participants reported the breed-to-wean facility as the production process they allocated the most amount of time toward during the website navigation procedure. A median (Mdn = 3.27) score was obtained from the agricultural involvement scale. Participants below the median were categorized into low agricultural involvement group, and participants above the median were regarded as individuals in the high agricultural involvement group. This resulted in 58.1% (n = 43) of participants categorized with low agricultural involvement and 41.9% (n = 31) of respondents placed in the group of high agricultural involvement.

Table 1
Dominant Website Area of Attention Based on Participant Self-Reported Data

Production Process	Low Involvement (n = 43)	High Involvement (n = 31)
Breed-to-Wean Facility	41.9%	38.07%
Finishing Facility	14.0%	19.4%
Boar Stud Farm	14.0%	12.9%
Gilt Developer Farm	11.6%	16.1%
Packing Facility	9.3%	9.7%
Grocery Store	4.7%	6.5%
Consumer Home	2.3%	0%
Export and Barge	2.3%	0%

Note. (N = 74) Percentages report the proportion of participants who deemed each area of the production process as the area where they spent the most amount of time on the website.

RQ 4: How do participants perceive the trustworthiness of The Maschhoffs organization?
To understand trust in The Maschhoffs organization, research question four was addressed by self-report measures. The Maschhoffs organization accumulated an overall mean trust score of 4.0 (SD = .85). Among high involvement individuals, the mean trust score was 4.5 (SD = .83). Among low involvement individuals the mean trust score was 3.8 (SD = .71). Participants generally agreed The Maschhoffs was qualified to provide information and could be trusted to disseminate factual information. Additionally, participants largely agreed The Maschhoffs organization had something to gain from developing the website.

RQ 5: What improvements do participants perceive can be made to the website?
Research question five sought to explore how participants believed the website could be improved. Open-ended responses revealed three themes embodying suggestions for website improvement: 1) encompassing navigational tools, 2) content additions, and 3) website structure. Several participants requested guides or explanations to aid their navigation of the site. As an example, one participant reported: “At first, I wasn't aware that some of the pictures had words on them so I didn't know to scroll and get that information. Somehow make it more noticeable that those pictures contain information.”

For some respondents, the information available on the website did not answer all their questions. Participants expressed concern in learning how much space each animal was allocated, how the nutritional needs of the livestock were being met, and how the slaughtering process was performed. In particular, one participant noted: “I would like to know how much room the pigs have in their pens. I feel like more animal-friendly information could be included in the website.”

The final theme consisted of revisions to the structure of the website, such as the incorporating videos for each production process and condensing written material. One participant stated: “There were only videos in some portions of the map. It would be cool to see more videos in each section. I tend to focus more on the visuals rather than the reading.”

Conclusions/Implications/ Recommendations

Results from this study reflect the individualistic nature of website usage. The absence of a scanpath pattern implies the lack of cohesive repetition, a finding perhaps linked with the request for navigational aid distilled from the open-ended responses. Participants often found themselves confused as to the sequence of the production process, as each individual forged a distinct path rather than adhering to any discrete pattern. If it was the intention of website developers to encourage viewers to follow a specific path, revisions to the website to consolidate areas of interest may need to be considered. Alternatively, if the goal is to allow users to choose their own adventure through the map, then the website supports the individual freedom of the user to find the information of interest to them and allow the user to dig deeper into that subject instead of constraining them to a linear journey through the map.

One notable conclusion fostered by the study's findings is the marked interest participants displayed to the breed-to-wean farm. Out of the eight production processes, more than a third of participants reported spending the most time attending to the breed-to-wean farm section of the webpage. Participants in both categories of involvement in agriculture gave attention to this area on the map, which describes the shelters of sows from insemination periods to approximately three weeks after birth. Among the most contentious practices in conventional swine production sensationalized by animal activist groups take place in the breed-to-wean facility. The use of gestation pens, farrowing crates, as well as the tail-docking of piglets occur in this sector of the farm operations. This finding aligns with previous work conducted by Deemer and Loboa (2011), suggesting these pork industry practices are among the most concerning to consumers. The overwhelming amount of information concerning the entire system of commercial pork production can present barriers to agricultural communicators, who may struggle to deliver targeted messaging. The finding that participants invested attention in this area reflects the interest and concern they harbor for this division of production. Researchers recommend agricultural practitioners exert time and energy in developing communication materials regarding this specific aspect.

Another area of the website that may benefit from expansion is the slaughtering process. The practices undertaken to harvest the swine did not constitute one of the 8 production steps detailed in the website. While many participants did not note the omittance of the process, those who did assumed it was because The Maschhoffs "had something to hide" (Participant 56). Previous research has noted the complicated balance of striving to be transparent without providing imagery potentially graphic or distressing to some audiences (Napolitano et al., 2010) However, the decision to refrain from publishing any material was not viewed graciously by participants who realized the section was absent. As Rawlins (2008) contended the threshold of transparency pertains to what the consumer perceives to be adequate information, researchers recommend further research exploring methods of informing consumers about slaughtering practices to increasingly engage in this dialogue.

Results stemming from the trust scale exude participants largely believed The Maschhoffs to be a credible source trusted to provide factual information, and an organization inherently concerned in upholding the public's well-being. Previous research has revealed the perceived trustworthiness and knowledge of farmers (Center for Food Integrity, 2018), an insight

explicating the innate value created by agricultural organizations and businesses in providing consumers with information regarding production practices. With this is mind, it is important to note consumers also recognize the benefits to the organization derived from building a website, a finding implying agricultural businesses will constantly have to work to build trust with consumers.

Future research is needed to identify specific concerns consumers possess regarding pork production. Such studies would grant refined insight as to which parts of the pork production cycle were most salient to consumers. Conducting social media analyses of animal activism groups may help communicators better understand the practices currently in contention. Additionally, inquiries seeking to better understand how much caution agricultural communicators should exercise when relaying information concerning slaughtering practices and other contentious topics could be advantageous to communication strategies.

Instead of using an multiple interactive webpages in an eye-tracking study, it is recommended future studies select a smaller subset of webpages to explore. Interactive websites with many pages and changing graphics can be assessed with eye-tracking software for visual attention; however, the data collected are challenging to discern and digest for useful reporting and discussion. Another option is for researchers to use static webpages in their eye-tracking work so as to create clear, unchanging areas of interest and determine individual page scanpaths from the inquiry. As for agricultural communicators who develop websites, they are encouraged to keep the selective attention of viewers in mind when designing online communication tools. By seeking to create pages harnessing top-down responses by following a streamlined narrative aligning with a viewers motivations, the information presented will be increasingly salient for an audience (Cummins et al., 2016).

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Seeing is believing: Applying social learning theory to agricultural virtual field trips in Ohio

For years, physical field trips have been a hands-on, interactive educational method to enhance student knowledge and perception on various topics. Today, schools face limited budgets and often times can't afford to send students on field trips; thus, virtual field trips (VFTs) have become an alternative to physical field trips. Youth of today are regularly exposed to countless forms of digital environments such as games on iPads, television, or YouTube videos. At the same time, agricultural literacy of the general public is very low. Several agricultural advocacy organizations have designed and hosted virtual farm trips, and each organization has taken its own approach. This exploratory case study of four agricultural advocacy organization's virtual field trip programs describes how these VFTs differ in platform, design, and supplemental educational materials while applying tenets of social learning theory, such as behavior modeling, retention, and reinforcement. Results show that online videos are the predominant format for VFTs but other materials, such as class activities and informational websites are also used to reinforce VFT information.

Introduction

For years, physical field trips have been a hands-on, interactive educational method to increase student knowledge and comprehension of classroom curriculum. Students can gain a lot from these experiences including interacting with professionals, connecting classroom lessons to real-world examples, and engaging with those real-world examples to increase interest and awareness of the topic of the field trip. Students are often limited to traditional classroom setting learning, for a variety of reasons, even though students are typically more interested in a hands-on approach to learning (Hehr, 2014).

Several agricultural advocacy organizations have implemented a virtual farm trip program. However, each organization has taken its own approach to virtual farm trips. Some of these organizations choose to work with other stakeholders for this effort, some run this operation in-house, and a few have only taken part for a short amount of time and found themselves stepping away from the program.

Virtual Field Trips

Virtual field trips (VFTs) have become an alternative to in-person field trips. In many instances, this is a cost-effective method of education that also saves time for teachers and schools, in preparation and travel. Similar to physical field trips, VFTs promote understanding of a professional field and explains the relevance of a career for students to connect with (Cox & Su, 2004). Virtual field trips also allow students with disabilities to have a valuable experience alongside their able-bodied classmates (Elleven et al., 2006). In addition, VFTs engage students in an informational and technological method of education that they are already comfortable with because of the frequent interactions they already have had with technology.

While several researchers have studied the use of VFTs, there is limited literature on agriculture-specific VFTs. Several agricultural groups and associations across the U.S. have hosted VFTs, but there are few published evaluations regarding the programs, their content, or their outcomes.

In this vein, this project was undertaken to better understand how agricultural organizations in Ohio are using VFTs to increase agricultural literacy among schoolchildren in the state.

Theoretical Framework

Agricultural Literacy

Frick, Kahler, and Miller (1991) defined agricultural literacy as "possessing knowledge and understanding of our food and fiber system" (p. 52). Pope (1990) determined how society will benefit greatly from having an agriculturally literate population that will make insightful and informed decisions regarding agricultural policies. As with other disciplines, an agriculturally literate society will result from regular instruction of agricultural and environmental sciences in educational settings. According to Erikson's Theory of Psychosocial Development, school-aged children (6-10 years old) "experience task identification, are enthusiastic learners, and are inquisitive about everyday surroundings and events" (Erikson, 1968 as cited in Sigmon, 2014). Studies have shown that students in elementary school are at the optimal age to shape their beliefs and attitudes about agriculture and the food system because at this time they are most open-minded and willing to explore differing ideas (Balschweid, 2002; Braverman, 1991; Hubert, 2000). According to Hubert's (2000) agricultural literacy study, children in grades Kindergarten through third are "the most influential" age group in terms of shifting perception or attitudes (p. 530).

An equipped teacher is the conduit necessary to increase agricultural literacy. Malecki, Israel, and Toro (2004) defined integration of agricultural literacy into the curriculum as "the purposeful integration of agricultural topics into the mandated curriculum...as natural interdisciplinary linkages" (p. 2). The teachers' beliefs, skills, and confidence in the course content positively correlate with the use of the curriculum (Rudd, 1995), and a student's knowledge is directly influenced by their teachers' exposure to and experiences with the content (Humphrey, 1994). Curriculum either does not include agricultural material or lacks accuracy because teachers lack experience and are unfamiliar with agricultural concepts (Trexler, 2001). This leads to a lack of knowledge in the students or inaccurate information being taught in the classroom.

Social Learning Theory

Bandura's (1977) social learning theory (SLT) addressed learning by observation modeling. Bandura (1986) stressed the importance of learning in diverse social environments and reinforcing the learned belief or behavior. Learning through modeling occurs when others observe an action or behavior and "forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action" (Bandura, 1977, p. 22). According to SLT, "modeling influences produce learning principally through their informative function" (Bandura, 1977, p. 22).

Bandura (1971) states that "virtually all learning phenomena resulting from direct experiences can occur on a vicarious basis through observation of other people's behavior and its consequences for them" (p. 2). SLT is based on the idea that individuals are faced with situations every day that challenge their actions and beliefs, but "through this process of differential reinforcement successful modes of behavior are eventually selected from exploratory activities,

while ineffectual ones are discarded" (Bandura, 1971, p. 3). These beliefs structure how an individual thinks and acts in future situations (Bandura, 1971).

Bandura (1977) identifies several factors that regulate attentional processes, including "the observers' characteristics, others involving the features of the modeled activities themselves, and still others involving the structural arrangement of human interaction" (p. 24). Additionally, learners are influenced by the social network by which they are regularly informed (Bandura, 1977). "Models who possess engaging qualities are sought out, while those lacking pleasing characteristics are generally ignored or rejected" (Bandura, 1977, p. 24).

While the experience of observation is important, it is crucial that the observation is reinforced to make adoption of a belief or behavior more likely (Bandura, 1977). This process, retention processes, is predicated on the idea that while being in an environment might stimulate learning by observation, one cannot acquire the belief or behavior without attending to it (Bandura, 1977). The final two processes, motor reproduction processes and motivational processes, involve analysis and evaluation of behaviors or actions a learner prefers to adopt (Bandura, 1977). These processes require the learner to reflect on their own understanding of their skills and prior beliefs and consider their motivation to adopt or not adopt an action or belief they observed (Bandura, 1977).

Social learning theory provided further guidance to analyze the visual component of VFTs. The modeling and observational components of a virtual field trip experience relate to the social learning theory. Students have the opportunity to see farmers and ranchers in action and gain more perspective on the career opportunities available to them and to visually understand, for example, how a tractor works, what pig feed looks like, and so forth.

Purpose and Research Questions

This study is a smaller portion of a larger project examining the implementation of VFTs by Ohio agricultural organizations. The purpose of this study was to examine virtual field trip communication artifacts for qualities related to the conceptual framework outlined above. The following research questions guided the study:

RQ1: What types of media are Ohio agricultural organizations utilizing in their VFTs?

RQ2: How do these organizations incorporate principles of social learning theory in their communication artifacts?

Methods

The purpose of this basic research was to explore VFTs developed by four agricultural advocacy organizations: Ohio Pork Council, American Dairy Association Mideast, Ohio Soybean Council, and U.S. Farmers and Ranchers Alliance. These agricultural advocacy organizations represent the farmers and ranchers of their organization and promote the commodities they serve.

Research Design

An exploratory multi-case study research design was chosen to provide as complete an understanding as possible of VFTs used by agricultural advocacy organizations. This research design builds on existing knowledge and is used to understand a situation holistically, rather than

examining specific variables (Merriam, 1998). A comprehensive understanding is realized through an in-depth description of the entity, program, community, and people being evaluated (Creswell & Poth, 2018). This method was most appropriate for this research because case studies seek to understand the interaction of all variables involved. Case studies are used when the researcher is interested in answering a question about how or why and obtaining information to further research about the subject matter being investigated (Creswell & Poth, 2018).

Sample Selection

An agricultural advocacy organization serves the farmers and ranchers that produce a commodity through programs, marketing, and promotion. The agricultural advocacy organization has an elected board that makes the decisions for how the money will be spent and a staff supports those decisions through implementation and courses of action. The agricultural advocacy organizations investigated in this research study were Ohio Pork Council, Ohio Soybean Council, American Dairy Association Mideast (ADAM), and the U.S. Farmers and Ranchers Alliance (USFRA). The Ohio Pork Council, Ohio Soybean Council, and ADAM are state or regional check-off associations that serve Ohio pork, soybean farmers, dairy farmers, and ranchers. USFRA is a member-funded, national association that consists of over 100 farmer- and rancher-led organizations.

The four organizations comprise a convenience sample identified through personal communications with the communications firm that manages several of the virtual field trip programs investigated in this study. These four organizations were chosen because they are among the few that chose to include VFTs among their programs. The U.S. Farmers and Ranchers Alliance is one of the only national organizations that have implemented a virtual field trip program, and they were chosen as the outlier to gather data about what is being done at a national level to increase agricultural literacy with VFTs.

Instrumentation and Data Collection

Focused interviews. Data were gathered through a combination of focused interviews and artifact examination. Interviews were conducted with staff members from the four agricultural advocacy organizations concerning the design of the VFTs and their motivation for implementation. The contact information for each field trip program manager was obtained through an internet search of staff at the organization and through recommendations made by professionals who had previously worked with the organization, and these staff members were contacted via email. All of the staff members that were invited responded and participated in the interview process, and four interviews were conducted.

Each interview was scheduled for no more than 45 minutes and was hosted via the Zoom teleconferencing platform to enable recording and transcription. The principal researcher prepared a list of open-ended questions regarding the program and its virtual field trip program. The questions reflected the objectives of the research to identify the motivations for implementing the program and the design of the VFTs. The questions were written to provide context for the interviewee's interest and expertise, their contribution to the virtual field trip, if the program aligns with the mission and vision of the organization, and further specific details of the virtual field trip. Table 1 provides the questions outlined for the focused interview.

Table 1

Focused interview questions

1. Can you tell me a little bit about your background? Education? Farm background?
2. What is your title and role at (commodity)?
    a. How long have you been in your position?
3. Tell me a bit about the purpose of (commodity)
4. What is the purpose of the VFT?
    a. When did you begin hosting VFT?
    b. How long has this program been at (commodity)?
    c. Did you establish the program, or did you adopt from another program?
5. How is it structured/how does it operate?
    a. How often?
    b. What content?
    c. How is it dispersed? (virtual or recorded)
    d. Additional resources?
        i. Do the teachers ask for these? Or do you give them?
    e. How do you market this program?
    f. Do you follow up with teachers?
6. What were the (commodity's) motivations for choosing to employ this program?
    a. why continue?
7. What does the future of the VFT look like?

Artifacts. Following the interviews, the researchers gathered documents the agricultural advocacy organizations sent to the classrooms when they host the VFTs. These documents included workbooks, lesson plans, and any related activity materials. The researchers also watched one example of each organization's virtual field trip that was archived on their respective websites.

Data Analysis

The researchers undertook a close reading of communications artifacts, including VFT videos, online resources, and physical documents. Close reading involves taking detailed notes and reflexively questioning the critic's interpretation of narrative, thematic, and stylistic features during the review. The interview data, used to triangulate the analysis of communications artifacts, were analyzed through a process of open coding. According to Saldaña (2009), a code is a short word or phrase that represents language-based data. Saldaña (2009) describes the process of coding as a method of capturing "a datum's primary content and essence" (p. 3). The interviews were transcribed and systematically categorized to reveal common themes among the four virtual field trip programs. Identifying the themes in the interviews provided a foundation for the researcher to execute cross-case analysis when analyzing the variety of data produced in this study. First, the researchers read through the transcriptions to identify common themes among the interviews. The themes were then categorized based on the research questions to which they closely aligned and the theories that support this study.

Findings

RQ1: What types of media are Ohio agricultural organizations utilizing in their VFTs?
Staff interviews and researcher review of VFT materials revealed a number of forms of communications media used by agricultural advocacy organizations to both prepare classrooms for VFT experiences and to conduct the VFTs themselves. All four of the organizations stated they chose to utilize video as their method of communication because consumers trust "real-life" video than any other communication channel. While they all agree video is good, they all slightly differ in how they implement their program design.

Ohio Pork Council. Ohio Pork Council's VFT program is heavily video-based and hosted via the organization's website and YouTube page. A Pork Council VFT starts with introductions of all participants, including a moderator, the host farmer, and participating teachers and classrooms, after which the farmer discusses the talking points they have been instructed to discuss. The moderator occasionally interjects to ask if any classroom has questions. They address each classroom and allow for several questions from students before moving on to other classrooms. Figure 1 is a screenshot of one of the archived VFTs found on the Ohio Pork Council YouTube page.

Figure 1. A screenshot taken from Ohio Pork Council's virtual field trip to a swine facility.

The Ohio Pork Council's virtual field trip webpage provides resources for teachers including Ohio swine industry facts, a summary of past VFTs, and a video about career opportunities in the pork industry. Figures 2 and 3 are screenshots of the Ohio pig facts video teachers are encouraged to show their students prior to the virtual field trips.

Figures 2-3: Screenshots from Ohio Pork Council's video shown prior to the VFTs

Ohio Soybean Council. Ohio Soybean Council manages a primarily web-based educational program called GrowNextGen. This program is a subset of Ohio Soybean Council and was designed to help teachers learn about opportunities to include agriculture in their classrooms and ultimately educate students about how agriculture and science fit together. This website provides curriculum and classroom activities, career videos, and industry contacts, along with information about the accompanying VFTs. Figure 4 is the first page of an activity obtained from this website. Figure 5 is a screenshot of a description of activities that can be completed with the purchase of a physical "classroom kit."

On the VFT page on the GrowNextGen website, Ohio Soybean Council provides resources and addresses state education standards. (At the time of data collection, VFTs from this program were not publicly available and thus were not included in this analysis.)

Figure 4. Ohio Soybean Council supplemental resource for teachers

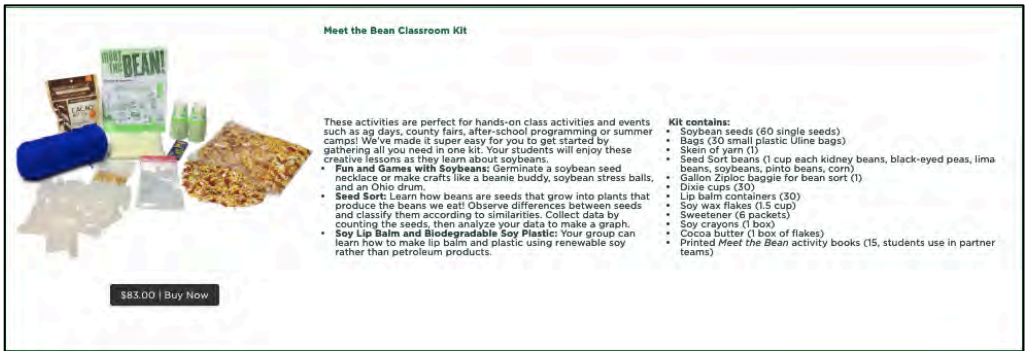

Figure 5. Ohio Soybean Council resource available on the GrowNextGen VFT website

The Ohio Soybean Council also works with an external communications firm to develop material to supplement the virtual field trip. The organization markets this program in several ways. The communications firm has a list of contacts they regularly invite to all virtual field trip programs they host. Ohio Soybean Council also informs the 5,000 contacts they have established through the GrowNextGen program, and also advertises the program in their magazine that is sent to 24,000 soybean farmers in the state.

U.S. Farmers and Ranchers Alliance. Figure 6 is a screenshot of the first image that appears in the 360° videos that promote Discovering Farmland, the VFT program operated by USFRA. The video continues to show a farmer speaking to a moderator about their dairy operation. Facts that relate to the farm appear on the screen for viewers to read while listening to the narrator.

Figure 6. The opening image of USFRA's Discovering Farmland videos.

Figures 7,8, and 9 are screenshots from the video on the dairy farm. The video is paused at 25 seconds in each screenshot, and the images are three different perspectives the user has when they scrub through the video.

Figures 8. USFRA video, angle 1

Figures 9. USFRA video, angle 2

Figure 10. USFRA video, angle 3

The USFRA encouraged participants to use 360° viewers that the organization provided;

however, users could access the videos on YouTube without the viewers. The organization chose to provide viewers to teachers who requested this program so the students could learn in an interactive way. On the USFRA 360° page, there is a PowerPoint (Figure 11) available for teachers called the "360 Degree Video 5-minute prep" that outlines how to use the videos and the benefit virtual reality plays in learning.

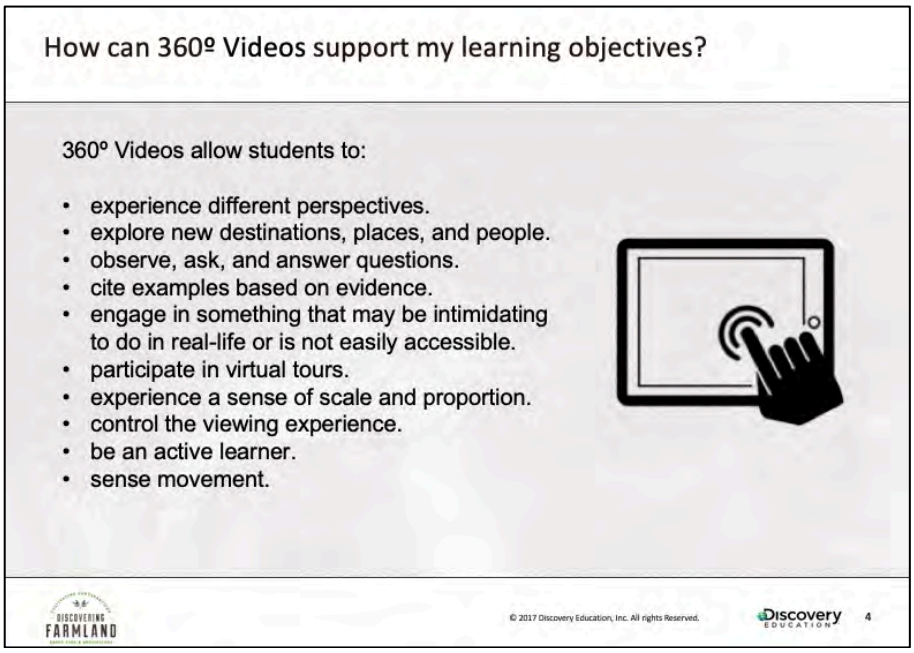

Figure 11. USFRA's 360 video prep for teachers

The organization presents programs at various trade shows throughout the year, and when they were informing their audience about the 360° videos, they would have 360° viewer giveaways. In preparing for the 360° they created a proposal to submit to the commodities they serve to request funding to develop the video.

RQ2: How do these organizations incorporate principles of social learning theory in their communication artifacts?

Social learning theory requires a combination of modeling, retention, and reinforcement, and these processes were borne out in our analysis of VFT manager interviews. Organizations gravitated toward video because it allows for a real-time experience for VFT participants. Stated the representative from the Ohio Pork Council when describing its YouTube format:

> This is not a pre-recording that comes in and we edit and cut things out. We've had baby pigs being born on the show in front of third graders. We've had embryos sacks that had to be punctured open so the baby pig could survive. And we've had iPads had to be set down so they can they can take care of a pig that's stuck in a feeder…[There's] value there for, not only for our producers to tell their story, but for consumers to see what it is we do.

Similarly, ADAM uses Zoom to both model behaviors in real time and to record and archive these videos for later viewing: "If the teacher wants to pop in and say, 'hey, Farmer Joe, I have a

question,’ that's great. We are going to record it through Zoom with the thought being if a student missed the day in class [and] they wanted to watch it, that’s great. Or if that teacher thought it went well and wants to share with other classrooms, that’s good, too.”

Like ADAM, Ohio Soybean Council uses Zoom to host its VFTs, and the organization takes advantage of the technology’s sharing features to reinforce the trips’ content: “[Partner] put together photographs and other visuals so that when they were talking about certain things, we’d bring them up. For example, if the farmer was talking a harvest about how a combine works, we had like a two-minute animated video of how a combine works, which is probably much easier to understand than having a farmer trying to explain it.”

National organization USFRA bolsters its VFTs with 360° videos, 360° viewers with which to interact with those videos, and online resources and in-class lesson plans for science, technology, engineering, and math (STEM) teachers. The USFRA VFT manager described the packages as “digital exploration”: “We livestreamed an event at John Deere narrated by these folks and we had B-roll from [partner] who’s in Minnesota that was talking about technology, and really the whole premise of this field trip was about smart farming and all the tools and technologies farmers are using to really make them efficient and sustainable.”

The virtual field trip programs allowed the agricultural advocacy organizations to educate uninformed audiences about farming and ranching practices in the most convenient way possible. Many participants had misconceptions about what a farm would look like, and, following the virtual field trip, they claimed to be pleasantly surprised by what they saw. The USFRA interviewee shared an experience they had following a virtual field trip: “We got so many comments like people didn't realize how clean it was. They were expecting, I guess, just a mess and disgusting and people would walk away like having a better understanding of what was actually happening and they’re like ‘well, it's not as bad as I would have thought.’”

Discussion

Two of the organizations pointed out the importance of sharing career opportunities with the students they interact with. This relates to the social learning theory and learning through observation (Bandura, 1977). Bandura (1986) stressed the importance of reinforcing the ideas or behaviors observed in an experience. The agricultural advocacy organizations, or their collaborators, have encouraged participating teachers to use certain lesson plans or activities before or following the virtual field trip to reinforce the knowledge that was obtained. Agricultural advocacy organizations should continue to collaborate with education specialists to create supplemental resources for teachers to use in classrooms. These resources could include activities, virtual games, worksheets, puzzles, and other materials that allow students to interact with each other in addition to the content. Based on social learning theory, students need to reinforce their learning through more activities and through social engagement with their peers, so VFTs should include an interactive component for students and hosts to engage in.

The social learning theory is slightly represented in the virtual field trip programs; however, it could be improved. In these experiences, students can participate as a group with their peers and to actually see what the farmer is doing on their farm. Students learn well in an interactive,

engaging environment because they have an opportunity to learn from each other, as well as the VFT organizers, and to voice their own ideas and opinions. Teachers must facilitate these in-class interactions while the VFT moderator and guests share information about farming and ranching practices; the moderator should allow time for the students to interact with the experts by asking and answering questions.

Web-hosted videos represent the predominant medium for VFTs and associated materials. Video has long been a part of immersive classroom experiences, and instructors have used recorded demonstrations, lectures, and other activities to model specific behaviors (Lange, 1971). Our interviews and materials review show that video remains a key tool in VFT delivery for its immediacy, interactivity (when recorded live via teleconferencing platforms), and accessibility. The inclusion of 360° videos adds a new angle to an established educational practice. 360° videos allow users to simultaneously record video from multiple viewpoints and splice together a virtual location that a student can "move" through when replaying the recording (Thompson, Krienke, Ferguson, & Luck, 2018). The technology has been used by Extension professionals in states like Ohio and Nebraska, and Thompson et al. (2018) report that "when attendees had the opportunity to view the 360-degree video prior to the formal presentation, they asked more informed questions and seemed to have a better grasp of the overall system. This experience demonstrated that 360-degree technology is a promising tool for engaging learners and bringing real-world experiences into a classroom setting" (p. 2). We recommend further study of 360° videos and their implementation in agricultural literacy endeavors.

Non-formal education programs that provide opportunity for students to learn in a particular situation and interact with experts, such as farmers, have the potential to shift students' perspectives. Interacting with experts offers a chance for students to compare what they've learned in a textbook to what they see in the real world. Educators continue to support the claim that hands-on learning is one of the most effective methods of learning. While virtual field trips lack an in-person component, the benefits of the program far outweigh the downfalls. Virtual field trips are cost-effective, time-effective, and safe for students and the livestock and crops on a farm or ranch.

This case study served as a starting point to understanding how agricultural advocacy organizations can optimize their resources to influence youth and increase agricultural literacy. Findings are not generalizable beyond these organizations at this point in time, thus future research studies of more programs could provide further insight into student outcomes. This study took place over a short amount of time and chose to look generally at the virtual field trip programs. It would be worthwhile to interview students and conduct pre- and post-tests of the students following their virtual field trip to compare the outcomes of students with the program design of the agricultural advocacy organizations virtual field trip in which they took part.

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The People or the Message: Which is responsible for Cognitive Conflict?

Abstract

While work on agricultural messaging is abundant, the way that audiences form perceptions of messages is not well understood and little research has examined the cognitive effects of image and word associations in an agricultural context. Previous knowledge gap research has shown that socioeconomic status and access to information could be one contributor of perception formation. We propose that these variables could also impact cognitive processing. Therefore, the purpose of this exploratory study was to examine how components of cognitive dissonance and knowledge gap theory apply in the context of a contentious agricultural issue. Data were collected from 1,049 United States' residents through an online survey with an embedded experimental design. Respondents randomly received one of two image and word association pairings. After viewing the treatment, measures of cognitive conflict, demographics, and desire to learn more were collected. The results showed that the cognitive conflict instrument performed differently in the context of a complex agricultural issue than in prior research. Additionally, the message pairings had a stronger influence on cognitive conflict components than demographic characteristics. Finally, the desire to learn more was impacted by the message treatments. Future research on cognitive conflict and advanced modeling is recommended.

Introduction

Single words, or phrases, often cause us to create mental images. For example, if you hear the phrase *dairy farm*, an image probably comes to mind that is reminiscent of experiences, knowledge, or prior images you have seen before. However, not everyone has the same experiences, knowledge, or exposure to prior images. While you may have imagined a modern dairy farm with a free stall barn and herringbone parlor, others may have imagined a farm situated on rolling hills with a big red barn and dairy cows out on pasture. This multiplicity of meanings is important for agricultural communicators to understand, as it could affect the way their audiences cognitively process and form perceptions about the images that they are presented with, including images of livestock housing. Furthermore, with less and less people having a direct relationship with the farm and agriculture, they are potentially more likely to have a mental image of the farm that is not consistent with modern reality and instead looks more like the farm that their grandparents or great-grandparents experienced (Rumble et al., 2019).

Communicators have known for some time that interpretation of words and images vary among individuals (Specht & Rutherford, 2013), and research on audience perceptions of agricultural messaging is plentiful (Goodwin et al., 2011; Abrams & Soukup, 2017; Ruth & Rumble, 2019). While the work on agricultural messaging is abundant, the way that audiences form perceptions of messages is not well understood. Several theories, such as cognitive dissonance and others, have been used historically to address communication issues. Theories such as knowledge gap have also attempted to explain the obstacles that different groups face to acquire knowledge through access of information. Knowledge gap research has shown that socioeconomic status and access to information could be one contributor of perception formation (Tichenor et al., 1970). We propose that these variables could also impact cognitive processing. If someone of low socioeconomic status does not have access to knowledge about information that is presented would their cognitive dissonance be impacted? In this study, we seek to examine if these

socioeconomic variables used in knowledge gap theory or message components have a greater influence on cognitive conflict related to livestock housing systems. This research also adds to the literature by examining the cognitive effects of image and word associations in an agricultural context. In a time where agricultural issues are becoming more nuanced, it is important to reevaluate if historical models and theories are still relevant in addressing complex issues, as well as to evaluate the relationship between these models and theories. As a result, this research seeks to fulfill the American Association of Agricultural Education Nation Research Priority 7: Addressing Complex Problems from the American Association for Agricultural Education (Roberts et al., 2016).

Key Literature & Theoretical Framework

Images and Meaning

Cognitive dissonance and the interpretation of images both play roles in the way audiences may process complex issues in the agricultural industry. Rhetoric, while once considered purely verbal or written, has evolved into a concept that includes visual images and symbols open for the interpretation of the audience (Specht & Rutherford, 2013). Images are thought to be very impactful and hold the same weight as words in terms of conveying meaning (Bulmer & Buchanan-Oliver, 2006). Visual images are affected by selection, emphasis, and framing, which communicators can use to influence how an audience interprets an image (Allen, 1996). While images can be framed to be interpreted in a certain way, audiences assign meaning to images based on each individual audience member's background, lifestyle, and consumption of mass media (Glaze et al., 2013). Past research has identified that individuals assign different meaning to traditional and conventional images of agricultural practices and cautioned that use of traditional images may be creating idealistic ideas about the industry (Rumble & Buck, 2013).

Cognitive Dissonance Theory

While it is known that individuals ascribe different meaning to traditional and conventional agricultural images, it is relevant to discover the cognitive dissonance caused within individuals by those meanings. Cognitive dissonance theory states that "individuals experience a psychological state of discomfort (i.e., cognitive dissonance) when faced with inconsistencies between two or more held cognitions" (Ong et al., 2017, p. 60). As a result of being faced with inconsistencies in their thought processes, individuals will seek to relieve the discomfort that the inconsistencies cause in their minds (Festinger, 1962). Individuals will either change their attitudes to be consistent with the new information, or they will reject the new information and stand by their previously held cognitions, to relieve this discomfort (Festinger, 1962). Furthermore, individuals will attempt to avoid information that discredits their beliefs altogether if they are able (Frey, 1986). Cognitive conflict as a result of dissonance is experienced when an individual has negative feelings about a decision they make, or the decision is inconsistent with their beliefs.

Research has suggested that due to different understandings of food and agricultural definitions, as well as the way individuals process messages, cognitive dissonance may occur when audiences receive messaging about agriculture. In a 2015 study, it was found that participants had varying definitions of local food. Some defined it as food grown in a certain location, while

others interpreted it as food grown anywhere from within the state or within the entire region (Gorham et al., 2015). The study suggested that when individuals purchase food products, they may experience cognitive dissonance, but will reject conflicting information and still purchase products that they are comfortable with (Gorham et al., 2015). Other research has connected cognitive dissonance to natural disaster perceptions and environmental issues (Gorham et al., 2016; Taylor et al., 2017). A 2018 qualitative study identified that audiences experienced cognitive dissonance after reading a negative book about animal agriculture and then discussing their own meat-eating behaviors, but the researchers did not measure the amount of dissonance that these individuals felt (Spolarich et al., 2018). The authors concluded that, "As one might assume, the increased controversy surrounding the U.S. food system has resulted in feelings of dissonance for many individuals when it comes to their own food-based behaviors" (Spolarish et al., 2018). Research has examined the relationship between images and cognitive dissonance, but in the context of body image, rather than visual images and none that looked at agricultural images specifically (Halliwell & Diedrichs, 2014; Steele et al., 1993).

An instrument for determining levels of cognitive conflict was first identified by Lee et al. (2003). This instrument identified four potential components to cognitive conflict that an individual may feel when processing new information: recognition of anomaly, interest, anxiety, and reappraisal of the cognitive conflict situation (Lee et al., 2003). Recognition of anomaly was operationally defined as "recognizing one's conceptions are not consistent with the results of the experiment/discourse/textbook, etc." (Lee et al., 2003, p. 592). The interest component represented the level of interest in the information. Anxiety resulting from the information was identified as the anxiety component. Finally, reappraisal of the cognitive conflict situation was defined as "reappraising the anomalous situation; the cognitive conflict and the problem" (Lee et al., 2003, p. 592). This component was present when individuals reassessed the information that differed from their preexisting thoughts. Based on the instrument, individuals are given a score for each cognitive conflict component after responding to a series of statements that correspond with each stage (Lee et al., 2003). Although the instrument was utilized originally in secondary classrooms, it is composed of general statements, which makes it easily adaptable to a variety of situations (Lee et al., 2003). The instrument was found to be both valid and reliable when measuring the cognitive conflict of students in a classroom (Lee et al., 2003). This instrument was later adapted for a study that added a fifth cognitive dissonance component, state of consonance, that accounted for respondents who do not experience cognitive dissonance after receiving new information (Dietrich, 2016). The study identified which agricultural practices caused the most dissonance in audiences and the impact that dissonance had on the respondents' attitudes toward the agricultural industry (Dietrich, 2016). Using the instrument, it was found that cognitive dissonance related to agricultural issues has a negative impact on feelings of safety and trust in the food industry (Dietrich, 2016). The cognitive conflict instrument was further adapted for this study, which will be discussed in the methods.

Knowledge Gap Theory

Knowledge gap theory states that there is a gap in knowledge between those of higher and lower socioeconomic status which then effects the way individuals in each group process new information (Tichenor et al., 1970). The gap is caused because those with higher socioeconomic status tend to gain access to information more quickly than those with lower status, and this further widens the gap between the two groups (Tichenor et al., 1970). Research has suggested

that those who reside in rural areas and have a lower income experience knowledge gap due to less access to media outlets and online sources (Rainie et al., 2003). It has also been suggested that representations and information of agriculture in the media are often incorrect (Whitaker & Dyer, 2000). In addition, a knowledge gap has been identified in consumers' beliefs of what agricultural practices produce safe and wholesome food (Rumble & Buck, 2013). Research has shown that members of demographics thought to have gaps in knowledge about agricultural issues, have self-reported that they are motivated to pay attention to media coverage about agricultural issues, specifically animal welfare, environment, nutrition, and food safety issues (Ruth et al., 2018). Audiences that have a knowledge gap on agricultural topics are most motivated to gain knowledge about food safety, but their self-reported motivation to gain knowledge about other issues suggests that they may be interested in learning more when presented with information that falls within their gap in knowledge (Ruth et al., 2018). This research seeks to identify if respondents most likely to have a knowledge gap about agricultural issues also experience cognitive dissonance related to those issues.

Purpose and Objectives

The advent of complex and contentious issues provides communicators an opportunity to pause and reexamine theoretical concepts that had been tested and proven in less contentious times. The purpose of this exploratory study was to examine how components of cognitive dissonance and knowledge gap theory apply, in the context of a contentious agricultural issue, to inform modern communication practices. The objectives of the study were to

1. Test and develop measures of cognitive conflict applicable to a context of agricultural images.
2. Determine the influence of demographics and message characteristics on cognitive conflict levels identified in the instrument.
3. By treatment group, determine if cognitive conflict components differ between those who want to learn more about livestock housing practices and those who do not want to learn more about livestock housing practices.

Methods

This study was a part of a larger experimental study, which included several dependent variables, some of which have been previously reported (Rumble et al., 2019). The study's population was United States residents over the age of 18. The 1,049 respondents in the sample were recruited via non-probabilistic sampling (Rumble et al., 2019). Kitchenham and Pfleeger (2002) identified that non-probabilistic samples are used, "because they are easily accessible or the researchers have some justification for believing that they are representative of the population" (Kitchenham & Pfleeger, 2002, p. 19). They also suggested that non-probabilistic sampling should be used when the target population is hard to identify or very specific and limited in availability (Kitchenham & Pfleeger, 2002). To account for some of the limitations associated with non-probabilistic samples, post hoc weighting procedures were used (Baker et al., 2013). Data were weighted to the U.S. Census statistics for gender, age, and race/ethnicity. Additionally, an attention filter and manipulation check were used in the survey to ensure that respondents were reading the questions carefully and attending to the experimental treatment. If the attention filter or manipulation check was answered incorrectly, the response was removed from the sample.

The survey was administered through the survey company Qualtrics which also recruited, qualified, and incentivized the sample (Rumble et al., 2019). In a large online survey, respondents were randomly presented with one of two researcher developed image and word association pairings. The first was an outdoor image of small-scale cage-free poultry housing, accompanied by the caption "This image depicts cage-free housing for egg laying hens. The hens may roam around and are able to enter and exit the enclosed nesting area as they please. The hen's housing is not climate controlled" (Rumble et al., 2019) (See Figure 1). In place of that pairing, other respondents received an image of indoor, large-scale poultry housing, along with the caption "This image depicts cage-free housing for egg laying hens. The hens may roam around and are able to enter and exit the enclosed nesting areas as they please. The hen's housing is climate controlled" (Rumble et al., 2019) (see Figure 2).

This image depicts cage-free housing for egg laying hens. The hens may roam around and are able to enter and exit the enclosed nesting area as they please. The hen's housing is not climate controlled.

Figure 1. Outdoor, small-scale treatment [Authors]

This image depicts cage-free housing for egg laying hens. The hens may roam around and are able to enter and exit the enclosed nesting areas as they please. The hen's housing is climate controlled.

Figure 2. Indoor, large-scale treatment [Authors]

After viewing the images, the respondents responded to 14 statements related to cognitive conflict on a five-point Likert Scale (real limits = 1.00 – 1.49 = strongly disagree, 1.50 – 2.49 = disagree, 2.50 – 3.49 = neither agree nor disagree, 3.50 – 4.49 = agree, 4.50 – 5.00 = strongly agree). Respondents were also asked to indicate whether or not they would like to learn more about a variety of livestock practices including the "housing of livestock raised for human consumption." Several demographic questions were also asked. The demographic variables of interest in this manuscript were age, sex, home location, education, and household income. Prior to data collection, the instrument and stimuli were validated through a panel of experts that included a social scientist, an animal scientist, and two livestock commodity organization representatives (Rumble et al., 2019).

The cognitive conflict scale was adapted from Dietrich (2016) who examined cognitive dissonance toward a series of agricultural images. The scale used by Dietrich (2016) was adapted from Lee et al's (2003) instrument for measuring cognitive conflict. While Lee et al's instrument included subscales of recognition of anomaly, interest, anxiety, and reappraisal of cognitive

conflict, Dietrich (2016) also added a component of consonance to her adapted instrument. Dietrich's (2016) study examined the instrument components descriptively and individually, thus there was an opportunity to further assess the adapted instrument in an agricultural context.
To analyze objective one a factor analysis was performed on the instrument to determine if the subscales were still reliable after the adaptation and in the context of agriculture. The Kaiser-Meyer-Olkin Measure and Bartlett's Test of Sphericity were sufficient and allowed for a varimax rotation. A varimax rotation maximizes "the dispersion of loadings within factors...resulting in more interpretable clusters of factors" (Field, 2013, p. 681). The factor analysis resulted in three components further described in the results for objective one. The reliability on each component was assessed using Chronbach's alpha before creating indexed components for use in objectives two and three.

Objective two was analyzed using multiple regression to determine what message and demographic variables influenced the cognitive conflict components resulting from the factor analysis. The demographic variables of sex (male*, female), home location (rural, urban or suburban*, city), education (High school or less, some college*, college degree), and income (Less than $25,000, $25,000-$49,999*, $50,000-$74,999, $75,000 or more) were all dummy coded. The asterisks for in each list of categories denotes the category treated as the constant. Age was not dummy coded as it was a continuous variable. Message treatment was also dummy coded, with image and word pairing of the outdoor image of small-scale cage-free poultry housing serving as the constant. The assumptions of normality, linearity, multicollinearity, and homoscedasticity were assessed for the regression models. There was a slight violation to homoscedasticity for the anxiety model. The anxiety variable was transformed to correct for the violation. The anxiety model reported is a result of the transformed data.

Objective three was analyzed using an independent t-test for each treatment group. The desire to learn more about livestock housing or not served as the grouping variable, while cognitive conflict components discovered in the factor analysis served as the dependent variables. The assumptions of normality and outliers were met. However, the assumption of Homogeneity of Variance was violated per the Levene's test for the outdoor large-scale treatment and equal variances could not be assumed and corrections were run per the recommendations provided by Field (2013). The statistics reported for the treatment account for the correction.

Results

Objective 1: Test and develop measures of cognitive conflict applicable to a context of agricultural images.

The factor analysis revealed three components, rather than four components suggested by the original cognitive conflict model (Lee et al., 2003) and the five components suggested by Dietrich (2016). The components included anxiety and consonance as well as a combined interest and recognition of anomaly component (see Table 1). The anxiety subscale included 5 items and had a Cronbach's alpha of .90. The interest and recognition of anomaly subscale had six items and a Cronbach's alpha of .822. Finally, the consonance subscale had three items and Cronbach's alpha of .487. Due to the low reliability of the consonance subscale, these items were disregarded for the remainder of the study.

Table 1.
Factor analysis of cognitive conflict scale in context of consumer reactions to image and word associations of complex livestock housing systems.

Items	Rotated Loading Factors		
	Anxiety	Interest and Anomaly	Consonance
Seeing the cage-free hen housing featured in this image makes me uncomfortable	**.856**	.182	.048
The cage-free hen housing featured in the image concerns me	**.838**	.254	.061
I wish I had not seen this image	**.816**	.055	-.056
Upon seeing this image, I have doubts about cage-free hen housing**	**.810**	.219	.093
The cage-free hen housing featured in the image confused me	**.772**	.130	.013
Since seeing the image, I am more curious about cage-free hen housing	.063	**.812**	-.045
The cage-free hen housing featured in the image attracted my attention	-.119	**.733**	-.190
I intend to seek more information about cage-free hen housing featured in this image**	.309	**.673**	-.013
My feelings about cage-free hen housing have changed after seeing this image	.353	**.669**	.012
I need more information about the cage-free hen housing featured in this image	.390	**.617**	.096
I am surprised by the cage-free hen housing featured in this image	.447	**.564**	.010
The cage-free hen housing featured in this image is a proper representation of U.S. agriculture*	-.066	-.214	**.732**
This image does not impact my thoughts about cage-free hen housing*	-.089	.353	**.685**
My perceptions about cage free hen housing are supported by this image *	.352	-.190	**.676**

*indicates reverse coding
**indicates factor loading different from original instrument
Note. Green shading = Anxiety component, Pink shading = Recognition of Anomaly component in original instrument, Blue shading = Interest component in original instrument, Gold shading = Reappraisal of cognitive conflict component in original instrument, Gray shading = State of consonance component, Violet shading = Combined interest and recognition of anomaly component

Objective 2: Determine the influence of demographics and message characteristics on cognitive conflict levels identified in the instrument.

To determine the influence of demographics and the message treatments on the cognitive conflict components two regression models were ran. In each model, the demographics and the message treatment served as the independent variables and were dummy coded. Age was the only demographic variable not dummy coded since it was continuous in nature. In one model anxiety served as the dependent variable and in the other interest and anomaly served as the dependent variable. The model for the anxiety variable was significant and explained 11% of the total variance in anxiety (p = .000, R^2 = .110). The interest and recognition of anomaly variable was also significant, but only explained 5.9% of the variance in interest and recognition of anomaly (p = .000, R^2 = .059). The significant predictors for each variable are seen in Table 2. In both models the message treatment had the largest influence. Anxiety increased by .620 and interest and recognition of anomaly increased by .288 among those who received the indoor, large-scale poultry housing image and corresponding cage-free text. Anxiety and recognition of anomaly both decreased for those who resided in rural locations (-.164 and -.204, respectively). Interest and recognition of anomaly also decreased among those with a college degree. Finally, anxiety decreased by .005 and interest and recognition of anomaly decreased by .004 for each increase in age.

Table 2.
Significant predictors of anxiety and interest and recognition of anomaly

Predictor	*B*	*t*	*p*
Anxiety Model			
Message Treatment	.620	10.075	.000
Home Location_ Rural	-.164	-2.083	.038
Age	-.005	-2.625	.009
Interest and Recognition of Anomaly Model			
Message Treatment	.288	5.848	.000
Home Location_ Rural	-.204	-3.237	.001
Education_ College Degree	-.149	-2.391	.017
Age	-.004	-2.835	.005

Objective 3: By treatment group, determine if cognitive conflict components differ between those who want to learn more about livestock housing practices and those who do not want to learn more about livestock housing practices.

In the indoor, large-scale treatment, 254 respondents indicated that they wanted to learn more about livestock housing and 280 indicated that they did not want to learn more. In the outdoor, small-scale treatment, 209 respondents indicated that they wanted to learn more and 306 indicated that they did not want to learn more.

When assessing the desire to learn more about livestock housing practices, descriptive and significant differences in anxiety and interest and recognition of anomaly were found among both treatment groups (See Tables 3 and 4). In the indoor, large-scale treatment group, those who

reported wanting to learn more about livestock housing had significantly higher anxiety (*M* = 2.95) and higher interest and recognition of anomaly (*M* = 3.69), than those who did not want to learn more (*M* = 2.57, *M* = 3.11). A medium effect size was observed for interest and recognition of anomaly (*d* = .769), while a small effect size was observed for anxiety (*d* = .368)

In the outdoor, small-scale treatment group, those who reported wanting to learn more about livestock housing had significantly lower anxiety (*M* = 2.01), and higher interest (*M* = 3.22) than those who did not want to learn more (*M* = 2.23, *M* = 3.03). Small effect sizes were observed for both interest and recognition of anomaly (*d* = .243) and anxiety (*d* = .234) The anxiety and interest and recognition of anomaly were higher among all groups that received the indoor, large-scale treatment.

Table 3.
Indoor, large-scale treatment: Independent T-Test of Differences in Cognitive Conflict Components between Desires to Learn

Cognitive Conflict Component	*M* Learn More (*n* = 254)	*M* Don't Learn More (*n* = 280)	*t*	*p*	Mean Difference
Anxiety	2.95	2.57	-4.230	.000	-.376
Interest and Recognition of Anomaly	3.69	3.11	-8.925	.000	-.580

Table 4.
Outdoor, small-scale treatment: Independent T-Test of Differences in Cognitive Conflict Components between Desires to Learn

Cognitive Conflict Component	*M* Learn More (*n* = 209)	*M* Don't Learn More (*n* = 306)	*t*	*p*	Mean Difference
Anxiety	2.01	2.23	2.605	.009	.225
Interest and Recognition of Anomaly	3.22	3.03	-2.664	.008	-.189

Conclusions & Recommendations

Objective 1: Test and develop measures of cognitive conflict applicable to a context of agricultural images.

In Lee et al's (2003) instrument, each of the items that were subjected to a factor analysis loaded equally into the four cognitive dissonance components that were identified in that study. Dietrich (2016) did not report completing a factor analysis to identify how the cognitive dissonance components loaded in an agricultural context. The factor analysis in this study showed a loading of three of the five proposed cognitive conflict components. While Lee et al's original instrument showed the components of anomaly and interest loading separately, our study showed them loading into a combined component in the context of an agricultural issue. This may be

explained by the context and age of participants in the Lee et al. study compared to this study. Lee et al's (2003) study was completed with Korean adolescents in an educational setting. The interest of participants in this study may be more intrinsically motivating as our respondents were not in an educational setting and were over the age of 18. The reappraisal of cognitive conflict item also loaded with the interest and anomaly component. This suggests that those who recognize an anomaly and are interested may be more likely to reappraise cognitive thoughts rather than immediately reject them. Further work should be done to better understand cognitive reappraisal either as its own subscale or as a separate outcome variable.

Additionally, the consonance component proposed by Dietrich (2016) did load but was not reliable in this study. Further work needs to be done to establish a consonance subscale with additional items as such a subscale could be beneficial to understanding cognitive conflict of complex issues. The anxiety component loaded closely to Lee et al's (2003) original anxiety subscale with the addition of one item that originally loaded as a recognition of anomaly item. The placement of this item should be further explored in subsequent studies. The differences in the cognitive conflict components identified in this study versus previous studies suggests that the cognitive conflict scale may operate differently in the context of a complex issue rather than in a classroom setting like the one studied by Lee et al. (2003).

Objective 2: Determine the influence of demographics and message characteristics on cognitive conflict components.

This research found that messages account for greater influence on components of cognitive conflict than demographics. While there was an assumption that individuals with knowledge gaps related to agricultural issues would have more cognitive conflict, it was found that either the knowledge gap is not large enough to observe the differences or the messaging is more influential. This provides an interesting twist to previous literature that found that agricultural messages are misrepresented in the media (Whitaker & Dyer, 2000) and that consumers have a knowledge gap related to agricultural issues (Rumble & Buck, 2013). Our research shows that messaging has a greater impact over conflict than the demographic information, and therefore knowledge gaps.

Both those who reported living in rural areas and older respondents had lower cognitive conflict, which is likely explained by experience, but contradicts prior knowledge gap work regarding rural respondents (Rainie et al., 2003). The increased cognitive conflict experienced by younger respondents could be explained by younger people being further removed from production agriculture and having a greater knowledge gap. Furthermore, because those with a college degree showed a decreased level of interest and recognition of anomaly it could be inferred that their interests are more specialized due to receiving a college degree. This research found that many of the predictors of gaps in knowledge about agricultural issues are not holistically predictors of cognitive conflict or higher levels of interest, as we previously expected.

Objective 3: By treatment group, determine if cognitive conflict components differ between those who want to learn more about livestock housing practices and those who do not want to learn more about livestock housing practices.

In general, we expected more participants to want to learn more about livestock housing than not, but that desire may be reflective our own interests. In both treatments, more respondents did not want to learn more than those who did want to learn more. The wording of this question may have impacted these results. The question asked if they would like to learn more about "housing of livestock raised for human consumption." The question did not ask specifically about the housing of poultry. If the wording was specific to learning about poultry housing the results may have been different. Additionally, the results may simply be reflective of the respondents' lack of interest or a desire to remain willfully ignorant, as seen in other studies of livestock perception (Bell et al., 2017).

When individuals have higher interest and recognition of anomaly, theory tells us to expect individuals to either seek additional information so that they can align their attitudes with new information or, reject the new information and stand by their previously held cognitions in order to remove dissonance (Festinger, 1962). The reappraisal of cognitive conflict item loading with interest and recognition of anomaly in objective one suggests that individuals with higher interest and anomaly may be more likely to align their attitudes with new information and the results in objective three also support this thought. In objective three, those who wanted to learn more about livestock housing, in both treatment groups, reported higher levels of interest and recognition of anomaly. Thus, suggesting that they may be seeking to align attitudes rather than reject the information. The medium effect size for interest and anomaly among those who received the indoor housing treatment may suggest a stronger desire to align attitudes among those who reported wanting to learn more.

However, when looking at the anxiety component, different desires to learn more were observed among the two treatments. Those who received the indoor, large-scale treatment reported higher anxiety in general, but anxiety was also higher among those who wanted to learn more. The opposite was true of the outdoor, small-scale treatment. Those in this treatment reported lower anxiety in general as compared to the large-scale treatment, but contrary to large-scale treatment those who wanted to learn more reported lower anxiety. Thus, the results suggest that there may be a range of anxiety scores where individuals are more inclined to reject and avoid information that discredits their beliefs altogether (Frey, 1986). However, those with anxiety below and above this range may be more likely to want to learn more and consider aligning their attitudes as suggested by the means. This may be explained by an interaction between anxiety and recognition of anomaly. Future research should explore how these two cognitive conflict variables interact in the settings purposed by this study.

Recommendations for Practitioners

Practitioners can use this research to understand the way that audiences are processing the messages that they are producing. Practitioners should recognize that messages have a greater impact on cognitive conflict of message receivers than their socioeconomic characteristics. This suggests that the message may be more important in creating or limiting cognitive conflict than considering the backgrounds and characteristics of message receivers. Additionally, practitioners should be aware of audience's desires to learn more and how their desire to learn may be compounded with interest and anxiety. Specifically, there is an opportunity to capitalize on and

research further those who desire to learn more about indoor, large-scale housing as their interest and anomaly could provide strategies for future communication.

In considering the pairing of image and word associations, practitioners should be careful in their selection and consideration of the cognitive conflict these pairings may produce. For example, in this study, pairing wording about cage-free housing with an image of indoor large-scale poultry production caused higher anxiety and higher interest and recognition of anomaly. However, pairing wording about cage-free housing with an image of outdoor small-scale poultry production caused lower anxiety and lower interest and recognition of anomaly, likely because this paring was more familiar to consumers. One could argue that producing higher anxiety and interest and recognition of anomaly may drive more people to action. On the other hand, choosing communication pairings to produce lower anxiety and lower interest and recognition of anomaly may keep audiences closer to a state of consonance and less likely to take action. Communicators should consider the goals of their communication when making these pairing decisions and continue to follow additional research in this area as it develops.

Recommendations for Future Research

Due to the limited previous research related to the way that audiences cognitively arrive at interpretations of messages and the way that historically accepted theories interact with complex agricultural issues, there are many opportunities for researchers to further explore this research area. Future research should explore the components of cognitive conflict in the context of other complex agricultural issues and with other audiences, to see if the components load in a consistent manner across additional testing. Additionally, researchers may want to explore how action or behaviors may be influenced by levels of cognitive conflict. Researchers should seek to further develop the consonance component of the cognitive conflict instrument in order to increase reliability of the instrument. An opportunity also exists to develop the reappraisal of cognitive conflict component of the instrument or explore its suitability as an outcome variable. Research should also utilize the existing instrument to evaluate cognitive conflict when respondents learn about other agricultural issues, to assess if cognitive conflict varies between types of agriculture.

Educators may also wish to utilize and test the instrument in educational settings where complex agricultural issues are being discussed. Utilization of the instrument in this context would allow educators to determine and compare if anxiety and interest and recognition of anomaly is different among students than the general population in this context. This information could be helpful in facilitating learning around complex agricultural issues. In addition, future research should investigate how cognitive conflict is impacted when respondents view two conflicting images of agriculture instead of being presented with only one.

Finally, this study was exploratory in nature and is limited by the methods and statistical analyses used. Advanced statistical procedures and modeling may reveal further explanation of the variables of interest.

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Defining Personas of Cotton Producers: A Q Method Study

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Abstract

The depleting nature of the Ogallala aquifer has incited widespread efforts by agricultural communicators to promote water conscious irrigation strategies on the Texas High Plains. To aid organizations disseminate targeted messages, this study sought to examine perspectives of sustainability among Texas cotton producers. The exploration of sustainable textile perspectives was conducted with the application of Q methodology, and data analysis process revealed 6 personas embodied by Texas High Plains Producers. Each persona characterized distinct values and worldviews shaping an individual's thoughts and beliefs of sustainable textiles. As the industry of agriculture grapples with the challenge of connecting to consumers through shared values, future research examining the trends and patterns of opinion formation has the potential to serve as a valuable endeavor informing communication practices.

Introduction

Generations of consumers today live in an era of unprecedented connection. With the internet-driven transformation of media, distance is no longer a barrier to widespread communication. As a society we can revel in triumphs of the human spirit and find ourselves inspired by achievements of those who we may never meet. It also means we have front-row seats to the challenges facing our world, from watching twisting masses of plastic conglomerate across blue oceans to ancient rainforests being slashed to the ground (Castells, 2014). This connection has sparked a movement imploring individuals to be conscious of the social, economic, and environmental climate of the world (Ficko & Boncina, 2019; Strong, 1996). It is a phenomenon which has hastened the application of a word effectively capturing the imagination of millions; a label beckoning with a promise of a fulfilled and operational society (Whiteman, 1999). In a world threatened by climate change, the demand of growing populations, and shrinking natural resources, the concept of sustainability has emerged as a silver bullet (Kumar, Rahman, Kazmi & Goyal, 2012).

At its most basic definition, sustainability is characterized as the ability to maintain. It is a concept forwarded by governments and global organizations, by scientists and political leaders. Part of the allure of sustainability comes from its vague nature, as its function is largely dependent on a local context (Newtown & Freyfogle, 2005). The ability of businesses to mold the construct to their own industries has also crafted the word into an exceptional marketing tool (Mcdonald & Oates, 2006). A sector that has recognized consumer demand for sustainability is the textile industry (Dodd & Supa, 2011), igniting a movement that has spurred a bandwagon effect (Rieple & Singh, 2010), propelling consumers to follow social norms and buy ethically sourced products out of a fear of being left out of a trend (Bikchandani, Hirshleifer & Welsh, 1992; Schmitt-Beck, 2015). Until the 1980s, attitudes surrounding apparel purchasing were characterized by a "make do and mend" philosophy, as individuals placed refined care in

restoring clothes (Djelic & Ainamo, 1999). However, the early 1990s brought a fundamental change to fashion market, a transformation that emphasizes shorter seasons and the "newness" of trends (Barnes & Greenwood, 2006). Consumer demand for fast-fashion, punctuated by a desire for original and inexpensive clothing drove retailer brands to accentuate speed, quantity, and size of production. In 2014, American consumers purchased 60% more clothing than in 2000, but kept each garment half as long (Remy, Speelman, & Swartz, 2016).

While financially adept, these practices are documented to come at the expense of the environment, depicted in the pollution of air or water systems, or social inequality, epitomized by sweatshop working conditions (Zavestoki, 2002). As apparel and textile manufacturing is a labor-intensive practice bearing ecological hazards, retail brands have come under scrutiny for both environmentally and socially harmful practices (Peterson, Hustvedt & Chen, 2012).
At the heart of the textile industry is cotton production, responsible for growing the most prominent natural fiber in the world. Of the approximate 5.7 million bales of cotton produced each year, 57% is fashioned into apparel, and nearly a third is allocated toward home furnishings (Macdonald & Vollrath, 2005). While the transition to the fast fashion business model in the 1990s shifted most of the textile manufacturing entities overseas in pursuit of cheaper labor, cotton production remained firmly planted in the United States. The production of cotton has experienced environmentally oriented criticism, as the industry is responsible for 25% of all agricultural pesticide applications in the world (Kant, 2012). Cotton also has a reputation for being a water intensive crop (Chapagain, Hoekstra, Savenije, & Gautam, 2006), although 60% of all cotton produced in the United States relies solely on rainfall (USDA, 2010). The production of cotton is viewed as a fundamental component of a textile's inherent level of sustainability, and many apparel brands are pursuing avenues to certify the sustainability of their supply of the natural fiber (Annual Report, 2017).

Historically, a key barrier to the verification of sustainable cotton was the absence of traceability in the supply chain. After the ginning process, the origin of the cotton quickly becomes lost in a supply chain known to be "fragmented, complex, and not very transparent" (Bhardwaj & Fairhurst, 2011, p.167). The off-shoring of manufacturing further convolutes the supply chain (Zavestoki, 2002); over 97% of the clothing sold in the United States is manufactured elsewhere (Uranda, 2017). The United States is the largest importer of garments in the world, importing products from 150 countries (Apparel Industry, 1997).

In light of the increased interest pertaining to sustainable fabric, organizations have emerged acting as third-party consultants to authenticate the sustainable practices of the grower (Hustvedt & Bernard, 2008). Among these organizations is the Better Cotton Initiative (BCI), founded in 2009, which has grown to be the largest certifier of sustainable cotton growing practices in the world (Annual Report, 2017). In 2017, the cotton acreage following the oversight of the non-profit accounted for 14% of global production. The expansion of organizations such as BCI have connected many U.S. cotton growers to clothing retailers for the first time in decades (Annual Report , 2017). However, there is no concrete definition of what is considered to be sustainable, and corporations are left to outline their own standards independently (Page & Ritchie, 2009). The ambiguity of cotton sustainability has prompted a disconnect concerning perceptions of sustainability between consumers and producers (Peters, 2015).

The burgeoning prominence of sustainable cotton is happening amidst a challenging economic climate for producers. As export markets account for three-fourths of total demand for U.S. cotton (USDA, 2018), the industry notoriously experiences volatile prices shifts associated with a globalized economy (Koenning et al., 2004). The Texas High Plains, a subregion of the Great Plains encompassing West Texas, is a notable cotton growing region, producing 25-30% of the annual U.S. cotton supply, thus representing a significant market share for retailer interests (USDA, 2018).

The Texas Alliance for Water Conservation (TAWC) was established in 2005 to support West Texas growers, and although the TAWC was implemented to "monitor water use, soil moisture, crop productivity, and economic returns of cropping systems," they also investigate enterprise options for producers (Weinheimer et al., 2014). Most recently, their efforts have involved forging industry partnerships and acting as an intermediary with the BCI to introduce clothing retailers to Texas High Plains producers. TAWC leaders identified the need for a holistic understanding of textile sustainability (Borgstedt, personal communication, September 14, 2018). It is essential to recognize the patterns of opinion formation varying populations carry concerning the food and fiber system (Kovar & Ball, 2013). Once agricultural communicators distinguish these similarities, messages can be adapted to meet the preferences and mindsets of targeted audiences (Leggette & Redwine, 2016). Crafting message frames to a target audience has been identified as an important constituent of effective communication.

The novel interaction between producers and retailers has illustrated a need to identify and describe the perceptions regarding sustainable textiles among High Plains cotton producers. The Pew Research Center's (2018) threshold for defining generational cohorts distinguishes Generation Y as individuals born between 1981-1996, while Generation Z encompasses participants born in 1997 or later.

Conceptual/Theoretical Framework

This study harnessed Q Methodology to aid the TAWC in fostering water conscious practices among producers on the Texas High Plains. Q Methodology studies human subjectivity, a concept embodying how an individual's personal opinions and feelings shape one's judgements. Stephenson (1953) understood subjectivity not as a far-fetched, isolated conscious separated from the concrete environment, but as a behavior or activity vested in its relativity to the impact on a person's surroundings, a conception Brown (1980) further elaborated:

> Fundamentally, a person's subjectivity is merely his own point of view. It is neither a train nor a variable, nor is it fruitful to regard it as a tributary emanating from some subterranean stream of consciousness. It is pure behavior of the type we encounter during the normal course of the day (p. 46).

Q Methodology seeks to understand viewpoints of individuals within a conceptual space, an area of thought defined by a concourse, or an "overall field of shared knowledge and meaning from which it is able to extract an identifiable 'universe of statements' for any situation occurring in all realms of human experience" (Stephenson, 1986, p. 44). The term concourse is derived from the Latin expression *concursus*, meaning to run or flow together. Similarly, concourse theory

describes the observable domain in which ideas of a society simultaneously exist and interact (Brown, 1993). The theory describes the act of understanding as an innately contextual process, with parts understood in light of the whole; and the whole being understood as an interaction of the parts. A concourse in Q methodology develops these parts into heterogenous statements. In a Q methodological study, participants apply their preferences and priorities according to how each element stands in relation to them and their current viewpoint. In this way, individuals are able to project their feelings with self-reference onto a set of ideas (Watts & Stenner, 2012).

The study's research design is guided by Ajzen's (1991) Theory of Planned Behavior (TPB). TBP is grounded in the concept of humans acting as rational beings, using available information and assessing the implications of their actions when making decisions. Ajzen (1991) concluded behavioral intentions can be accurately forecasted through assessment of behavioral attitudes, perceived behavioral control, and subjective norms.

Ajzen defined intentions as a reflection of the extent of favorability felt toward a behavior, representing a notable predictor towards an individual's action. For Ajzen, (1991) behavioral attitudes encompass the subjective probability the behavior will produce a certain outcome, or what is anticipated to occur. Subjective norms comprise the social pressures of the behavior. These pressures may be indicative of what an individual believes is expected of them through peers, family, friends, and society. Ajzen (1991) described perceived behavioral control as the individual's perception of the ability to perform the behavior.

The investigation of perceptions surrounding sustainable textiles will be performed with the application of Q methodology, which studies human subjectivity through factor analysis by analyzing correlations between subjects across a sample of variances. The employment of Q methodology not only allows for the investigation of stakeholder attitudes by rating an individual's level of agreement, but also examines perceived subjective norms by exposing participants to a diversity of viewpoints. West Texas cotton growers have a unique connection to the sustainable textile industry, which allows for an exploration of a segmented audience's practices and intentions. The attitudes, subjective norms, and perceived behavioral control defined by Ajzen embody the very motivations and characteristics of opinion formation of the personas uncovered by Q methodology. By recognizing the inherent viewpoints of these personas, researchers can more fundamentally understand consumers' approaches to purchasing behavior or High Plains producers' adoption of farming practices.

Purpose and Objectives

The purpose of this study was to examine perspectives of sustainability among a key stakeholder group in the West Texas cotton industry – cotton producers. The identification of perspectives will enable the TAWC to clarify factors resonating with this target audience. To meet this purpose, two objectives were used:

1. Identify level of agreement with statements related to manufacturing and agricultural production practices among Texas High Plains cotton producers.
2. Describe personas related to the production and manufacturing of sustainable textiles of West Texas cotton growers.

Methods

The examination of sustainable textile perspectives was conducted with the application of Q methodology. Q methodology investigates the "values and preferences held by the public" (Steelman & Maguire, 1999, p. 362). Q methodology was designed to aid researchers in exploring human subjectivity to describe patterns of viewpoints held by specific audiences (Watts & Stenner, 2012). Leggette and Redwine (2016) noted these patterns are revealed by performing analyses that invert the Spearman *r* correlations and use the individuals as tests rather than instruments. "Instead of using instruments to test the performance of an individual and make comparisons to the population, Q methodology uses each individual, complete with all the subjectivity and holistic diversity, as tests for the performance of items" (Leggette & Redwine, 2016, p. 51).

Q methodology uses qualitative aspects of research in the examination of subjective human experiences and perspectives (Brown, 1993), but also integrates the quantitative tools of correlation and factor analysis to yield persona groupings (Simons, 2013). Q methodology is implemented through concourse development, Q sort identification, Q sort analysis, factor analysis, and factor interpretation (Simons, 2013).

The development of the Q sort instrument entails a process through which the researcher crafts a comprehensive account of constructs encompassing the perceptions, beliefs, and opinions of a topic known as the concourse. These ideas were formed into statements that compromise the Q set, physically sorted by individuals from negative to positive. Watts and Stenner (2012) recommended using a 40-80 statement Q set to enable coverage and balance into the topic. Q methodology researchers have cautioned against using too many statements, which can render the sorting process overly demanding and taxing for participants (Watts & Stenner, 2012). The current study employed a 40 statement Q set to avoid respondent fatigue (Table 1).

Table 1. *Q-set Statements*

Statement No.	Sustainability Domain	Statement
1	Social	Sustainable textiles are safe for the consumer
2	Social	Sustainable textiles are affordable for the consumer
3	Social	Sustainable textiles are made from high quality fibers
4	Social	Sustainable textiles are made with cotton grown using practices that minimize health stress to the producer
5	Social	Sustainable textiles come from an identifiable cotton producer
6	Social	Sustainable textiles are produced in large quantities to meet demand
7	Economic	Sustainable textiles support the continuity of family farms
8	Economic	Sustainable textiles are profitable for the cotton producer
9	Economic	Sustainable textiles are produced by cotton growers supported with government subsidies
10	Economic	Sustainable textiles are produced from cotton grown on small scale farms
11	Ecological	Sustainable textiles are made with cotton grown using practices that protect soil health

12	Ecological	Sustainable textiles are made with cotton grown using low emissions of greenhouse gases
13	Ecological	Sustainable textiles are produced from cotton grown in ways that respect biodiversity
14	Ecological	Sustainable textiles are produced with cotton grown with the responsible use of chemicals
15	Ecological	Sustainable textiles are produced using cotton grown without chemicals
16	Ecological	Sustainable textiles are produced with cotton grown with a focus on water conservation
17	Ecological	Sustainable textiles are made with GMO cotton
18	Ecological	Sustainable textiles are produced under standards to maintain air quality
19	Ecological	Sustainable textiles are made with cotton grown using practices to enhance wildlife habitat
20	Social	Sustainable textiles provide economic support for local communities
21	Social	Sustainable textiles are manufactured by workers who earn a living wage
22	Social	Sustainable textiles are manufactured without child labor
23	Social	Sustainable textiles are manufactured in factories that are voluntarily disclosed to consumers
24	Social	Sustainable textiles are functional fabrics
25	Social	Sustainable textiles sold in the U.S. are made with cotton grown by U.S. producers
26	Economic	Sustainable textiles are produced cost-efficiently
27	Economic	Sustainable textile are profitable for the retailer
28	Economic	Sustainable textiles are produced by companies who donate to the community
29	Economic	Sustainable textiles are manufactured by workers in fair working conditions
30	Ecological	Sustainable textiles are fully recyclable
31	Ecological	Sustainable textiles are free of synthetic dyes
32	Ecological	Sustainable textiles are packaged with recyclable material
33	Ecological	Sustainable textiles are manufactured using renewable energy
34	Ecological	Sustainable textiles undergo minimal transportation through the process from cotton to clothes
35	Ecological	Sustainable textiles should be worn multiple times before being washed
36	Ecological	Sustainable textile regulation is the responsibility of the retailer
37	Ecological	Sustainable textiles are produced using minimal water in the manufacturing process
38	Ecological	Sustainable textile regulation is the responsibility of the government
39	Ecological	Sustainable textiles generate minimal waste in the manufacturing process
40	Ecological	Sustainable textiles are manufactured without polluting water systems

Producers in the Texas High Plains were recruited for this study. In anticipation of cotton planting season, data was collected from producers in the months of March and April. The researcher administered the Q sort process to producers at regional business locations. Producers (N = 20) ranged from 31-75 years of age, with a mean of 54. The p-set was 95% male (n = 19) and 5% female (n = 1). The mean for farming experience was 27.8 years, with a range of 51 years. Every participant noted the implementation of drip or pivot systems for irrigation practices. Participants cultivated a variety of crops including cotton, hay, wheat, milo, and sorghum upon farms ranging from 630-4,000 acres.

Brown (1980) stated the purpose of Q methodology was to establish the existence of particular viewpoints, then to explicate and compare them. According to Watts and Stenner (2012), "large numbers of participants are not required to sustain a good methodological study" (p.72). Watts and Stenner (2012) suggested a minimum ratio of two participants to every study variable, or twice as many Q set statements as participants.

Data collection was accomplished in three stages. First, participants were prompted to complete a pre-sort questionnaire. Watts and Stenner (2012) noted the collection of demographical data adds to the richness of a Q methodological study by "confirming and corroborating the tone of particular interpretations" (p.75). Next, participants undertook the Q sort process. Large magnetic boards were formatted with a 13-point forced choice distribution, numbered from -6 to +6. Each Q set statement was printed on a 2" by 3" laminated card with a magnet attached to the back. An identifying number was placed on the back of each card to distinguish each statement for data analysis.

Participants were first prompted to read each statement and sort it into one of three categories. Category one consisted of statements the participant agreed with, the second category included the statements the individual disagreed with, and the third category comprised the statements the participant was unsure or felt indifferent toward. This "provisional ranking" process enables researchers to more accurately interpret the completed Q sort by understanding the balance of positive and negative sentiment (Watts & Stenner, 2012, p. 84). Once each statement was compiled into a category, participants were prompted to sort each statement into the forced distribution according to their level of agreement. Final placings were recorded using the statement's number on paper form, and a digital picture was captured for an additional layer of accuracy. Upon completion of the Q sort, the researcher conducted exit interviews to guide further insight into their perspectives and aid the researcher in interpreting the ranking carried out by the participant.

Data analysis was achieved through the employment of the PQ Method software, a system designed for Q Methodology. Following the guidelines Watts and Stenner (2012) provided, the researchers first calculated a Principal Component Analysis (PCA) to create an unrotated factor matrix. The Kaiser-Guttman Criterion advises practices for factor extraction, and in line with the measure, all factors with Eigenvalues of 1.0 were considered defining sorts. Factors holding Eigenvalues less than 1.0 were dropped and did not continue to the factor rotation process.

Results

To address RO1, a Principal Component Analysis was conducted as a method of factor extraction, rotating based on an Eigenvalue set a priori at 1.0 or higher. This principle guided the decision to extract six factors, explaining 62% of the total variance. Analytical characteristics are presented in Table 2.

Table 2. *Reliability, Eigenvalues, and Variance of Extracted Factors*

	Factor					
	1	2	3	4	5	6
Composite Reliability	.89	.89	.89	.92	.89	.92
Eigenvalues	6.40	2.64	1.53	1.49	1.29	1.02
% Explained Variance	32	8	7	6	5	4
Cumulative Explained Variance	32	40	47	53	58	62

Six distinct personas were elucidated from the data analysis process. These independently derived personas were labeled Autonomous Producers, Bottom-Line Focused Producers, Consumer-Driven Producers, Public Servants, Cotton is King Producers, and Practical Agriculturists.

Autonomous Producers were distinguished by a foremost concern for what they can personally control, exerting priorities within their reach. A notable distinction for this persona was the belief that cotton should be produced without chemicals. The safety of sustainable textiles was their highest priority. Many environmental aspects ranked high, inclusive of water conservation, responsible use of chemicals, protecting biodiversity, each a component a producer can accomplish. Autonomous Producers ranked the ecological attributes of air quality and renewable energy lower, both elements not always within the jurisdiction of producers. Social aspects of the manufacturing process, which do not directly affect a Texas High Plains cotton operation, were perceived as less important. Additionally, this group was most supportive of small farms, and the demographic characteristics revealed these producers operated the least amount of acreage than other producers.

Bottom-Line Focused Producers were strikingly business oriented. But while these producers ranked profit as their top priority, this persona also valued living wages and fair conditions for workers. The conservation of water and restraint from water system pollution was placed in high regard. While water was deemed important, individuals within this factor placed soil health and wildlife habitat lower than any other factors in the producer population, indicating this persona recognizes their operation depends on economic stability and as well as the caretaking of workers. Additionally, consumer affordability was ranked the lowest for Bottom-Line Focused Producers. One participant said, “I hate to say this, but I don’t care what happens anywhere else. I don’t care what happens in Thailand or India. I am only concerned with what happens right here.” This statement reflected a distinct priority of caring for their own workers rather than investing energy in concerning about textile workers abroad.

The sorting process indicated Consumer-Driven Producers uphold a broader approach to the issue of sustainability and also rely on the expertise inherent to the system. For this persona, creating a safe product while adhering to environmentally conscious practices such as protecting biodiversity, conserving water, using renewable energy, and responsibly applying chemicals

dominated the perspective. Consumer-Driven Producers were less attuned to focus on community resilience, sorting donation and economic support of local communities lower than any other factor in the producer population. Ultimately, this persona works to serve the consumer, and depends on retailer profit to drive incentives. Individuals in this group ranked "sustainable textiles should be profitable for producers" lower than any other factor, perhaps reflecting that other priorities transcend financial security for cotton growers. One participant stated, "I've been in this business long enough to know that we do not shape the market. Retail business and consumers create the demand, and we do our best to produce what we can."

Public Servants evidenced a viewpoint perceiving themselves as a link in an important system; working to fulfill an overarching goal of serving the public good. This persona strongly believes sustainable textiles should be produced by growers with subsidies, support local communities, be safe and affordable for consumers, while still exerting a focus on water conservation and soil health. Public Servants ranked mass production to meet demand, community donation, and the responsible application of chemicals higher than any other factors. This persona rejected the idea that sustainable textiles are produced solely in the United States and that sustainable textiles should undergo minimal transportation. Public Servants reflected a balanced approach to try and fulfill the needs of society. One individual who sorted into this group stated, "What we do is important. We help clothe so many people that we will never meet. But as people in our communities we have to try and make our own town a better place too."

Cotton is King Producers carry an inherent pride in the craft of producing cotton; and the priorities of this persona revolve around growing the best product. High quality fiber was deemed the most important component of sustainable textiles, inciting a consistent trend oriented around quality. Water conservation, restraint against water system pollution and waste, as well as maintaining air quality were the environmental constructs sorted as priorities, each representing features explicitly contributing to the attributes regarding the quality of cotton. Using renewable energy, enhancing wildlife habitat, and protecting biodiversity were sorted as less important. This persona rejected regulation both by the government as well as the retailer. One Cotton is King Producer stated, "I know what I'm doing. The retailers don't know how to grow cotton. They should stay out of it."

The Practical Agriculturists were set apart by a distinct sense of realism. While to this group sustainable textiles should be from the United States and profitable for retailers, the hardships of production are not alleviated for producers, but indiscriminately woven into this persona's sense of identity. Practical Agriculturists recognized the challenges associated with production, ranking health stress and fair working conditions low. Legacy was identified as particularly important to this factor, while exuding a sense that it is the producer's role to bear the burden (and therefore make a profit) rather than retailers. There was a pride and inherent status cultivated by a lifestyle associated with hard work. An individual in this persona stated, "What we do is not easy, and not everyone can do it. But it is our life." Traceability was important for this group, reflecting a sense that producers deserve recognition for the work they do. This tie to traceability and legacy was echoed in perspectives surrounding child labor. One participant noted, "My children were working with us from the time they could walk. I was out in the fields right about from the time I was crawling. Child labor is not bad. My kids learned about hard work early in their lives."

Conclusions & Implications

Persona development is a common strategy used to distinguish key stakeholder entities for marketing purposes. Personas are detailed archetypal characters stemming from empirical inquiry (Guo & Ma, 2018). The effective use of personas in strategical marketing and communication has been widely documented (Beason, 1991; Dion & Arnould, 2015; Min Kim & Wiggins, 2016;). Personas enable researchers to define subgroups within a population, constituting critical information for tailored messaging practices (Beuscart-Zéphir, Jaspers, Kuziemsky, Nøhr, & Aarts, 2013). The configuration of these factions requires a discerning knowledge of the psychographics inherent to the target audience (Guo & Ma, 2018), and this study was employed to capture an accurate depiction of the inherent beliefs, values, opinions, and preferences of the Texas High Plains producers.

One heartening conclusion stemming from the Q sort procedure was that producers consistently sorted water conservation as a high priority. This indicates the degree of impact regional organizations such as the TAWC have successfully administered in raising awareness, and such efforts remain at the forefront of producer's psyche.

While it appears water conservation is woven into the identity of producers in the Texas High Plains region, such a commitment doesn't necessarily transcend into other environmental principles. The importance of water conservation was sorted as a key aspect of cotton farming, but the value of other environmental constructs was far more ambiguous. A consensus did not emerge regarding the importance of soil health, biodiversity, responsible application of chemicals, air quality, wildlife habitat, or the pollution of water systems, and producers did not portray consistent streams of ideas regarding environmental stewardship. Such a finding reflects the complex nature of the challenge before communicators and conveys an opportunity for organizations to incorporate dialogue surrounding aspects of soil health and biodiversity into their message dissemination.

Another takeaway from this study regards how the concepts of producers being primarily economically driven should not be approached with a black and white mindset. Producers' desire to remain profitable was also characterized by a balanced concern for their workers and their land. While incorporating messages relaying economic stability are undoubtedly compelling to producers, it is important for communicators to understand profit may not constitute the sole driver of a producer's operation.

The statements producers sorted demonstrated how this population is selectively attuned to their world of cotton production in West Texas. Trials of workers abroad or manufacturing transgressions by corporations are less salient to this population. Additionally, the concept of child labor was revealed to be highly polarizing. The researchers caution the incorporation of child labor as a method of stirring sympathy for working conditions abroad.

While evinced more intensely in some personas than others, a recurring thread throughout the Texas High Plain Producer population was a strong association with the local community paired with an inherent identity tied to the profession. For Public Servants, this identity manifested as a duty to promote the common welfare of people. For Cotton is King producers, the cultivation of

high-quality products was evinced as a renowned source of pride. Practical Agriculturists highly valued the traits of hard work and discipline developed from farming lifestyles. Each of these underlying motivations can be incorporated into message frames by organizations and communication professionals.

One topic dividing the personas was the importance of textiles sold in the United States originating from cotton grown in the United States. Half of the personas – namely the Practical Agriculturist, Cotton is King, and Bottom-Line Focused producers – deemed this a high priority, while Public Servants, Autonomous Producers, and Consumer-Driven Producers rejected the notion sustainable cotton sold to Americans should be grown in the U.S. This pattern underscored a perception several personas conveyed regarding a distrust of cotton production practices abroad, a pride in the attention to detail their own operations implement, and a dissatisfaction with the fragmented nature of the industry. Alternatively, the other division of personas adopted a utilitarian perspective, believing sustainably grown cotton can be grown in other countries, and the sourcing of cotton from foreign nations ultimately empowers the consumer to purchase more affordable clothing. The presence of this divide highlights different ideological approaches regarding protectionism and the consequences of globalization. It is worth noting producers with smaller operations are innately focused on what is within their grasp to control and personally accomplish. Although they do value environmental stewardship, this group needs support and steps to showcase how sustainable practices can be attainable.

This study also evinced producers' widespread association of identity with cotton production. The purpose grounded in the discipline, legacy, and pride of producing quality fiber serves as pronounced areas of distinction for communicators to capitalize upon. This recommendation is deeply rooted in the thesis of cultural cognition, which advances the concept that people are drawn to messages that validate their belonging in a group and verify their sense of identity (Kahan, 2015). Messages should focus on the centralized, regional community of West Texas. Broad, sweeping messages global in nature will likely be far less salient to this population.

This study also demonstrates a wariness producers adopted regarding retailers and the textile manufacturing process. The pride producers carry in their own ability to conduct their profession is strong, and they are opposed to oversight from these entities. This finding exemplifies the likelihood that partnering with retailers may prove to be a challenging endeavor. Producers perceive themselves as experts in the cultivation of cotton, and they may not appreciate input from others with limited experience in agriculture. Organizations may benefit in navigating such collaborations by assuring producers' autonomy over their operations.

Recommendations

Further research could be conducted to bolster the limitations of the study. One stakeholder entity this inquiry did not incorporate was textile retail representatives. Understanding this group's interpretation of sustainable textiles may yield additional insight for organizations such as the TAWC. As organizations seek to connect producers with the buying power of these corporations, knowing what is important to this key audience represents a promising area of investigation.

As participants sought to conceptualize sustainable textiles, a number of participants exuded a notable trend concerning the importance of contributing to one's community. At times this value manifested separately from the social elements of sustainability. The inclination for participants to perceive constructs relating to aiding one's community as being separate from the statements embodying the pillar of social sustainability necessitates further research to more accurately understand how the concern for one's community may be embedded within the economic, environmental, and social aspects of sustainability. Additionally, although Q methodology strives to accomplish a detailed overview of people's preferences and opinions, it does not seek to ascertain the numerosity of these personas. Using the insights garnered from Q methodology, researchers could administer a questionnaire to obtain a more refined understanding of the quantity of individuals associated with each persona to further inform communication strategies.

A growing field in science and political communication research is identity protection cognition, a research area that seeks to describe how a person's sense of belonging with a group shapes their opinion formation and habits (Kahan, 2015). The exploratory nature of Q methodology lends it as an auspicious approach in recognizing the social constructs that develop the nuances of a group's identity. Future research could build upon this study by construing message frames using the acknowledged psychographics of personas, and then conducting an experiment testing the salience of the frames to a target audience.

As Q methodology is a relatively novel endeavor in the agricultural communications discipline, this study also contributes insight to the body of knowledge of harnessing the research approach for a communications application. As this type of research seeks to explain the complexity of diverging viewpoints, it offers a promising approach to understanding a wide array of natural resource controversies relevant to agriculture, such as examining water or grazing rights, resource depletion, or public land use. Additionally, using this method to garner insight regarding perceptions of technological advancements represents a timely pursuit in the discipline. As mentions of lab-grown meat, gene editing, precision agriculture and robotic systems become increasingly prominent in the media, acquiring a detailed understanding of consumer viewpoints surrounding these innovations may better inform marketing and communication approaches. Determining purchasing intentions of consumers serves as another pertinent application of Q methodology, as it enables participants to make distinct preferences concerning agricultural production practices, food processing regulations, and nutritional qualities of food products.

Future Q methodology researchers should keep in mind the application of the study when framing the Q set, as the pursuit of developing specific marketing approaches will require a narrower, more targeted conceptual space. The fragmented and wide-reaching intricacies of the textile industry introduced complexity in crafting a Q set bearing statements with equal representation and granted unique discernment into the influences of attitudes and beliefs. While the Q set provided acumen into consumers' overall conceptualizations of the industry, the breadth of the constructs paired with the abstract characteristic of the conceptual space granted insight into overarching trends and patterns but did not lend many specific marketing approaches. From this the researcher can surmise the level of specificity invoked in the Q set corresponds with the degree of precision in marketing frames the researcher will garner. The

more specific and targeted the Q set statements, the more targeted marketing approaches will be elucidated from the results.

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Examining the Social Properties of Oklahoma Agricultural Facebook Pages: A Quantitative Content Analysis

Social media is used by millions of people in the United States, and producers are often encouraged to maintain a social media presence to promote their businesses and agriculture in general. Farmers have deeply entrenched identities. Social identity theory states people self-sort into certain groups. Social comparison and positive distinction are two principles of social identity theory. There is a need to research how agricultural operations are portraying those identities, including how they portray the identities of dissimilar agricultural operations online. This study compared Oklahoma mainstream and alternative producers in a quantitative content analysis of their Facebook pages. The following objectives guided this study: 1) Describe the agricultural operations in Oklahoma present on Facebook, 2. Describe the Facebook presence of agricultural operations in Oklahoma, 3) Describe operations' expression of social-identity via Facebook, and 4) Compare the communication of alternative and mainstream agricultural operations in Oklahoma. Results of this study indicate that overall agricultural operations do not post frequently. While operations were likely to use positive distinctions to distinguish products from others, they were not likely to use social comparison. Moreover, there were not major differences between mainstream and alternative producers. Future studies should explore the personal pages of agricultural producers.

Introduction and Theoretical Framework

Public perceptions of agriculture vary across sectors of the industry, demographics, and regions. Some of the public see producers as irresponsible stewards of the environment (Peterson, 2015). The public relates little to no prestige with farming (Pilger, 2015). In response, agriculturists are often encouraged to be transparent and share the story of agriculture (Hays, 2019).

Social media platforms, such as Facebook, offer an outlet to create conversations about food and agriculture. At the end of 2018, Facebook had more than 2.32 billion monthly users (Chen, 2019). It was also reported that 68% of Americans used Facebook in 2018 (Smith & Anderson, 2018). Social media became a common venue for people to talk about and share ideas regarding food (Arnold, 2019). In 2016, it was estimated 9% of farmers used Facebook for business, highest among all social media platforms included in the study (Wilson, 2016).

While being present and active on social media is important, researchers also need to understand what is being shared. This study focused on ingroup and outgroup identity portrayals on agricultural operations' Facebook pages as they have the potential to affect the public's perceptions of agricultural practices.

Online Behaviors of Agricultural Producers

Agricultural operations have been encouraged to increase their presence in online media (Shaw et al., 2015; White, Meyers, Doerfert, & Irlbeck, 2014). Producers themselves recognize the significance and necessity of a social media presence. Younger producers are more likely to engage in social media for agricultural business use (Telg & Barnes, 2012).

Past research suggested a social media presence could increase the number of customers and profitability of agricultural businesses (Gibson, Ahrens, Meyers, & Irlbeck, 2012), and

alternative farmers who engaged in online promotional activities increased business viability (Abrams & Sackman, 2014). However, only 37.3% of agricultural producers used websites for business purposes and 23.5% use Facebook for business (Shaw et al., 2015). Social media can improve the viability of agricultural operations, but it is often underutilized.

Some producers choose to engage online to be more visible to potential landlords, attract employees, or to build their farm's brand (Lykins, 2011; Pratt, 2018). The primary driver for the use of social media by farmers is financial (Abrams & Sackman, 2014). Resources exists for producers to set up successful websites and social media. There are entire organizations devoted to helping operations thrive in the online space (e.g., the Center for Rural Enterprise Engagement). These resources have offered suggestions for prudent information on About Pages, types of posts for engagement, and timing of posts (Cornelisse, 2016; Culler, 2018; Pratt, 2018). Resources include online tutorials, Extension fact sheets, popular press articles, and other helpful resources.

While there are a variety of resources, the recommendations from these resources can vary. Some suggest posting every other day (Pratt, 2018). Others suggest to simply have a page and disregard engaging in regular posting. (Culler, 2018). Past research on agritourism operations in Oklahoma have found that posting frequency by agritourism operations' Facebook pages has a moderate relationship with page likes but a negligible relationship with the number of reactions to those posts (Bowman et al., in press).

Farmer Identity

Studies revealed producers have deeply entrenched occupational identities, even more so than other occupations. This occupational identity can be parsed out into sub-identities such as farmer and conservationist or agribusinessman (Abrams, Gosnell, Gill, & Klepeis, 2012; Burton & Wilson, 2006). Farmers' self-concepts are wrapped up in being as productive as possible, creating higher yields, and supplying cheap and safe food (Burton & Wilson, 2006). The identity of farmers affects the land management decisions and general agricultural practices (Groth & Curtis, 2017).

While rural areas are predominately agricultural lands, an assortment of management practices are used (Groth & Curtis, 2017; Mitchell, 2013). These practices range from conventional, large-scale operations to organic production or putting marginal land in conservation programs. The practices of agriculture profoundly affect the identity of producers (Bell, Jarnagin, Peter, & Bauer, 2004). These different practices reflect producers' varying beliefs, values, knowledge, and resources (Mendham, Curtis, & Millar, 2012), as well as being tied to producers' families (Bell et al., 2004). Producers of all kinds often wrestle with "unresolved tensions between idealized discourses and practices of good farming" (Gray & Gibson, 2013, p. 96).

Researchers have examined how agricultural producers coexisted with other large-scale industries, such as coal (Huth et al., 2017). Farmers did not feel that these industries understood the producers' identity or connection to place. Therefore, larger industries could not connect well with farmers. On the other hand, it has been found that when mainstream or industrial farmers interact with one another, build relationships, and engage in agricultural networks, their identities

are strengthened and their duty to the principles and practices of industrial agriculture are strengthened (Gray & Gibson, 2013).

While research has been found comparing agricultural producers to other industries, there has not been research found comparing segments of producers within agricultural communication. Mainstream and alternative operations were the focus of this study. Mainstream agriculturists were operationalized as conventional, large-scale, traditional operations. Alternative operations were operationalized as locally focused agriculturists, community-supported agriculture, organic operations, and/or agritourism operators (Carolan, 2012). While agricultural practices may vary, USDA has indicated that coexistence between these different groups is a priority area (USDA, 2015).

There are some basic differences between mainstream and alternative producers, which can affect their identities. On average, mainstream producers have been farming longer than alternative producers (Egri, 1999). More women are involved in alternative farming than mainstream agriculture (Egri, 1999). Alternative farmers tend to have strong, direct relationships with their consumers and are more connected to local communities (Goodman, 2000).

Alternative agriculture shifted from an idea of a movement to "farmers committed to a deeper, more ideological notion of sustainability" (Goodman, 2000, p. 218). Moreover, alternative producers involved in local food movements have helped reconnect consumers to food and agriculture, offering unique value (Albrecht & Smithers, 2018). Studies have found that reconnections between producers and consumers are valued by both parties. However, these reconnections take added time and effort for both the consumer and producer (Albrecht & Smithers, 2018; Hoey & Sponseller, 2018). Whereas alternative producers attempt to connect with consumers, mainstream producers tout the importance of science and its essentialism in food production (Rotz, 2018). Simultaneously, the same farmers perceived consumers to question science and prefer science be removed from food production (Rotz, 2018).

Although identities and practices may differ, agricultural producers still need to interact with each other. The actions of neighbors and peers often affect decision making for operations. Organic operations that cannot control what neighbors produce or how they care for their land risk degradation and the purity of products. When a mainstream producer must switch his or her chemical application preferences because of a neighbor's organic field or grape vineyard, the economic consequences can be high. When facing pressures like this, tensions run high and relationships can be damaged. For example, in 2016, a dispute between farmers in Arkansas over dicamba chemical drift ended in murder (Koon, 2017).

Though much attention has been paid to the failing relationships between producers of all kinds and agricultural companies such as Monsanto, few studies have addressed inter-farmer relations (Kinchy, 2012). One study did find there is rising competition between farmers (Rotz, 2018). Another study found that organic producers did not believe they were being served by Extension as well as conventional producers because agents did not understand organic producers' perspectives (Crawford, Grossman, Warren, & Cubbage, 2015).

Social Identity Theory

Identity can be thought of through four frames (Jung & Hecht, 2004): personal (i.e., self-image), relational (i.e., identification of oneself with relation to others), enacted (i.e., what one presents to the world), and communal (i.e., how a group defines itself collectively). While identity is often seen as through the personal frame, it is important to recognize the role of social interactions and communities in the development of identity. For the agricultural community, the distinction between mainstream and alternative producers has been socially constructed and is not easily defined (Goodman, 2000).

Social identity theory states people sort themselves into certain groups (Tajfel, 1978). These groups change the way people perceive the world. The group that one is a part of (i.e., ingroups) is seen as more favorably than the groups one is not part of (i.e., outgroups). This results in a "'us' versus 'them'" mentality (Hogg, 2006, p. 115).

Social comparison and positive distinctiveness are two principles addressed in Social Identity Theory (Tajfel & Turner, 1979). Social comparison occurs when group members directly compare their ingroups to outgroups. In Social Identity Theory, groups are referred to as prototypes or a "fuzzy set of attributes (perceptions, attitudes, feelings, and behaviors) that are related to one another…captures similarities with the group and differences between that group and other groups" (Hogg, 2006, p. 118). Positive distinction occurs when the ingroup is clearly favored and its differences are accentuated in communication (Tajfel & Turner, 1979). An example of positive distinction in agriculture is value-added products, meaning "adding value to a raw product by taking it to at least the next stage of production" (Anderson & Hanselka, 2013, para. 3). This type of positive distinction is equally accessible for mainstream or alternative operations. Creating this value was related to increasing the perceived customer benefits (Anderson & Hanselka, 2013).

In agriculture, it is important to understand how mainstream and alternative producers portray their respective ingroups and outgroups on social media because these presentations of identity can affect how members of the public view both communities. Even if the producers never interact with each other in person, these online interactions have real effects, but there has not been much research looking at these ingroup and outgroup perceptions in agriculture.

Purpose and Objectives

As social identity was an important characteristic in the agricultural community (Bell et al., 2004; Goodman, 2000; Rotz, 2018), there was a need to research how agricultural operations are portraying those identities, including how they portrayed the identities of dissimilar agricultural operations. Because this enacted form of identity could affect public perceptions of agriculture, this research relates to AAAE's National Research Agenda Research Priority 1: Public and Policymaker Understanding of Agriculture and Natural Resources (Enns, Martin, & Spielmaker, 2016). The purpose of this research was to assess the online communication of Oklahoma agricultural operations, particularly the social properties of this communication. The following objectives guided this study:

1. Describe the agricultural operations in Oklahoma present on Facebook,

2. Describe the Facebook presence of agricultural operations in Oklahoma,
3. Describe operations' expression of social-identity via Facebook, and
4. Compare the communication of alternative and mainstream agricultural operations in Oklahoma.

Methods

This study used quantitative content analysis. This research method is an organized and replicable analysis of elements of communication (Riffe, Lacy, & Fico, 2013). These elements are sorted into categories based on valid rules. The relationships between those categories and elements are then analyzed using statistical methods (Riffe et al., 2013). Typically, content analyses involve selecting a representative sample of the material of interest. People are then trained to be coders and sort the sample content according to the established rules, also called a codebook.

Past research has shown that Facebook was the most commonly used social media site for producers (Gibson et al., 2012; Wilson, 2014). Therefore, Facebook pages were used as the analysis unit for this study. Pages were identified for analysis via the search function of Facebook. Search terms like Oklahoma agriculture, Oklahoma farm, Oklahoma wheat, Oklahoma soybean, and so on were used. The search terms used were chosen based on the state's agricultural commodities listed in the Agriculture Census (USDA NASS, 2014).

Initially 575 pages were identified. This study was focused only on agricultural operations which were contributing to commercial agriculture, rather than only stock show animals or tourism. Pages were eliminated from the sample if food or fiber was not produced on the operation. For example, if a winery did not produce grapes it was not included in the study. The population for the study consisted of 364 Facebook pages. A panel of experts, consisting of a faculty member in plant science and a faculty member in agricultural economics, sorted pages into two categories: mainstream (n = 250) or alternative (n = 115). In the context of this study, mainstream agriculturists were operationalized as traditional, conventional, or large-scale operations. Alternative operations were operationalized as locally focused agriculturists, community-supported agriculture, organic operations, unique crops or animals to Oklahoma, and agritourism operators (Carolan, 2012).

A quantitative content analysis of all 364 pages was conducted from February 1 to March 1, 2019. The About Page and all posts for the six-month period between July 1 and December 31, 2018, were examined. This timeframe was used to encompass a change of seasons and to include a time period of harvesting.

A protocol, codebook, and code sheet were made per recommendations from Krippendorff (2013) and Riffe et al. (2013), including recommendations for the identification of content units and classification systems for categories of codes, acceptable levels of interrater reliability, and internal and external validity. The codebook was reviewed by a content analysis expert who was not on the author team to help ensure validity (Krippendorff, 2013; Riffe et al., 2013). Two coders were trained for this study: coder one was a first-year doctoral student in agricultural communications, and coder two was a second-year master's student in agricultural

communications. Coders were trained using 30 Facebook pages from a neighboring state (Krippendorff, 2013; Riffe et al., 2013).

The researcher-developed code sheet contained 18 items. Six of the items were factual including business/farm name, mentioning of family, date of last post, number of posts in six-month period, number of agricultural products produced, and types of agricultural products produced. The remaining items required interpretation (Riffe et al., 2013). Items related to the About Page included whether or not positive distinction or social comparison was used and whether or not that social comparison was positive, negative, or neutral (Tajfel, 1978; Tajfel & Turner, 1979). Posts or About Pages were coded as using positive distinction if they included words such as quality, superior, fresh, registered, cage-free, local, and so on. Social comparison was identified if the content alluded or referred to another group or product. For example, "Our beef is better than store bought and will not make you sick," is an example of negative social comparison.

Content related to posts during the study period were coded for whether positive distinction was present and how many times. Social comparison was also examined in posts. The number of times social comparison was used and its category (i.e., positive, negative, or neutral) count was also included.

The agricultural products produced by each page's operation were recorded during coding. These were then sorted into the following categories: row, oil, and forage crops (e.g., wheat, corn, alfalfa, peanuts); meat-producing livestock (e.g., cattle, meat goats, grass-fed beef, meat rabbits, poultry); fiber-producing livestock (e.g., alpaca, hair sheep, fiber rabbits, llamas); dairy/egg livestock (e.g., dairy cattle, dairy goats, eggs, cage-free eggs, donkey milk); produce (e.g., pumpkins, herbs, microgreens, fruit, vegetables); tree nuts (e.g., walnuts, pecans); fish; and miscellaneous (e.g., honey, lavender, water, cannabis).

Initial interrater reliability was conducted on 10% of the population. Cohen's kappa was used to measure the level of agreement between coders on an item basis. An acceptable level was reached and the next 10% was coded. Recommended reliability for 20% of the sample is .70 (Riffe et al., 2013). Items that were factual data had a Cohen's kappa score of 1.0 and the interpretive items had scores ranging from .89 to .74.

Data were analyzed using IBM SPSS 22. Analysis for objective 1-3 included frequencies, percentages, and descriptive statistics. Analysis for objective 4 was done using correlations, chi squares, and independent samples t-test.

Results

Objective 1: Describe the agricultural operations in Oklahoma present on Facebook

There were 364 Oklahoma agricultural operations found on Facebook. Of those operations, 250 were mainstream operations and 114 were alternative operations. The majority produced only one agricultural product (n = 236), 60 produced two agricultural products, 24 produced three, 23 produced four, 12 produced five, four produced six, two produced seven, two produced eight, and one producer produced nine different products.

Table 1 shows the distribution of alternative and mainstream operations among agricultural product types. The average number of operations per product type was 59.8. Fish had the lowest number of operations (*n* = 2). Meat livestock was the highest (*n* = 127). Tree nuts consisted of the highest percentage of mainstream producers (81.0%), while fiber livestock consisted of the highest percentage of alternative producers (96.2%), aside from fish, which only had two total operations.

Table 1

Distribution of Producer Types Among Product Types

Agricultural Product	Number of Operations	Mainstream	Alternative
Meat Livestock	193	141 (73.1%)	52 (26.9%)
Dairy/Egg Livestock	100	45 (45.0%)	55 (55.0%)
Produce	93	71 (76.3%)	22 (23.7%)
Fiber Livestock	26	2 (7.7%)	25 (96.2%)
Crops	21	17 (81.0%)	4 (19.0%)
Tree Nuts	12	11 (91.7%)	1 (8.3%)
Fish	2	0 (0.0%)	2 (100.0%)
Miscellaneous	31	21 (67.7%)	10 (32.3%)

Oklahoma is split into nine crop reporting districts. Table 2 shows the distribution of alternative and mainstream operations amongst the districts. The average number of operations in districts is 36.4. District 10 had the lowest number of operations (*n* = 2); District 50 had the highest (*n* = 127). District 30 had the highest percentage of mainstream operations (80.8%), while District 50 had the highest percentage of alternative operations (37.8%), aside from District 10.

Table 2

Distribution of Producer Types in Crop Reporting Districts

Crop District	Number of Overall Operations	Mainstream	Alternative
10	2	1 (50.0%)	1 (50.0%)
20	11	8 (72.7%)	3 (27.3%)
30	26	21 (80.8%)	5 (19.2%)
40	27	21 (77.8%)	6 (22.2%
50	127	79 (62.2%)	48 (37.8%)
60	43	31 (72.1%)	12 (27.9%)
70	70	47 (67.1%)	23 (32.9%)
80	40	29 (72.5%)	11 (27.5%)
90	18	13 (72.2%)	5 (27.8%)

Objective 2: Describe the Facebook presence of agricultural producers in Oklahoma

The number of total posts during the six-month period were counted. About one-fourth (24.2%) of pages did not post at all during the study period (*n* = 88). The mean number of posts in the six-month period was 23.19 (*SD* = 43.09) with a median number of posts of 8. Figure 1 shows the distribution of frequency posts. More than half of the operations posted less than 10 times in the six-month period (*n* = 203).

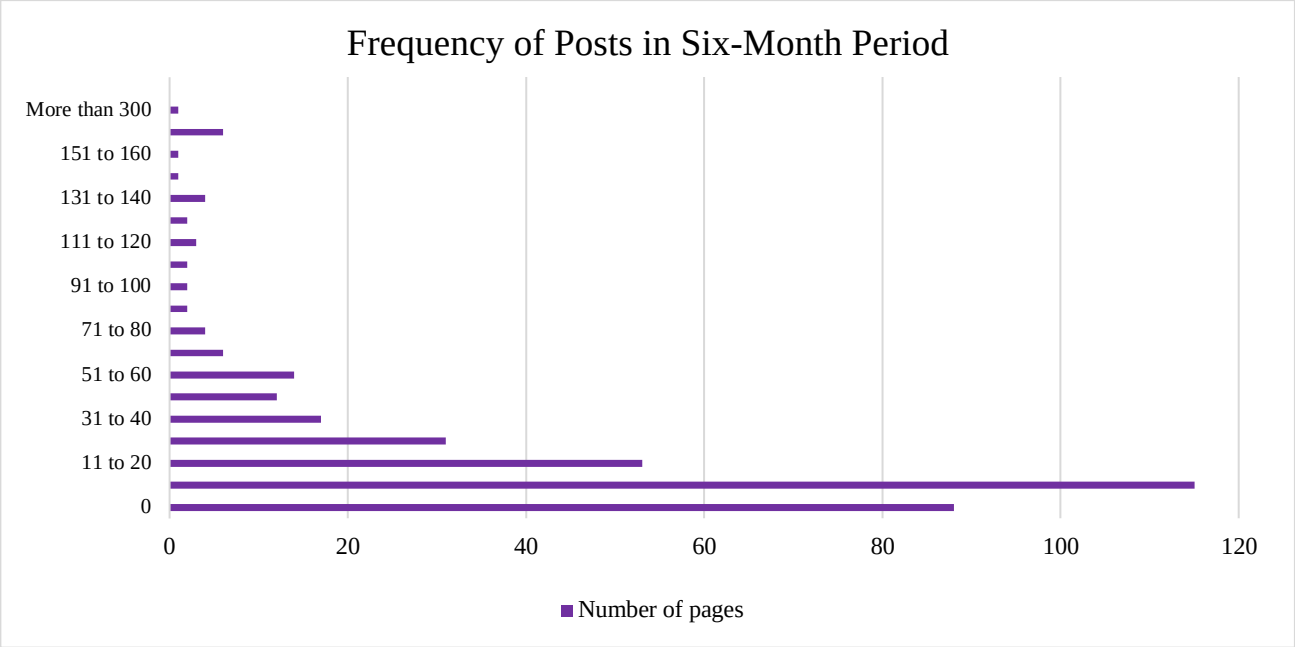

Figure 1. Bar graph detailing the number of posts in the six-month period.

Objective 3: Describe operations' expression of social-identity via Facebook

About Page. In the About Page, 19.5% (*n* = 71) of pages mentioned being a family-operated business. Positive distinctiveness was used by 56.9% (*n* = 207) of pages. Social comparison was only used by 2.2% of pages (*n* = 8). Of those eight pages, seven of them used it negatively and two pages used social comparison in a neutral way. None of the pages used social comparison in a positive way.

Posts. In the posts, positive distinctiveness was used by 39.8% (*n* = 145) of pages. Social comparison was only used by 5.2% of pages (*n* = 19). Of those 19 pages that used social comparison, 14 of them used it negatively, six were neutral, and none were positive. Of the pages that used social comparison, 17 pages used social comparison in posts once, one used it twice, and one used it six times.

Objective 4: Compare the communication of alternative and mainstream agricultural operations in Oklahoma

An independent-samples t-test was conducted to compare number of posts in the six-month period in mainstream and alternative operations. There was not a statistically significant difference in the number of posts for mainstream (*M* = 21.90, *SD* = 42.68, *Mdn* = 8.0) and alternative (*M* = 26.20 *SD* = 44.15, *Mdn* = 7.0) operations; $t(362) = -.882$, $p = .379$).

About Page. When comparing alternative and mainstream operations, 19.13% (n = 22) of alternative operations mentioned being a family-run operation, while 19.60% (n = 49) of mainstream operations used the word "family" to describe their businesses. The difference between these variables was not statistically significant, (X^2 (2, N = 1) = 0.005, p = .946).

Positive distinctiveness was used by 66.96% (n = 77) alternative operations. Fifty-two percent (n = 130) of mainstream operations used positive distinctiveness. The difference between these variables was statistically significant, (X^2 (2, N = 1) = 7.71, p = .005) with a small effect size of .145.

Social comparison was used by five alternative operations and three mainstream operations. The difference between these groups was not statistically significant, (X^2 (2, N = 1) = 3.697, p = .054). None of the instances of social comparison were positive. Five of the mentions by alternative operations were negative; comparatively, two of the mentions by mainstream operations were negative. One of the each of the mentions by both types of operations was neutral.

Posts. Positive distinctiveness was used by 41.23% (n = 47) of alternative operations. Comparatively, 39.2% (n = 98) of mainstream operations used positive distinctiveness in their posts. The difference between these groups was not statistically significant, (X^2 (2, N = 1) = 2.411, p = .299).

Social comparison was used by eight (7.02%) alternative operations and 11 (4.4%) mainstream operations. The difference between these groups was not statistically significant, (X^2 (2, N = 1) = 2.411, p = .299). None of the instances of social comparison were positive. Five of the mentions by alternative operations were negative; comparatively, nine of the mentions by mainstream operations were negative. The difference between these groups was not statistically significant, (X^2 (2, N = 2) = 2.095, p = .351). Three of the mentions by both types of operations was neutral.

Conclusions and Recommendations

According to the 2012 census of agriculture, 80,245 farms are in Oklahoma (USDA, 2014). Our initial Facebook search found just 575, meaning only 0.72% of Oklahoma agricultural operations were accounted for in this study, much less than the projected 9% by Wilson (2016). While some may not have a business presence on Facebook, it is also possible that the sampling method did not find every page. If sampling was not the issue, this is concerning because operations may be missing out on an opportunity to engage with consumers and potential customers. Organizations that advise producers, such as Extension and USDA, should promote the use of social media by operations because of the opportunity to improve viability of the operations (Abrams & Sackman, 2014).

The majority of pages 68.68% (n = 250) were mainstream operations and 31.59% (n = 115) were alternative operations. This parallels the overall producer population of Oklahoma. (USDA, 2014). Most operations only produced one type of agricultural product. The majority of products produced by operations on Facebook were meat-producing livestock. Cattle and calves are the most productive commodities in Oklahoma (USDA, 2014). Most of the meat producing livestock were mainstream operations. The majority of operations in crops, meat livestock, produce, tree

nuts, and miscellaneous were considered mainstream operations. However, the alternative operations were represented proportionately to the overall population distribution in most production categories. The only categories of agricultural products that alternative operations were overly represented and were also the majority of operations in the category were fiber livestock, fish, and dairy/egg producing livestock.

The distribution of operations through crop reporting districts varied. District 50 had the highest number of operations; this has the largest population center of the state and is more metropolitan. Conversely, district 10 had a very low representation; however, it is also the most sparsely populated region of the state and very rural. Rural landscapes do not seem to have more operations with a Facebook presence as compared to metropolitan areas. While this makes sense in regard to the general population, it is counter intuitive as the more rural parts of the state would be expected to have higher numbers of agricultural operations when compared to the metropolitan areas. Future research that assesses the utility of social media for producers closer to urban centers compared to those in more remote areas would add nuance to understanding the role of social media for supporting the viability of agricultural operations.

A quarter of the pages found did not post in the six-month period. This may suggest that business owners thought it was important at one time to have a page but do not maintain it. Alternatively, it could suggest that just a presence on Facebook for things like contact information was important for operations, but prioritizing posting is not something they find necessary. While this parallels the suggestion of Culler (2018) to simply have a web presence, if page likes is related to overall posting frequency (Bowman et al., in press), operations are not properly utilizing Facebook to promote their businesses and reach a wider audience.

When operations did post, there was a lot of variance in the frequency of posting. In the six-month period, 55% of operations posted less than 10 times, while two pages posted more than 300 times. There was not a statistically significant difference between frequency of posting between mainstream and alternative operations. The limited number of posts in an extended period of time is worth noting. It can be inferred that both types of operations vary in their use of Facebook, but the tool is being underutilized overall. This is troubling because research has suggested the importance of an active online presence for agricultural operations (Shaw et al., 2015; White et al., 2014).

In terms of the enacted version of their identities, about one-fifth of operations mentioned family, which lines up with past work showing that family is commonly tied to farmers' identities (Bell et al., 2004). A similar number of alternative and mainstream producers mentioned family. The only measure that was significantly different between mainstream and alternative operations was using positive distinctiveness on About pages. Alternative operations used positive distinction more often than mainstream operations on About Pages. While the effect size was small, these results are noteworthy. A higher percentage of alternative operations also used positive distinctiveness in posts, but it was not a statistically significant difference. This relates to previous findings that found operations involved in local foods offer more value-added products than conventional operations (Albrecht & Smithers, 2018). Moreover, this supports past research that found alternative producers had strong and direct relationships with consumers (Albrecht & Smithers, 2018), which Facebook because of its direct connection to consumers can help leverage.

Operations did not often engage in social comparison, but when pages did so, social comparison was primarily used in a negative way. Social comparison was found more often in posts than on About Pages. One possible reason is that operations did not want to openly engage in negative discourse on the more permanent About Pages. The lack of social comparison does not necessarily support past research that shows rising competition among farmers (Rotz, 2018). However, this was an initial study of an under-researched area (Kinchy, 2012). The pages represented in this study are for the operations themselves, not personal pages of producers.

This research should be repeated in other states to see if these results are unique to Oklahoma. Future research should also assess if identity portrayal differs between the producers' professional and personal accounts and the individual producers' accounts. Another population worth including in future research are those who are involved in the agricultural industry but are not directly producing food because they are also likely to engage in online agricultural discourse. Future research would also benefit from including other social media outlets that may lend themselves more readily to other forms of identity expression. In order to thoroughly understand agricultural producers' conceptions of identity, in-depth interviews with producers throughout the state should be conducted. While online communications can be assessed for enacted versions of identity, in-depth interviews can allow for more direct assessment of the personal, relational, and communal identity frames, which is necessary to fully understand producers' identities.

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Cultivating Identity, Sowing Relationships, Fertilizing Success, and Harvesting Coexistence: Understanding Oklahoma Producer Identity and Relationships

The USDA has identified coexistence, or producers growing food in a variety of ways (conventionally, organic, etc.) in a harmonious manner as a critical challenge and high priority. Despite this call for coexistence and assurance of mutual success, agricultural sectors often have conflicts. Both sides of the niche and mainstream rift tend to pick and choose radical examples of problematic practices to portray the opposition. Producers, more so than most other occupations, have a deeply entrenched occupational identity. Many studies focused on the need for relationships between agricultural producers and the public. No work has been found to understand how producers from different sectors of agriculture view one another. This study sought to understand producers' identities and the relationships producers have with one another. Results indicate the occupation of farming, family ties, connection and duty to the land, hard work and pride defines producers' identities. When defining a "good farmer," producers cited innovation and efficiency, farm succession, passion and joy, and profits as markers of success. The relationships between producers varied. Overall, producers respected other producers enough to make their own choices concerning production. Social media was often mentioned when producers talked about how they communicate with one another.

Introduction and Theoretical Framework

The United States Department of Agriculture (USDA) identified coexistence as a critical challenge and priority concerning every agricultural producer. Coexistence is "the concurrent cultivation of conventional, organic, identity preserved and genetically engineered crops consistent with underlying consumer preferences and farmer choices" (USDA, 2015, para 2). Coexistence essentially consists of producers from the same geographic areas producing food in a variety of ways. The increasing demands of consumers for nutritious and affordable food cannot be satisfied by any one sector of agriculture:

> As one sector of agriculture expands, so does the entire agriculture industry. All farmers. . . should benefit from the continued growth of all. . . sectors of U.S. agriculture, as should the local communities and food industries that support agriculture (USDA, 2015, para. 5)

Despite this call for coexistence and assurance of mutual success, agricultural sectors often have conflicts. According to a review of recent research regarding organic agriculture's part in feeding the world, it was concluded that both sides of the niche and mainstream agricultural rift tend to pick and choose radical examples of problematic practices to display (Tal, 2018). In 1990, Beus and Dunlap described the relationships between niche and mainstream producers as a "large chasm" and their practices as "fundamentally divergent" (p. 609). These tensions are exacerbated by declining rural communities, degraded environments, and conflicting ideas of the ideal producer (Gray & Gibson, 2013).

Producer Identity

Producers, more so than most other occupations, have a deeply entrenched occupational identity (Abrams, Bliss, & Gosnell, 2013). Some researchers even posit that farming is not just an

occupation but an ethnicity (Bell, Jarnagin, Peter, & Bauer, 2004). Once a producer committed to a type of practice or sector of the industry, it became part of their identity, which made it difficult for producers to consider changing those things (Gray & Gibson, 2013). Consequently, the self-concept and identity of producers affect agricultural and land management decisions (Groth & Curtis, 2017). Producers have also cited a family heritage in the industry as a point of pride and component of identity (Bell et al., 2004). Moreover, as agriculture is an ever-evolving industry, a producer's identity is often evolving. "The struggle to create a stable identity against the backdrop of uncertainty becomes an ongoing accomplishment that provides meaning to the lives of . . farmers" (Bell et al., 2004, p. 122). The identity of producers is complex, fluid, and influenced by multiple entities.

Producers strive to create an identity of being a "good farmer." Definitions used by producers to constitute "good farming" vary. Producers used ideas of community participation, respectability, and farming ability as criterion to assess the quality of other producers (Phillips & Gray, 1995). Some think that a producer who farms conventionally, takes few risks, and remains consistent from year to year is the definition of a good producer, but others consider those who are innovative, try new techniques, focus on sustainable production, and are progressive to be good producers (Phillips & Gray, 1995).

Communication Theory of Identity

According to the Communication Theory of Identity (CTI), there are four frames of identity: personal, enacted, relational, and communal (Hecht, 1993). One's personal identity is one's own self-image or concept. Only oneself is completely aware of one's personal identity. Enacted identity is the identity one presents or conveys to the world. Enacted identities are portrayed through communication. Relational identity is considered to be the way one considers themselves in relation to others, as well as identifying oneself through relationships (Jung & Hecht, 2004). Lastly, the communal identity refers to the way a group of individuals define their identity as a collective. "The four frames of identity are not always consistent with each other. They can be contradictory or exclusive to each other. However. . . the frames still coexist and work together as part of identity" (Jung & Hecht, 2004, p. 267). Producers' identities cannot be properly understood independent from the influence of personal history, relationships, social structure, and communities (Philips & Gray, 1995).

Producer Relationships

Many studies have focused on the need for increased relationships between agricultural producers and the public (King, 2008; Sharp & Smith, 2003). For instance, agro-ecological systems (e.g., community supported agriculture, farmers markets, and community gardens) have been cited as vehicles to foster community relationships and resilience (King, 2008). Moreover, attention has been paid to the failing relationships between producers of all kinds and agricultural companies such as Monsanto (Kinchy, 2012). However, few studies have addressed relationships between producers. Some of the research that has been done suggests there is rising competition between producers, and they are becoming less likely to turn to their neighbors for answers (Bell et al., 2004; Rotz, 2017). Organic or niche producers may have regulations they must follow and therefore must restrict their neighbors' abilities to use herbicides, pesticides, or

genetically altered seeds (Kinchy, 2012). This can create feelings of resentment and ill will between neighbors.

Networking is an important aspect of learning for organic growers. It has been cited as the most important source of information for niche producers (Crawford, Grossman, Warren, & Cubbage, 2015). Through networking, producers create social connections and gain social capital (Bennett, 1968). In 2013, Läpple found organic producers are more likely to rely on other organic producers for information, particularly while converting their operations to organic. Moreover, higher social integration of producers and information networks resulted in higher adoption of organic practices (Läpple, 2013). Producers often experiment with different crops or practices. Sharing the results of these tests with friends, neighbors, or peers is a regular part of their lives (Gray & Gibson, 2013). Online resources have been found to be less effective than other forms of communication (e.g. networking and university sources) (Crawford et al., 2015).

No work has been found to understand how producers from different sectors of agriculture view one another. The present study sought to understand producers' identities and the relationships producers have with one another. Fostering positive relationships between different types of producers could help to increase the resiliency of the agricultural industry and the communities it affects (USDA, 2015), which aligns with the American Association for Agricultural Education (AAAE) National Research Agenda Research Priority 6: Vibrant, Resilient Communities (Graham, Arnold, & Jayaratne, 2016).

Purpose and Research Questions

The purpose of this study was to explore producers' descriptions of their identities in the agricultural community. The following research questions guided the study:

1. What are major components of how producers describe their identities?
2. How do producers define a "good farmer"?
3. How do producers relate to and share information with others involved in agriculture?

Methods

In order to answer the research questions, 13 semi-structured qualitative interviews were completed in Oklahoma in the summer of 2019. Qualitative research offers in-depth understanding of research topics (Creswell, 2012; Flick, 2009). Individual interviews were ideal as identity and relationships are inherently personal. The open-ended questions in interviews offer participants the space to communicate their experiences comfortably (Creswell, 2012).

Population

Grain and oil crop, dairy, beef cattle, produce, nuts, and poultry were represented in the sample, all of which are common commodities in Oklahoma. Eight mainstream and five niche producers were interviewed. Producers who used conventional types of agricultural practices were considered mainstream. Producers were considered to be niche producers if they used alternative forms of agriculture such as organic or grass-fed methods or if they were agritourism operators. Producers were selected from different USDA crop reporting districts to ensure better representation of Oklahoma agriculture. Participants were recruited through a producer-member

organization and through Facebook. The purposive sampling frame was used to interview producers who produced a variety of items with a variety of production practices in order to get a clear picture of producer perceptions.

Procedures

The locations of interviews were at the discretion of the participants. These included kitchen tables, farm offices, and barns. The researcher-created questioning route was written to address the research questions in a relatable and logical way. The guide helped the interviews remain consistent from interview to interview, as recommended by Creswell (2012). The questions helped researchers gain an understanding of producers' identities, perceptions of other producers, and relationships with other producers. Questions were asked regarding producers' operations and history, production practices, challenges associated with operation, short- and long-term goals, and definitions of success. Researchers also inquired about their neighbors and peers, and their perceptions of them, as well as their beliefs about society's perceptions of agriculture. At the end of each interview, the researcher summarized the discussion and asked the participant to confirm its accuracy. This served as a member-check (Creswell, 2012).

Internal consistency was addressed by comparing the interviewer's field notes with participants recorded and transcribed responses. The field notes were written on hardcopies of interview guides during each interview. Data were also collected from interviews via audio recorders. These combined data sources created an audit trail and are a complete record of the research from beginning to end (Flick, 2009). The audio recordings were transcribed by an online transcription application, Temi. Identifying information of participants was removed from transcripts and pseudonyms were assigned. The research protocol was reviewed by experts separate from the research team to ensure face and content validity. These experts included professors from agricultural communications and anthropology with research experience in producer behaviors and identity

In order to ensure transcription was done correctly, the researcher listened to each interview from beginning to end. Names, geographic identifiers, and other identifying information were removed, and pseudonyms were assigned. The software MAXQDA18 was used to code each transcript using Glaser's Constant Comparative method (1965). Codes are used in qualitative methods to label phrases used by participants to provide description and meaning (Creswell, 2012). Codes from transcripts were compared to codes from previous transcripts to create a comprehensive and inclusive system of codes (Glaser, 1965). Themes were established by grouping together related codes that represented major ideas present within the data (Creswell, 2012; Glaser, 1965).

Findings

RQ 1: What are major components of how producers describe their identities?

To explore the major components of producers' identities, participants were asked to describe themselves, their operations, and the history of their operations. Interviews yielded the following themes: occupation of farming is major component of identity, family ties contribute to farming

and identity, connection and duty to the land, hard work and pride defines producers, and social self-consciousness.

Occupation of farming is major component of identity. Regardless of the amount of time spent farming, producers acknowledged farming as the main component of their identity. All participants in the study had been involved in agriculture in some fashion for the entirety of their lives. Esther, a niche producer, said this about her husband and partner in farming, "He just said, 'you know what, this is who I am. This defines me. I love what I'm doing. I think there's a reason and a purpose for this . . . . God had a plan for us.'" Bill, a mainstream producer, said "If you're doing what you love and loving what you do, you won't work a day in your life. You know, being a cattleman is something I take pride in and defines who I am."

Family ties contribute to farming and identity. Family connections gave producers purpose and helped to form their identities. All 13 producers interviewed for this study mentioned family in some capacity. Gary, a mainstream producer, said, "One of the main goals of our operation is to raise a family on the farm. To me, farm kids are more well-rounded and have more common sense . . . they see life, they see death . . . it's not a video game." Wayne, a mainstream producer also spoke of the importance of passing the farm to the next generation, "Transitioning from one generation to the next is a priority for me. . . . I hope to raise grandsons or granddaughters in this lifestyle."

Producers did not exclusively speak about the next generation of farming. Producers were quick to mention if they were operating a centennial farm or the number of generations that had been raised on the farm. Esther, a niche producer, said with pride, "My husband and I both inherited our Oklahoma centennial farms. So, we have quite a longevity and history of farming in our family." Mike, a niche producer, said "My great great granddad homesteaded this place in 1895 and ran stock on it . . . . I'm just hoping if he's looking down on me or up at me that he approves of what I'm doing with the land."

Connection and duty to the land. A connection and duty to the land was another major component of producer identity. Producers of all kinds had a sense of attachment to their land. Mike, a niche producer, described it as, "I'm real attached to my land, which is weird. Well, it's not to me. It's weird to some people. There is a lot of heritage that goes into the land and it's mine." Dave, a mainstream producer, spoke of land and the importance of passing it to the next generation, "You want to make a good living and feel good about what you're doing. You want to be a good steward of the land because there's another generation coming up behind you that wants to be on the farm." Gary, a mainstream producer, also shared these sentiments, "It's [passing land on to the next generation] important to me. It's just, I mean, it's just land, it's just, you know, property and stuff, but you know, for now it still means something."

Hard work defines producers. Working hard was a cornerstone for producers when describing themselves and their agricultural peers. Gary, a niche producer said of himself and peers, "When you get up at five o'clock in the morning, most of the time you don't stop until dark, and it's not five days a week. It's every day. So we have to be a little crazy." Susie, a mainstream producer, described it like this:

Agriculture to me would be somebody who I guess works hard, probably harder

> than the average bear, whether you're my seed salesman or whether you are me as a crop insurance agent or Clifford as a farmer or me as a farmer, you know, we're gonna put the hours in probably more so than a lot of than other sectors of work.

Producers had a great sense of pride associated with their operations and industry. When speaking about the public perception of agriculture, Dave, a mainstream producer said, "This is a living for us, but it's also a living for them too. Without it, basically, they wouldn't have nothing." Gary, a mainstream producer, said,

> We have the most valuable asset in the world. Making food. If you stop everything in oil and gas, we can continue. Stop all food, take it all out, just lock the stores up. Yeah, who's going to live? It's life and death then.

Mike, a niche producer, said "Both the plant and animal side of it goes toward the human race. Keeping them fed, keeping mankind fed worldwide, not just nationwide, but worldwide."

Social self-consciousness and perceived vilification. Producers seemed to be very self-conscious when asked about themselves or peers. They did not want to come off as arrogant, derogatory, or be seen as gossiping. Bill, a mainstream producer, said "I have a premiere cow herd, I kinda have a reputation for that. It's not an ego thing; it's a goal." When asked about her competitors, Esther, a niche producer, said "This is going to sound arrogant and I don't mean it to, but I don't think I have any."

When speaking about peers, Susie said, "It's not like they're doing it wrong. There's always room for improvement. There's room for improvement in what we do. I'll be the first to admit that we could improve." Moreover, they were aware when they were the subject of gossip and did not appreciate it. Esther, a niche producer, mentioned that when they transitioned from mainstream to niche production the perception of their neighbors was difficult to deal with:

> We knew that we were the primary subject at the co-op coffee every morning. The first few years, that was, that was very concerning. We could see one of them drive by and just to see what we were doing. They went to the co-op and reported it and there was a lot of poking fun.

Susie, a mainstream producer, felt similarly, "A lot of people think that we're crazy for growing cover crops, people were like, 'this will never work, it's a fluke.' You get talked about at the coffee shop a lot."

Mainstream producers were convinced that media and other sectors of agriculture portrayed them as the "bad guy." Wayne, a mainstream producer, stated "I had no idea that we would become the enemy," when reflecting back on his career and the changing public perception. Gary, another mainstream producer, spoke about the backlash he has endured on social media: "I post something on Facebook, and someone will be like, oh, you're a farmer so you're just trying to kill us with the chemicals." Susie stated, "They think that we're poisoning them with methane emissions," when asked about the public's perception of agriculture.

RQ 2: How do producers define a "good farmer"?

In order to understand how producers defined a "good farmer," producers were asked about how they determined if their operation was successful and the factors that contributed to success on

agricultural operations overall. The major themes associated with success were innovation and efficiency drives success, farm succession defines success, passion and joy measure success, and profits are paramount for success.

Innovation and efficiency drives success. Some producers believed that an innovative and efficient operation determined success and represented a good producer. Susie, a mainstream producer said "I think of being innovative as being successful. Right now you can't just do anything that grandpa did. That won't make you successful." Bob, spoke of efficiency and labor management as a measure for success, "If it takes everything you got, 18 hours a day just to get everything done and you're struggling, I don't think that's successful."

Farm succession defines success. Producers postulated that taking care of land for the next generation and maintaining the integrity of the operation for the future were markers of good producers. Dave, a mainstream producer, said "As long as you make a living and you, you feel good about what you're doing. I mean, you know, you want to be good stewards of the land because there's another generation coming up." Wayne, a mainstream producer said, "You have to have profits to reinvest, to build equity, to transition from one generation to the other, instead of just building it up to sell."

Passion and joy measure success. Some producers thought the joy they got from food production was the best determinant of success. Esther, a niche producer said, "We measure success in farming with the joy we get out of it and the opportunity to grow healthy food for people who are interested in healthy food." Bill, a mainstream producer, echoed these sentiments:

> You've got to love what you're doing, if you don't, I don't care much money's behind it. You got to love what you're doing and know it's going to take perseverance . . . . You got to have that mindset before any operation can be successful. If you don't have that mindset, don't start it. I'm serious. It won't work.

Profits are paramount for success. Many producers thought success and being a good producer was defined by the profitability of an operation. Greg, a mainstream producer said, "This is kind of generic, but I would say that if it can be profitable year in and year out, I think you're a win." Gary, a niche producer simply defined success as, "If you're making money you're successful." Joe, a mainstream producer, spoke of the volatility of markets and taking advantage of the good years, "You've got to hit them years where the cattle market's high and then try to carry over or pay down what you need to but yet carry that money to the next year." Margaret, a niche producer noted the idea of economic sustainability, "You need to be ecologically sustainable as well economically sustainable. You have to be able to earn enough money at what you're doing that you can pay the bills. Maybe even more than pay the bills. That'd be nice."

RQ 3: How Do Producers Relate to and Share Information with Others Involved in Agriculture?

To understand how producers relate to and share information with one another, participants were asked about their relationships with neighbors, information sources, and perceptions of their respective outgroup. The relationships between producers varied. The major theme associated with relationships was respect for other producers to make their own choices concerning production. Social media was often mentioned when producers talked about how they communicate with one another.

Producer relations. Participants in the study had a variety of views regarding other producers regardless of category. Some producers saw all those involved in agriculture as part of their peer group and, some producers saw anyone outside of their commodity groups as separate industries. However, the prevailing attitude was one of camaraderie and concern for wellbeing regardless of production practices and products.

Positive. Margaret, a niche producer, felt as though her relationships among her neighbors was positive and she was intentional in maintaining that:

> Maybe people think we're a little weird sometimes. I haven't ever felt like there was any animosity or anything like that. . . . One thing that we have tried to do is to be very careful not to bad mouth, um, conventional producers because I think that's pretty nonproductive.

Tammy, a niche operator, spoke of being surrounded by a supportive farming community:

> We try to use a lot of the farmers around us, for instance, like our hay, we bring in our hay from one of the big producers . . . They brought us, a little half round bale for free. They delivered it themselves. They said "We thought you might be able to use this for one of your pumpkins, that you spray paint to look like pumpkins. We thought this would be a perfect one for that. Can you use it?" And so they kind of have caught onto the idea of like wanting to help us because they see that this is more of a visible farm, where theirs aren't so visible.

Susie, a mainstream producer, strove to be a good neighbor to all, regardless of their production practices, "It's a small community. What I do has implications for everybody, and I'm not going to sit there and cause a hiccup for somebody. . . and we do border the organic guy and we're very cognizant of it." Bill, a mainstream producer, echoed the importance of being a respectful neighbor**,** "You will never find any better people than there is in agriculture. . . But don't talk about your neighbor or you'll have the rest of the community on ya."

Competition. Overall, producers did not see neighbors or peers as competition. Tammy, a niche producer, said "We felt like it was a competition until we started visiting with other farms and then we realized, oh you know what, it really isn't." Gary, a niche producer, spoke of demand and its effect on the competitive lens, "So when other farmers say, 'Well gosh, don't you think I'm competition?' And I started laughing. I says, 'Buddy, if all of us had a thousand acres each we couldn't supply the state.'" Producers were more inclined to see their competition as major corporations or other countries. Dave, a mainstream producer put it this way, "Since we're such a major exporter, we're in competition with the world. I mean that's where we're at." If producers did see neighbors or other producers as competition, they were not threatened by them. Bill, a mainstream producer, said this of other ranchers, "We compete, but, they're not a threat to me because I've got a better product" Mike, a niche producer, said

> Oh we're not competitors. The market is big enough to where it's the competition. You know, the only competition we have is who can grow the prettiest and the best. So we push each other and that's a good competition. It's a healthy competition.

Negative. Mike, a niche producer, said of conventionally raised strawberries, "If you buy them from the store, you're getting nothing but a bucket of poison, 'cause they spray this, they spray that, and put it in a box." Gary, a niche producer, said of the chicken his neighbors produced,

> To me that's gross. How can you get a seven-pound chicken in three months? And I opened one up. It was green. And when the juice touched the meat, it turned it green. I'm like "I'm not eating this chicken."

Susie, a mainstream producer, talked about a neighbor that did not use soil conservation methods. "Their field blew out and literally covered up a neighbor's crop for 40, 50 feet on the other side of the fence. They lost 40 to 50 feet of their canola crop that year." Susie also referred to organic production as a "scheme."

Some mainstream and niche producers saw the other as lazy. When referencing organic production, Susie said "for some reason instead of doing the hard work and figuring out how to market your crop, they just start bashing somebody else. That seems like what they've done." Gary, a niche producer, shared similar sentiments about mainstream producers, "Why use all the pesticides? Because they [conventional producers] are lazy. They have organics you can put on your crops; they have [predatory] pests you can buy and they're not expensive. And it's better for you, better for the environment."

Mainstream and niche producers alike said organic farming was reverting back 40 to 50 years. Susie, a mainstream producer, stated "I feel like [organic producers are] trying to farm like my great grandpa did . . . there's a push for more research into organics. They did that in the 1950s. This is where we've got ourselves. Why are we going back?" Wayne, a mainstream producer stated that despite social pressures to change to organics, he has no plans to do so: "I've spent my entire lifetime trying to advance. And to me that's regressing back. And I'm not a regressive person. I mean that, that's regressing back to the 1920s. And I can't do that." Even though mainstream producers viewed this regression as negative, niche producers viewed reverting to old practices as positive. Esther, a niche producer, said, "In some ways we've reverted back to what they were doing before those new things came."

Support of other producers and proponents of coexistence. Of the 13 participants, 11 explicitly stated that they respected other producers to make their own choices regarding production practices. Esther, a niche producer, said,

> I respect what my neighbors do with their operation. Agriculture is so diverse, and people are more so. Whatever part agriculture plays in their life and the way they feel like they need to do it, I respect. And hopefully some of those people who are so opposed to one type of agriculture over another, well, as they get older, like I am, will realize that there's more to it than just their way.

Gary, a niche producer, said this of mainstream producers, "I never criticized them. You know,

what would be the point? If that farmer has been doing this for a generation or two and this is how they grow corn, who am I to tell them what to do?" He went so far to compare the idea of telling other producers how to farm as attempting to convert their religion, "Why should I interject my belief? Yeah, that'd be as bad as going in and saying, 'Well, I'm a Catholic.' 'Well, wait a minute, I'm a Baptist. You should be Baptist.' It's like leave people alone!" His final thought on the matter was "Hey, as long as it's not illegal, go for it."

Greg, a mainstream producer, said "People that grow organic, that do both, that's great. More power to them. You know, I think of him as a peer. They just found the market where they can make it work." Joe, another mainstream producer shared the sentiment, "If they can make it go, that's great."

Whereas producers were supportive of others making their own production choices, they were wary of government regulations that limit their ability to produce on their terms. When speaking about different production practices, Wayne mentioned, "I have no problem with it. I encourage that. I just don't want laws to say that's the way you have to do it. I want the market to determine what's grown, not the federal and state government."

Along with a fear of government regulations, producers also had a sense of paranoia that other producers did not support their respective outgroups. Wayne, a mainstream producer, commented on this:

> If someone's wanting to get in the free-range chicken business. Have at it. They can have all that they want. Now, those people do not necessarily want me to do what I do. But I don't want to restrict them in any form or fashion. As long as there's a wholesome product and the consumer is willing to pay for it, they can have at it.

Bob, a mainstream producer, echoed these sentiments:

> You know, more power to them if they want to do that. The consumer will finally wise up eventually, I would think. Maybe not. I have no problem with it when it's in the free market, but when it gets into where it's dictating, you tell me I can't use a GMO, telling me that I can't do this or that, then I come out swinging. That's where the rub is.

Producer networks. When asked about information sources, producers mentioned other producers as sources. Interestingly, some of the networks consisted of close neighbors and some networks were far flung. Gary, a niche producer, is an example of the latter, "I talk to people all over the U.S., you know, anybody can call me up. Or the other farmers come down from another state and look at what we're doing." Mike, a niche producer, spoke about neighboring operations as beneficial cooperators, not as competition, "I can call any of them up right now. I share equipment with some of my neighbors. We're not competitors. The market is so big that we will never be stepping on each other's toes."

Another prevailing function of producer networks, regardless of geography, was mentorship. Producers both desired to serve as mentors and be mentored by others. Bill, a mainstream producer, works to mentor two younger producers in the cattle business, "I told him I'd help him get started. It is so hard for young people to get started because it's capital intensive. I try to help them get started because it's hard to get young people back."

Social media. Nine of the 13 producers interviewed for this study mentioned social media as a way they connect with other producers, as well as the public. Tammy, a niche operator, uses Facebook to reach her customers and advertise the farm, but she also uses Facebook to gain industry information:

> We have learned a lot on that Facebook page [for agritourism operators]. People are just asking questions or sharing their advice, and people aren't afraid to share their failures. No one is trying to keep trade secrets. People want other farms to be successful too.

Susie, a mainstream producer, spoke about the benefits social media can offer a producer:

> Farming can be a pretty lonely occupation. I don't feel like is as lonely as it used to be in, because there is much more social media, but before Facebooks and Twitter and Instagram, you would kind of be on your own for days at a time. But with social media you feel like you may not be so alone, there's community there.

Conclusions, Recommendations, and Implications

This study sought to understand producers' identities and relationships with other producers and communities. The present study found producers' identities were influenced by their occupation, family, and sense of duty. These components of identity are indicative of enacted identity, or the identity that is communicated to the outside world (Hecht, 1993). In this study, producers communicated about agriculture (or their identity) nearly every day. Findings in this study confirm the idea that occupational identities of producers are deeply entrenched (Abrams et al., 2013). Producers often defined themselves by their occupation of organic farmer, rancher, or farmer within their first few sentences.

Producers defined "good producers" by their financial success, efficiency, innovation, and longevity of operations. Similar to Phillip and Gray's (1995) findings, when defining a "good farmer" producers indicated innovation and efficiency as factors as well as operation longevity and consistency from year to year. However, producers also noted financial stability and joy or passion for the work as other factors determining the quality of a farmer. Producers were proud of being involved in agriculture and often spoke of the industry's superiority and societal necessity. Each producer's communal or collectively defined identity (Hecht, 1993) was marked by this sense of pride and importance related to their industry.

Moreover, producers were concerned with not only being a good producer (Phillips & Gray, 1995) but also a judicious and kind neighbor. The majority of producers in this study were very conscious not to speak ill of other producers or criticize their production practices, even if they did not agree with others' production practices. Though most were careful to avoid negative statements, one mainstream producer referred to certain niche practices as a "scheme" and some niche producers spoke poorly of the quality of mainstream products. There were participants from both mainstream and niche groups who referred to the other as lazy. This kind of comparative language is representative of the relational frame of identity. Relational identity is how one defines themselves in comparison to others (Hecht, 1993). By naming other producers as lazy or as running a scheme, producers distinguished themselves as hardworking and honest.

Overall, producers spoke of a mutual respect for other producers, regardless of their choices in production practices. Although producers may not want to buy or produce the products produced by the other group, they generally supported their desire to farm as they saw fit. This support ranged from genuine concern and encouragement of other producers to a more laissez-faire mentality. Although producers said they were supportive of others, each producer felt aggression from the other side of agriculture. Mainstream producers felt attacked by niche producers as though niche producers were attempting to change mainstream production practices. Niche producers often felt the same way about mainstream producers. Moreover, producers were also extremely conscious of being the subject of gossip, particularly if they were trying something new and different.

Despite the general support of other practices, as Gray and Gibson (2013) found, producers were very set in their own practices and seemed unlikely to change. This points to the chasm between the two groups mentioned by Beus and Dunlap (1990). Despite efforts by the USDA (2015) to create coexistence, perceptions of relationships remain strained even with the majority of producers viewing the other group in a positive light; they often believed the other group harbored negative perceptions. Although past research indicated a rise in competitive feelings between producers (Rotz, 2017), producers in this study did not consider other producers in the area to be competition in negative way. Not only were producers more likely to express concern for the success of other producers than feeling of competition, but they even welcomed the idea of "friendly competition." Producers in the present study were more concerned with international competition than farmers down the road. Neighbors were a popular source of information for producers.

Networks were utilized by producers to learn new information, share resources, and even mentor younger producers. Social media played a substantial role in these producer networks. Previous research regarding producers using others as information sources was conflicting. Past studies indicated niche producers were more likely than mainstream producers to use peers for information (Crawford, et al., 2015). Research also indicated producers were becoming hesitant to turn to neighbors for answers and help (Bell et al., 2004; Rotz, 2017). However, according to a different study, producers shared information related to agriculture regularly (Gray & Gibson, 2013). Results from the present study indicate producers relied heavily upon their neighbors and peers for information. Producer information networks were important for both mainstream and niche producers. Similar to past research, many producers spoke of talking to people every day about agriculture (Gray & Gibson, 2013). Social media served as an important outlet to producers to create social connections and gain information. This finding is contrary to the Crawford et al. (2015) study that indicated online media was an ineffective source of information for producers.

As this study focused on producers in Oklahoma, it is suggested that similar research be conducted in other states. In order to understand if the perspectives of producers in this study are similar to those across the state, a quantitative survey of all Oklahoma producers is recommended. Future research should examine the way producers use social media to communicate and build networks. The mentoring aspect of networking should also be examined.

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Influence of Message Theme on Consumer Perceptions of Lab Grown Meat

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Lab grown meat is a new technology being developed as a potential alternative protein source. Although some research has been done about public perception of lab grown meat, no studies to date have observed the effects of message themes on public perception of lab grown meat. The study sought to better understand measures of uncertainty and risk and benefit perceptions after viewing a themed blog post about lab grown meat. Participants were randomly assigned one of three themed blog posts – against lab grown meat, neutral, or support lab grown meat. Perception questions were asked after viewing the blog post, and a total of 238 responses were collected. Results indicated message theme had a statistically significant effect on risk perception, benefit perception, and intention to consume, but not on message evaluation or measures of uncertainty. Further discussion as well as suggestions for future research are included.

Introduction/Need for Study

In the upcoming years, the world population is expected to grow and as it does, the demand for meat as a protein source is expected to grow with it (Lee, 2018). In the United States alone, meat consumption rose 5% in 2015 (Wilks & Phillips, 2017). Scientists are looking outside of the realm of traditional agriculture to solve the higher demand for animal protein sources while simultaneously lowering the environmental impacts present in agricultural production (Shapiro, 2018). Lab grown meat, an innovation in cellular agriculture and food biotechnology, has been proposed as an alternative protein source. No single name has been settled upon for this new technology with a variety of descriptors used in the media and literature: cultured meat, *in vitro* meat, lab grown meat, synthetic, artificial, and factory grown meat (Verbeke et al., 2015). For consistency and lack of confusion, "lab grown meat" will be the term used throughout this study.

In their review of the current literature surrounding public perception of lab grown meat, Verbeke et al. (2015) found that providing additional information about the benefits of lab grown meat resulted in a greater willingness to try lab grown meat as well as willingness to purchase lab grown meat. Although the study indicated only a small number of consumers completely rejecting the idea of trying lab grown meat, there is no proof of how likely consumers will be to repeatedly buy or replace traditional meat with lab grown meat (Verbeke et al., 2015). In a cross-country survey of consumer's perception of plant and lab grown meat, consumers in India and China were more willing to consume lab grown meat than consumer counterparts in the United States (Bryant et al., 2019). Of the consumers in all three surveyed countries, meat-eaters and omnivores were more likely to purchase lab grown meat than pescatarians, vegetarians, or vegans. In the United States, political leaning to the left and those more familiar with lab grown meat showed a higher intent to purchase lab grown meat given the scenario that it was on grocery store shelves (Bryant et al., 2019).

While new food technologies enable innovation, they are not always readily accepted by the public (Siegrist, 2008). Consumers often view new food technology with scrutiny due to the significance and essential nature of food in daily life (Lucht, 2015). Due to the importance of consumer acceptance on the success of new food products, consumer attitudes, including naturalness and risk and benefit perceptions, should be evaluated at an early stage in the process of developing a new food technology (Siegrist, 2008). Several factors – price, environmental affect, and animal welfare – play into the public's perception of lab grown meat. It remains unclear how consumers will accept this new technology (Verbeke et al., 2015) and there is a need to explore how messaging might influence perceptions of this new food technology.

Conceptual Framework

The conceptual framework for this study was built on the concepts of risk and benefit perceptions and measures of uncertainty. Risk is a measure of hazard times exposure, and is inversely related to benefit perceptions (Juanillo, 2001; Ueland et al., 2011). Uncertainty perceptions measure the amount of conflicting or confusing information that exists in a scientific issue (Zehr, 2000).

Risk and Benefit Perceptions

Risk is assessed by the formula that states risk = hazard x exposure (Juanillo, 2001). Assessment of risk is essentially the process of answering the question of what is safe. In the context of risk communication, exposure, the amount of time and frequency exposed to a message, and the actual content of messages may impact risk perception (Binder et al., 2011). Binder et al. found increased exposure to a message amplified both benefit and risk perceptions. Discussion of the issue was shown to amplify risk, benefit, or neutrality positions rather than sway people closer to one side of the issue (Binder et al., 2011). The results of this study are significant because preexisting attitudes, whether a person assesses something as positive or negative, have been shown to affect behavior toward a new issue (Kim et al., 2014).

In regard to food technologies, consumers often see them as risky (Cavaliere & Ventura, 2017). This is magnified in the eyes of consumers as marketers portray the exact opposite of food technology with the label "all-natural" emphasized as the healthiest, most beneficial option when it comes to food (Biltekoff, 2010). Despite technology's role in keeping food safe and plentiful, there is an underlying connotation that things of nature or "natural" are inherently pure (Biltekoff, 2010).

In a literature review of risk and benefit perceptions of new food technologies, Ueland et al. (2011) found risks and benefits were inversely correlated; when benefit perception is high, risk tends to be low. Consumers tend to be more cautious rather than adventurous toward new food. Foods that are "traditional" and "well known" tend to align with perceptions of benefits, while new or highly processed food tends to be associated with higher risk perception (Ueland et al., 2011).

Scientific Uncertainty

Scientific uncertainty is an element of incompleteness in regard to something in nature or something that results in a dissonance regarding a scientific claim (Zehr, 2000). This is not always a negative thing, as it is often what pushes scientists to continue researching in order to clear up the uncertainty. However, this could pose an issue between the public and scientists as uncertainty can lead to mistrust of scientists among the public (Zehr, 2000).

Communicating scientific uncertainty is essential because all aspects of science contain some uncertainty (Fischhoff & Davis, 2014). If uncertainty is not communicated effectively, someone may put too much or too little faith into a technology and make an inaccurate decision regarding it. Scientific communication should uncover uncertainties and simplify uncertainties to a point where people can identify the best choice about a scientific innovation for themselves.

Uncertainty is present in risk information and may affect the impact risk information has when it reaches the public (Han et al., 2008). Han and colleagues found that some people associated uncertainty with a greater risk perception, but some did not associate uncertainty with any heightened risk. Han et al. concluded that uncertainty does matter to people, even if it has different effects on different people.

Purpose/Research Questions

The purpose of this study was to examine the influence of themed messages on public perceptions of lab grown meat. The following research questions guided the study:

RQ 1: What influence does the message theme of a blog post have on message evaluation and intention to share content about lab grown meat?

RQ 2: What influence does the message theme of a blog post have on risk and benefit perceptions of lab grown meat?

RQ 3: What influence does the message theme of a blog post have on perceptions of uncertainty regarding lab grown meat?

RQ 4: What influence does the message theme of a blog post have on intention to consume?

Methods

In order to address the research questions of this study, a between-subjects experimental research design was used. A between-subjects experimental study allows different groups to participate in each experimental condition, which provides an opportunity to compare the groups (Field, 2018). The message stimuli evaluated in the experiment were in the form of blog posts, which were embedded in an online instrument. Texas Tech University's Institutional Review Board approved the study prior to data collection.

Message Stimuli and Message Testing

Three blog posts served as the message stimuli and were developed from online content found through Meltwater sentiment analysis and existing blog posts (Boykin et al., 2019). The three researcher-developed blog posts were designed to reflect the message themes: *support lab grown meat*, *against lab grown meat*, and *neutral*. The positive blog post was adapted from Bloch

(2019) and GrantTree (2018) and was edited to ensure a positive outlook toward lab grown meat. The neutral blog post was developed from Rabie's (2019) blog post and edited to ensure a neutral viewpoint of lab grown meat. The negative blog post was adapted from Van Eenennaam (2018) and Condon's (2018) blog posts. Blog post stimuli all had the same credited author, and each had around 400 words.

Before launching the questionnaire with a nationally distributed sample, message testing was conducted to ensure the developed blog posts were distinct and reflected the desired themes of *support lab grown meat*, *against lab grown meat*, and *neutral*. Twenty-nine graduate students in studying agricultural education and agricultural communications were sent a Qualtrics questionnaire with the blog posts. Participants were asked to read each randomly presented blog post and indicate if the overall message was in support of lab grown meat, against lab grown meat, balanced/neutral toward lab grown meat, or whether they were unsure. Results indicated the themes *support lab grown meat* and *against lab grown meat* were both identified easily. However, there was inconsistency in identifying the *neutral* theme. A sentence was added at the beginning of the *neutral* message for clarity, and a smaller group of graduate students were presented with the message again and deemed it appropriate for subsequent testing.

Questionnaire

The instrument was constructed in Qualtrics. The data reported in this manuscript are a portion of the larger dataset; the constructs explored in this manuscript are described below.

Message Evaluation

After viewing the randomly assigned stimulus, participants provided their evaluation of the message by answering eight questions using a 7-point Likert-type scale (1 = *strongly disagree* to 7 = *strongly agree*). These measures were adopted from Steede's (2018) study of trust of messages about animal antibiotics. A sample statement from the measure was "This blog post is reliable." Steede reported Cronbach's α = .839. In the current study, *post hoc* reliability was calculated with Cronbach's α = .885.

Intention to Share Content

Intention to seek out information about lab grown meat and share the blog post seen on social media were asked in a three-question item adopted from Steede (2018). Responses were reported on a 7-point Likert-type scale (1 = *strongly disagree*, 7 = *strongly* agree). A *post hoc* reliability analysis was calculated with Cronbach's α = .853.

Risk Perception

Risk perception was measured with three questions using a 5-point Likert-type scale (1 = *very unlikely*, 5 = *very likely*). An example of the questions in the measure was "How likely is it that lab grown meat presents a serious health hazard?" These questions were adopted from both Binder et al. (2011) and Kim, Yeo, Scheufele, and Xenos (2014). Binder et al. reported a Cronbach's α = .86 and Kim et al. reported a Cronbach's α = .91. *Post hoc* reliability was calculated on the three measures with a result of Cronbach's α = .925.

Benefit perception
Benefit perception was measured using three questions with a 7-point Likert-type scale (1 = *strongly disagree* and 7 = *strongly agree*). Participants indicated their agreement or disagreement to the following items: 1) I believe lab grown meat is good for the environment. 2) I believe lab grown meat is good for animals. 3) I believe lab grown meat is good for future generations of people. Questions were adapted from Kim et al. (2014) who reported a Cronbach's α = .91. Reliability calculated *post hoc* resulted Cronbach's α = .878. The responses were summed and averaged for a grand mean of 3.85 (*SD* = 1.62), which indicated participants were somewhat neutral toward perceived benefits of lab grown meat.

Uncertainty
To measure uncertainty, three questions adopted from Li and Brossard (2012). Participants were asked their level of agreement with response options presented on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). Reliability was calculated at Cronbach's α = .733. The summed and averaged responses resulted in a grand mean of 2.83 (*SD* = 1.08).

Intention to Consume
A three-item question set was asked to measure a consumer's intention to consume lab grown meat. The questions were adopted from Wilks and Phillips (2017) survey of attitudes toward lab grown meat. Respondents were asked questions such as, "How likely are you to try lab grown meat at least once?" The response options were Likert-type questions (1 = *not at all Likely* to 5 = *extremely likely*) with a reliability calculated *post hoc* with Cronbach's α = .853.

Demographics
Respondents were asked to report gender, age, education level, income, political view, and political party.

Data Collection
Participants in the study were recruited using Marketing Systems Group (MSG). MSG is an information systems company used to distribute online instruments, compensate participants, and collect data. Because the current study was an experimental design with a nationally distributed sample, 30 responses per message stimuli was the minimum number of responses needed according to Roscoe (1975). In order to increase statistical power and account for potential errors, 300 complete responses were requested. For completing the instrument, MSG compensated participants with points, which are redeemable for Amazon gift cards.

Two attention checks were embedded within the instrument. If both attention check questions were answered incorrectly, the response was removed from the data set. Sixty-one responses were removed leaving a total of 239 viable responses. One additional response was removed due to not meeting the minimum age requirement of 18 years of age. The final total of usable data was 238.

Data Analysis
Data analysis was carried out using IBM® SPSS® Statistics version 25. Data from MSG was received as an Excel file and non-qualifying responses were extracted before importing into SPSS. Descriptive statistics were used for nominal and scale data. Measures of central tendency,

including means and modes, were calculated as well as measures of variability, i.e. frequencies, standard deviations, and ranges. ANOVAs were used to compare the stimuli's influence on message evaluation, risk and benefit perceptions, measures of uncertainty, and intentions to share content and consume lab-grown meat.

Description of Participants

Of the 238 participations, nearly three-quarters were female (*n* = 182, 76.2%). The age of respondents varied from 18-80 years old with the mean age of respondents being 45.7 years old. Most respondents had an undergraduate degree (*n* = 83, 42.7%) or 33.5% (*n* = 80) had completed high school. The majority of respondents were meat-eating individuals (*n* = 184, 77.3%), 4.2% of respondents were vegetarian (*n* = 10), 4.2% reported being pescatarian (*n* = 10), and only two respondents (0.8%) reported being vegan.

The income level of respondents was primarily $20,000 to $39,999 (*n* = 55, 23.1%) and less than $20,000 (*n* = 53, 22.3%). The majority of participants responded they were moderate in their political views (*n* = 78, 32.8%). While 21 participants (8.8%) chose not to answer, the majority of participants identified their political party as Democrat (*n* = 93, 39.1%). The remaining responses were split with 66 respondents (27.7%) being republican and 58 respondents (24.4%) identifying as an independent.

Each participant was randomly assigned a themed blog post. Due to 61 responses being removed due to not meeting the quality check questions, slightly more participants (*n* = 88, 36.8%) saw the positive stimuli. The remaining participants saw either the negatively themed blog (*n* = 74, 31.0%) or the neutral themed blog (*n* = 77, 32.2%).

Results

RQ 1: **What influence does the message theme of a blog post have on message evaluation and intention to share content about lab grown meat?**

To answer RQ1, a one-way ANOVA was conducted for each dependent variable (Table 1). No significant difference was found between the message theme that was viewed and how participants evaluated the message (F = .59, *p* = .55). The group means (Table 2) showed that those who viewed the neutral themed blog post reported slightly more agreement regarding trust, reliability, ease of understanding, and accurateness (*M* = 4.67, *SD* = 1.09), but this was not statistically significant when compared to the evaluation of the other message themes.

Table 1

ANOVA of the Effects of Message Themes on Message Evaluation

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	1.39	2	.69	.59	.55
Within Groups	275.45	235	1.172		

Table 2

Means of Message Evaluation (N = 238)

Message Theme	*M*	*SD*
Support Lab Grown Meat	4.50	1.09
Neutral	4.67	1.09
Against Lab Grown Meat	4.64	1.07

Another one-way ANOVA (Table 3) reported statistically significant differences between the blog post theme viewed and intention to share content (F = 5.02, p = .01). The group means (Table 4) showed that those who viewed the blog post themed against lab grown meat were less likely to seek out information about lab grown meat, share the blog post on social media, or think the blog post would interest their followers on social media (M = 2.03, SD = 1.21).

Table 3

ANOVA of the Effects of Message Themes on Intention to Share Content

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	16.99	2	8.49	5.02	.01
Within Groups	397.42	235			

Table 4

Means of Intention to Share Content (N = 238)

Message Theme	*M*	*SD*
Support Lab Grown Meat	2.64	1.27
Neutral	2.56	1.41
Against Lab Grown Meat	2.03	1.21

A *post hoc* analysis using Bonferroni comparison was calculated to understand where the significance occurred between the message themes. Statistically significant difference was found between *support lab grown meat* and *against lab grown meat* themed (p = .01) and *against lab grown meat* and *neutral* themes (p = .04). There was no statistically significant difference found between *support lab grown meat* and *neutral* blog posts (p = 1.00).

RQ 2: What influence does the message theme of a blog post have on risk and benefit perceptions of lab grown meat?

Two one-way ANOVA calculations were calculated to answer RQ2. The first comparison was between the viewed blog post theme and risk perception. As Table 5 displays a statistically significant difference in risk perception was found between the three message themes (F = 3.44, p = .03). The group means (Table 6) showed that those who viewed the blog themed *against lab grown meat* were somewhat more likely to perceive risk (M = 3.58, SD = 1.07) than those that

viewed the *neutral* (M = 3.19, SD = 1.20) or the *support lab grown meat* (M = 3.13, SD = 1.12) themed blog post.

Table 5

ANOVA of the Effects of Message Themes on Risk Perception

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	8.79	2	4.39	3.44	.03
Within Groups	300.27	235	1.28		

Table 6

Means of Risk Perception (N = 238)

Message Theme	*M*	*SD*
Support Lab Grown Meat	3.13	1.12
Neutral	3.19	1.20
Against Lab Grown Meat	3.58	1.07

In order to identify where the significance existed, a Bonferroni comparison was calculated, which found a statistically significant difference existed between the *support lab grown meat* theme and the *against lab grown meat* theme (p = .045).

Table 7 shows the one-way ANOVA calculated to compare the viewed message theme on benefit perception showed a significant difference between the two variables (F = 7.08, p < .001). The group means (Table 8) revealed that participants who viewed the blog post themed *against lab grown meat* somewhat disagreed with the statements of benefits of lab grown meat (M = 3.28, SD = 1.60). However, those who viewed the *support lab grown meat* themed blog post on average neither agreed nor disagreed with benefit statements about lab grown meat (M = 4.14, SD = 1.57).

Table 7

ANOVA of the Effects of Message Themes on Benefit Perception

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	35.26	2	17.63	7.08	.00
Within Groups	585.06	235	2.49		

Table 8

Means of Benefit Perception (N = 238)

Message Theme	*M*	*SD*
Support Lab Grown Meat	4.14	1.57
Neutral	4.06	1.56
Against Lab Grown Meat	3.28	1.60

In order to shed light on where the significant difference existed, a *post hoc* Bonferroni comparison was run. The comparison showed a statistically significant difference between *against lab grown meat* and *support lab grown meat* (p = .002) and between *against lab grown meat* and *neutral* (p = .007) themed blog posts.

RQ 3: What influence does the message theme of a blog post have on perceptions of uncertainty regarding lab grown meat?

A one-way ANOVA was calculated to assess the interaction between the message theme viewed and perceptions of uncertainty toward lab grown meat. As shown in Table 9, no significant difference between message themes and measures of uncertainty was observed (F = 1.46, p = .23). The group means (Table 10) showed that those who viewed the *against lab grown meat* (M = 2.68, SD = 1.19) themed blog more strongly disagreed with statements of certainty than those who viewed the other themed blogs.

Table 9

ANOVA of the Effects of Message Themes on Measures of Uncertainty

	SS	*df*	*MS*	*F*	*p*
Between Groups	3.38	2	1.69	1.46	.23
Within Groups	271.45	235	1.16		

Table 10

Means of Measures of Uncertainty (N = 238)

Message Theme	*M*	*SD*
Support Lab Grown Meat	2.97	.95
Neutral	2.81	1.09
Against Lab Grown Meat	2.68	1.19

RQ 4: What influence does the message theme of a blog post have on intention to consume?

The interaction between message theme of a blog post and intention to consume lab grown meat was measured with a one-way ANOVA. Table 11 shows there was a statistically significant difference between message themes and intention to consume (F = 5.02, p = .007).

Table 11

ANOVA of Effects of Message Theme on Intention to Consume

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	16.99	2	8.49	5.02	.007
Within Groups	397.42	235	1.69		

Table 12

Means of Intention to Consume (N = 238)

Message Theme	*M*	*SD*
Support Lab Grown Meat	2.64	1.27
Neutral	2.55	1.41
Against Lab Grown Meat	2.03	1.21

A calculation of the group means, shown in Table 12, indicated that those who viewed the message theme *against lab grown meat* (M = 2.03, SD = 1.21) more strongly disagreed that they intended to consume lab grown meat than those who viewed the other two message themes. A Bonferroni *post hoc* analysis showed the significant differences existed between *against lab grown meat* and *neutral* (p = .04) and between *against lab grown meat* and *support lab grown meat* (p = .01) themed blog posts.

Conclusions/Discussions/Implications

The blog posts were designed to each feature a distinctive theme: *against lab grown meat, neutral,* and *support lab grown meat.* No statistical difference was found between message evaluation and the message themes viewed. This indicates that regardless of the stimuli assigned to a participant, each blog post was evaluated similarly. This shows that the blog posts were written in a way that was equally credible despite the difference in message frame.

However, RQ1 found a statistically significant difference in the intention to seek information or share information about lab grown meat between the three themed message conditions. Those who viewed the *against lab grown meat* themed message were less likely to seek out information or to share information about lab grown meat. This aligns with findings from Majmundar et al. (2018) who found one of the four main reasons people retweet or share content on social media is to show approval or agree with the content.

The message theme used in the blog post was found to have an influence on risk perception. A Bonferroni *post hoc* comparison found the statistically significant difference was between the themes *against lab grown meat* and *support lab grown meat.* The mean scores indicated those who viewed the *against lab grown meat* blog post were somewhat more likely to perceive risk than those in the other two treatment groups. This result is intuitive; seeing a negatively themed message causes people to be more wary of an issue. This also aligns with Cobb's (2005) framing study where he found negative themed messages increased risk perception and decreased benefit perceptions.

In regard to message theme and benefit perception, again there was a significant difference found in perceptions related to the theme present in the blog post. The mean scores revealed those who viewed the *against lab grown meat* themed blog indicated a higher level of disagreement with statements about the benefits of lab grown meat. The Bonferroni *post hoc* comparison found statistically significant differences between *against lab grown meat* and *support lab grown meat* as well as *against lab grown meat* and *neutral* themed blog posts. Similar to the results of risk perception, this also aligns with Cobb's (2005) findings that a negative theme would decrease benefit perceptions.

Unlike risk and benefit perceptions, the theme of the blog post viewed did not have a significant effect on participants' uncertainty toward lab grown meat. However, on average, participants were more likely to disagree with statements of certainty after viewing the *against lab grown meat* themed blog post. While risk and uncertainty are often tied closely together in literature (Han et al., 2008), the uncertainty associated with lab grown meat is much more ambiguous than risk. Risk can be calculated with a formula, but uncertainty is an element of incompleteness within a scientific claim (Zehr, 2000). Han et al. found uncertainty affects different people in different ways which could explain the statistical inconsistency between the message theme and perceptions of risk and uncertainty.

Similar to risk and benefit perceptions, the blog post theme viewed by the participant had a significant effect on a person's intentions to consume lab grown meat. Those who viewed the negatively themed blog post more strongly disagreed they would consume lab grown meat than those who viewed the other blog posts. Again, this demonstrates the influence negatively themed information can have in heightening risk perceptions, which would decrease interest in consuming lab grown meat.

Recommendations

The results of this study add to previous literature regarding how the public may perceive and eventually accept lab grown meat as an alternative protein source after viewing one of three themed blog posts. Other message themes may arise as the public forms opinions and more information about lab grown meat is exposed to the public. These message themes should be explored in regard to measures of uncertainty, intention to share content, intention to consume lab grown meat, message evaluation, and risk and benefit perceptions.

In order to decrease uncertainty, the general public needs to clearly understand the terms referring to lab grown meat (Fischhoff & Davis, 2014). The multitude of terms used to describe lab grown meat likely increase measures of uncertainty. By examining future research about the public's understanding of the terms used to describe lab grown meat, one term should be decided upon and used consistently throughout marketing, literature, and news to refer to this technology.

In addition to the unknown consumer acceptance of lab grown meat, it is also not clear what impact this new technology could have on beef production and ranchers worldwide. The livestock industry – breed organizations, feedlots, ranchers, and seedstock operations – should be aware of the public's perceived risks and benefits associated with lab grown meat. Although

there are still barriers to overcome before this technology is a direct competitor for traditional livestock production, it is essential that livestock producers and breed organizations be aware of what may come. With this knowledge and insight, they can be better prepared to answer consumer questions and inform the development of policies regarding how lab grown meat is labeled, regulated, and marketed.

Because this product is not yet available to consumers, the livestock industry should begin to develop communication strategies that clearly outline what lab grown meat is. Those who viewed the *against lab grown meat* themed messages were more likely to perceive this new food technology as risky and indicated lower benefit perceptions and a greater level of uncertainty. This implies that providing consumers with these aspects may lead them to be less willing to accept this alternative to traditional protein sources.

A better understanding of public perception can give the livestock industry a head-start in responding to this technology and be more effective when marketing their own product alongside this alternative protein source. South Carolina and Missouri have already put laws into place regarding the labeling of lab grown meat. Knowledge of public perception may influence other states to create their own legislation in regard to labeling and marketing aspects of lab grown meat.

Understanding public perception can be beneficial to startup companies as they attempt to market their product to the public. Marketers should be aware of risks in order to address them and understand what influences benefit perceptions in an effort to highlight benefits in the public's eye. As communication practitioners go forward to create messaging to educate or market lab grown meat, they should be aware of how an emphasis on different aspects of a message may influence public perception.

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That's Not a Real Farm: Exploring the Agricultural Visual Vocabularies of Visual Communicators

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As consumers become increasingly more removed from the agricultural industry, stereotypical or inaccurate images of agriculture only aid in strengthening consumer misconceptions of the industry and its practices. Understanding how graphic communicators develop their visions of the agricultural industry could help us better understand the visual messages provided to the public. This qualitative phenomenological study of graphic communicators and their visual vocabularies of agricultural practices sought to understand the influences that shaped their perceptions of agriculture. Using semi-structured photo elicitation interviews, participants shared that their personal exposure to agricultural images and experiences played a large role in influencing their visual vocabularies of the industry. Many also noted the influence of picture books from their childhood on their memories and knowledge of the agricultural industry. Future research should further explore the factors that influence the development of visual vocabularies for graphic communicators tasked with depicting agricultural topics.

Introduction/Theoretical Framework

Consumers lack an understanding of agriculture and the modern practices that make food plentiful, healthy, inexpensive, and ethical because they are so far removed from agriculture. According to The American Farm Bureau Federation (2019), farm and ranch families comprise just 2% of the U.S. population. The further away from the farm today's consumers become the less knowledgeable they are about food and fiber production.

An inaccurate view of agriculture is often perpetuated through the images of pastoral fantasy displayed in today's media and advertising. The modern advancements of farming and animal husbandry are so far removed from how Old MacDonald ran his farm that it is little wonder that consumers are swayed that only non-GMO vegetables or antibiotic-free chickens are safe to eat. The disconnect between fantasy and reality has also given rise to organized groups who, without proper knowledge, demonize the industrial practices of modern agriculture and further control consumer thoughts of the industry.

Agriculture and rural living are often portrayed through a pastoral fantasy lens in media with *Happy Cows* (Specht & Buck, 2011), red barns, and "corn as high as an elephant's eye" (Rogers & Hammerstein, 1947). Pastoral fantasy is a "longing after innocence and happiness…through the medium of the rural world" (Alpers, 1982, p. 437). Marx (1963) blamed the perpetuation of pastoral imagery on advertising copywriters who take advantage of consumers "yearning for a simpler, more harmonious style of life" (p. 6). Additionally, Specht and Buck (2014) suggested that much of the advertising for consumer products has perpetuated the stereotypes of pastoral fantasy. To combat that, they recommended that producers move away from fantasy-type

advertising because it is not ethically responsible. Similarly, Scott (1994) said the imagery in commercial advertising was not straightforward and was often complex and laden with the personal agendas and cultural cues of the creators. Scott (1994) pointed out that for far too long the focus in advertising has been on attention-getting ploys and called for more research on how consumers are affected by the images portrayed in ads.

Pastoral imagery has also been seen in entertainment media as well including children's literature, television, and movies. Studies of agricultural imagery in popular reality and children's television programing have suggested a need for further investigating the visual images provided to the public (Dietrich, Buck, & Specht, 2015; Specht & Beam, 2015; etc.). Children's programming is of particular interest because preschool children form their schemas during those early years. Dietrich et al. (2015) stated it is essential for the industry to know what children learn about agriculture because that forms the basis of their understanding of agricultural products as consumers and found that the portrayal of agriculture in children's TV programming was mostly through the lens of the pastoral fantasy.

The communicators and artists that create these advertising and entertainment images play a major role in what visuals are presented to the public and ultimately influence much of their attitudes and knowledge about the agricultural industry. These communicators often rely on their own thoughts and ideas, drawing upon their own personal experiences and memories, to create visual images. John-Steiner (1997) explained that creative people have a "bag of memories" (p. 68) where they record visual memories of their past experiences. "Among the invisible tools of creative individuals is their ability to hold on to the specific texture of their past. To some, the birth of a creative idea is linked to memories reaching back into childhood" (John-Steiner, 1997, p. 68). Creative individuals use different parts of their bag of memories to understand new ideas and concepts, and self-knowledge is paramount to creativity (John-Steiner, 1997). Giorgis et al. (1999) termed this our bag of memories our visual vocabulary and referred to it as our ability to construct meaning from visual images from our past.

Other influences affect how people develop their visual vocabularies, a process that is thought to begin at birth and is a progression of learning, forming our schemas, and building understanding based on what we see. DeLoache (2002) spoke of the vast interactions children have with symbols and pointed to illustrated books, television, and representational toys as children's main sources of exposure to symbolic artifacts. She found that even babies build associations and connections to images that represent objects they interact with in real life, such as baby bottles, and learn early on that 2-D images are only a symbol of an object and not the real thing. DeLoache (2002) suggested that children are now exposed to images at earlier ages than ever before, making our understanding of how children interpret symbolic artifacts more essential than ever. Phillips, Gorton, Pinciotti, and Sachdev (2010) also stated that young children not only learn images early, but that images enhanced their learning of other skills such as school-readiness. Additionally, Dooley (2010) hypothesized that children begin comprehending symbols, text, and images much earlier than most educators believe, so what children see early on is very important to their cognitive development.

Several factors influence the thoughts and opinions of consumers and future consumers including media content, education, and home environments. The development of their visual vocabularies

is important to understand as well, as the visuals people consume play a major role in their thought development. Visual communicators rely on images to communicate ideas and information to their audiences, particularly about topics they may have little information about, such as the agricultural industry. Marx (1963) felt pastoral fantasies were perpetuated by advertising agencies, who inform consumers through media outlets, but other inaccurate images of agriculture exist in various visual mediums, including in children's literature and entertainment media. Popular children's literature, such as the Little Golden Books series, often depict agriculture through a pastoral lens and could be negatively affecting the thoughts children form of the agricultural industry and its practices by portraying agriculture in a less than accurate light.

The visual communicators that create the often inaccurate and pastoral images that further influence children and consumers are essentially the gatekeepers to providing accurate portrayals of the industry to the public and future generations of consumers. Understanding the influences and development of their own visual vocabularies may help break this cycle and help the agricultural industry find a solution to the need for accurate visuals created by those who have little to no experience with the industry and were not trained as agricultural communicators.

This research was guided by the theory of semiotics. The images used in the study had a deeper meaning that transcended the images taken at face value. Semiotics is the study of signs and the meanings the sign transfer. According to Chandler (2017), signs have two parts, a signifier, which is the visual object, and a signified, which is the mental representation of that object. The signifier is like a stop sign at a crossroad and the signified is the implied meaning that sign conveys, in this case to stop. Barthes (1977) pointed out that sign systems are simple visual cues that lead to a deeper understanding or meaning on the part of the individual viewing them. Barthes (1977) used the example of a sweater, which is just an article of clothing designed to keep the wearer warm; however, a sweater could represent long walks in the woods to the wearer taking on a more profound significance. The symbols of agriculture also take on a deeper meaning that exceeds the utilitarian use. A red barn is more than just a building; it is a representation of an idyllic rural lifestyle to some and could represent the production of food and fiber to others.

The relationship between how pictures and text work together in children's books has been described as complex. Sipe (1998) introduced a variation to the theory of semiotics based on the concept of what he called "transmediation, or the translation of content from one sign system into another" (p. 97). Sipe (1998) described that the process of transmediation continues as the observer matures and acquires new experiences. According to Sipe (1998), illustrations serve as important cues to help viewers understand intended meanings of text. The text of a children's book could say "ferocious creature," but the illustration could actually show a furry, cuddly teddy bear. The juxtaposition of the opposite stories told by the text and illustrations tell a third story that neither could tell alone.

Purpose and Objectives

Consumers are less knowledgeable about the food and fiber industries today than ever before because of the growing distance they are the agricultural industry. They get their perceptions of

agriculture mostly from entertainment media, advertising, social media, and news media outlets. The purpose of this study was to examine the creators of visual content and explore where their visual vocabularies may have originated? Bates et al. (1979) suggested the "marvel" of visual vocabularies begins in infancy and is a combination of new and old experiences (p. 1). John-Steiner (1997) felt that images viewed in our lives are deposited into a bag of memories to be accessed in the future. Our visual vocabularies contain experiences and influences including pastoral fantasy images perpetuated in many outlets. This study sought to examine factors and experiences that could have influenced visual communicators' views of agriculture to better understand the development of their ideas about the industry. The following objectives guided this study:

1. Examine the factors that influence the agricultural visual vocabularies of visual communicators.
2. Explore the responses visual communicators had to agricultural images from Little Golden Books compared to images of modern agricultural practices.

Methodology

This study used a qualitative research approach with a phenomenological design. Phenomenology is the study of similar individuals with similar experiences and how they express those experiences. According to Creswell (2007), phenomenology focuses not on the life of the individual, but rather on the experiences of the individual, reducing them into a common experience, or "essence of the experience" (p. 94). Gallagher and Zahavi (2008) determined that phenomenology is not self-examination, but rather explores the essence of possibility. As all of the participants had similar backgrounds and experiences, phenomenology was used to examine their shared experiences with their visual vocabularies.

Participants consisted of 10 visual communicators outside the academic field of agricultural communications from the [city, state] area who were members of a local professional organization for visual communicators. Purposeful criterion sampling was used to ensure participants had experienced the phenomenon being researched (Creswell, 2007; Groenewald, 2004). Baxter and Eyles (1997) suggested that a purposeful sampling of the population being studied and the ease with which they can speak on the topic yields rich data. Palinkas et al. (2015) stated the goal of criterion sampling is to identify and choose participants that meet an a priori set of standards that are determined to be imperative to the research. For this research, participants had to meet three key criteria to be included in the study:

- Be a visual communicator working full-time at an outside or in-house agency
- Have a degree or at least eight years of experience in a field related to visual design or visual communications
- Specialize in an area of communication and media related to the study's objectives: print designers, web designers, social media designers, copywriters, art/creative directors, and videographers

Interviews and a researcher-sourced photo elicitation exercise were simultaneously used to collect the data used in this study. One-on-one, semi-structured interviews were conducted with

each of the 10 participants. Each interview ranged from 45 minutes to just over an hour in length and were audio recorded with the permission of the subjects to ensure their responses were captured accurately. A researcher developed interview guide was used to guide each interview and ensure consistency. Each interview consisted of two phases. The first phase explored the participants' experiences with agriculture, their creative processes, and their work styles when creating visual images. These questions were asked during phase one of each interview to ensure participants' answers were not biased by the photo elicitation exercise of phase two.

Once discussions on the phase one questions were complete, each interview transitioned into a photo elicitation exercise in which participants were shown 11 sets of images representing illustrated images of agriculture depicted in Little Golden Books compared with modern agricultural practices depicted in various media outlets from the present. The images shown to participants were used to create a deeper stimulus from past experiences of those being interviewed, as suggested by Harper (2002). Similarly, Collier (1957) reported interviews using photographs could stimulate more conversation and more information than those without images. Photo elicitation interviews (PEI) can be approached in two ways: researcher-produced (deductive) or participant- produced (inductive) (Clark-Ibáñez, 2004; Richard & Lahman, 2013). In this study, images were researcher-produced (deductive).

Eleven images were selected from an analysis of agricultural imagery found in Little Golden Books. Each of these illustrated images was then paired with a similar image of modern agricultural practices obtained from a search of agricultural magazines and online media. Participants were guided through each set of images and were asked questions related to the images and their perceptions of how well they felt they depicted accurate agricultural practices.

Interviews were transcribed verbatim. Detailed field notes were kept during each interview in a research journal, which was also used during data analysis to record initial thoughts of the researcher. Interview transcripts were loaded into *ATLAS.ti* for the iMac, a qualitative data organization software, and were coded using the constant comparison method utilizing an open and axial coding process. This allowed me to group comparable thoughts and phrases into more significant representations. The constant comparison method was developed by Glaser (1965) in grounded theory as a way to develop theories while reviewing data. Similarly, Boeije (2002) noted that a constant comparison of data allowed for "inductively, namely categorizing, coding, delineating categories and connecting them" (Boeije 2002, p. 339). From this process, major themes in the data emerged. During data analysis, participants were given pseudonyms to protect their identity and ensure confidentiality of their responses.

This study was limited to the geographic area and the response of the participants. The region in which the data was collected might not be the same as the data collected from a large urban population. Their responses are specific to their backgrounds, environmental influences, region, and experiences. The participants lived in a predominantly agricultural area and were likely exposed to the ideas and the images of modern agriculture. They also could have been tasked to work on projects for agricultural clients further exposing them to agricultural topics. In a phenomenological research, Moran (2000) suggested the use of bracketing to interpret data from the lived experience of participants while setting aside the researchers' own experiences to give voice to the interviewees. My own lived experiences were, in many ways, the same journey as

the participants. I bracketed my own experiences to immerse myself in the responses, stories, and experiences of the participants and did not interject my own opinions or thoughts into the interviews or data.

Findings

Ten visual communicators participated in this study, with five (50%) males and five (50%) females in the group. Most participants (*n*= 6, 60%) identified their hometowns as small rural towns, while four (40%) identified their hometowns as large cities (see Table 1). At the time of the interviews, all were living in the city except Ava who lived on a small acreage outside of the city limits. All participants attended at least some college, and most completed at least one degree (*n*= 9, 90%). Participants represented a wide range of work experiences ranging from one to 30 years of experience. Participants were employed at either an outside agency or an in-house agency. An outside agency was defined as an independent business that designs marketing and advertising materials for a variety of clients that hire their services. An in-house agency provides the same services, but only produce them for a single client and is often housed within that client's organization. A majority (*n*= 8, 80%) of the participants in this study currently worked at in-house agencies.

Table 1
Participant demographic information.

Participant	Hometown	Age	Gender	Education	Career Longevity	Role	Current Agency Type
Aiden	Rural	25	Male	Bachelors	1	Designer	In-House
Ava	Rural*	35	Female	Masters	14	Designer/ Photographer	In-House
Olivia	City	37	Female	Masters	10	Videographer	In-House
Max	City	38	Male	Bachelors	5	Illustrator	In-House
Dan	Rural	38	Male	Bachelors	10	Illustrator/ Instructor	Outside
Alex	Rural	40	Male	Some College	14	Media Specialist/ Photographer	In-House
Charlotte	City	41	Female	Bachelors	11	Designer	In-House
Sophia	Rural	47	Female	Masters	24	Art Director/ Copywriter	In-House
Emma	Rural	55	Female	Masters	30	Designer/ Instructor	In-House
Ethan	City	59	Male	Bachelors	38	Owner/ Creative Director	Outside

Note: *Lived in an unincorporated area in a rural county.

Findings for Objective One

Objective One sought to examine the factors that influence the agricultural visual vocabularies of the visual communicators in this study. Three themes emerged and all related to environmental

influences that affected their views of agriculture: family influences, the location where the participants grew up, and the creative/proofing process. All of the participants were in close proximity to agriculture in their youth, but none grew up in or were engaged in agriculture. They saw agriculture either through the car window on the way to school or as part of a holiday outing with family.

Family influences. All of the participants interviewed were at least a two-generation or more removal from agriculture. A majority (*n*= 8, 80%) reported their grandparents and extended family as their primary exposure to agriculture. Olivia, who grew up in a large city spent time on the family farm during holidays.

> Mostly it would be just like over holidays, you know holiday breaks and things like that when I was in school, but in the summers, I spent a lot of time [on their farms], especially with my grandmother who lived nearby. [My other grandparents] had 10 acres right outside of their house and they farmed a part of it. I got to drive his tractor up and down the rows. I just remember how much fun it was…when I was probably 10 or 11, my grandmother and grandfather tilled up a part of their yard so that I can have my own garden with like spinach, some carrots, and a few other things.

Similarly, despite growing up in a small rural town, Sophia did not identify as a "farm girl." She explained that only her grandparents were involved in agriculture and exposed her to the industry.

> My grandfather, when I was growing up, he worked for the soil conservation agency so, I wouldn't say I had an agricultural background, but it wasn't that far for me since my grandfather was big into soil sciences. He talked to us a lot about it and my grandmother was a gardener and homemaker. So, I wasn't around it, but maybe it was more around me.

Most of the participants had memories of family gatherings at their grandparents' farms. While most of these farms were in [state], one participant, Ethan, had exposure to agriculture in another region, [state], during his childhood.

> My earliest memory of farms was my grandparents, and they were in [state]…So, I spent a lot of time in my childhood in [state] going back and forth when we'd go for vacation. I didn't live there but that was how I started forming my vision of a farm and barns is what I saw in [state].

All of the participants were exposed to agriculture to some degree in their childhood, but some more than others. They all expressed memories of holidays or time spent at relatives' homes bring up nostalgic feelings, and those memories, images, and events found their way into the visual vocabularies they developed of agriculture.

Location. Most of the participants reported the location they grew up in being in close proximity to agriculture. This provided many memories of agriculture from their childhood, like Alex, who recalled, "My neighbors just down the street had a son my age. They were big into

farming. I hung out with him a lot, and I would help him do stuff [on their farm].” Sophia recalled the beauty she saw in the fields around her growing up.

> There was nothing more beautiful than the blue sky and the brown dirt and the green cotton. That’s one of the most beautiful images I can think of because there's so much color and the colors are so true, like when the dirt has just been plowed and it's really brown and the cotton doesn't have the cotton, not yet… just green.

Emma grew up next to a ranch, and while not related to the owner, she did work for him for a brief period of time giving her some firsthand agricultural experience.

> I knew the owner of the land behind the house that I lived in and I used to go out there [and] ride his horses bareback. One day he just said, “Hey do you want to help him and earn some cash?” He told me what I'd be doing, and I was like “Yeah, I’ll do it once. I may never do it again.” We did branding…I helped vaccinate and castrate calves one summer. [I was] covered in cow poop from head to toe. Just did it for one of the local ranchers. I'm just always up to learn something new so I did it. It was really interesting, very interesting.

Aiden lived in a small town and saw agriculture every day. “I grew up next door to a cotton field, so I had an idea of what was going on. Basically, right across my backyard alley was a cotton field.” Similarly, Sophia said of growing up in a small town close to cotton fields, “You can't grow up in [region] without dating a farm boy or your best friend's dad is a farmer, so it was never very far from me.” Their proximity to agriculture gave participants a basic knowledge of the agricultural industry, influencing what would become their visual idea of what the industry was.

Some participants also mentioned other influences on their visual vocabularies outside of the agriculture they saw around them. Dan recalled how he learned a lot by viewing the things he played with or saw on TV.

> When I was two, I would be doodling and sketching. I would always challenge myself. I would see an image, and I will try to duplicate it. So, toys, cartoons; I would see it on TV, and I would just draw it over and over and over. I think it was just that repetition of drawing it over and over that I kind of enhanced my skill.

The creative/proofing process. Participants described another influence that impacted their creative choices and visual vocabularies. In the visual communication world, the client is at the top of the food chain. They have a great deal of influence on the result of a design project. The other influence that molds the creative process was which media the visual communicator was working in. Each design project undergoes a process to assess its content and graphics, correct errors, and make sure the messaging is clear. Each of the participants described this process in their professional environment, and most described a creative process that involves multiple people. As a result of the creative/proofing process, the vision the visual communicator had at the beginning of the project could potentially be transformed by the other people involved in the project. A client, for example, could potentially alter a project and even wholly reject the

initial concept of the artist. Participants mentioned this as a barrier to expressing their own visual interpretations of topics as the visual vocabularies of others often influenced their own work.

Ethan owns his own agency and works with a variety of clients. He described how some clients change projects a multitude of times during their creation."[Sometimes] you just have a rough month because you have those clients [that] are hard to work with…Clients don't understand what their role is and what we do." Other participants who worked in outside agencies reported much of their process involves research and collaboration with clients. Ethan described working with a client who was in an industry outside of his agency's knowledge base. "Man, it took a few months for us to really learn their products, what they do every day, and how we were going to promote them."

Dan, however, found the process of creative/proofing valuable when he was assigned a client whose business and products were not familiar to him.

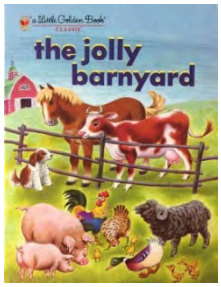
> I'm working with a company and don't know a whole lot about them, but I've had people that worked with [demographic] and stuff like that, so they have a little bit more insight. They gave me a different perspective on the demographic, so that helps me, you know, visually on what to communicate since the company basically wants a [certain] demographic, so that kind of helps put things in perspective.

Findings for Objective Two

Objective Two sought to explore the responses visual communicators had to agricultural images from Little Golden Books compared to images of modern agricultural practices. Two themes emerged related to this objective: preferences for either illustrated images or real images and the connection participants made to their life experiences while looking at the sets of images.

Image preferences. Participants' reactions to the agricultural images of Little Golden Books versus images of modern agricultural practices were mixed. Throughout their interviews, participants made 88 references to pastoral ideals compared to 66 references to reality ideals. While most participants expressed a preference for one set of images, they were open to the other set of images and how they represented agriculture. However, Sophia did not feel like any of the Little Golden Book images accurately portrayed her idea of what agriculture should look like. She reacted very strongly to the first image presented to her (Figure 1) and stated, "That is not a farm! Not a farm. That looks like a petting zoo. That is not a farm." Sophia had expressed similar ideas earlier in her interview.

> I lived in such rural areas, you had to drive by cotton to get school. When you see that



> every day and then you look at a book and they're like “This is a farm with a horse and a cow,” I thought that's so silly there's not a horse and cow in a cotton field; there's not [a] chicken. So ‘farm’ to me never meant animals in the cotton because that’s what I grew up with up.

Figure 1. The Jolly Barnyard. Bedford & Gergely (1978).

Conversely, Max did not perceive the modern images of agriculture as accurate to his views of agriculture. Max grew up in a city, had no exposure to agriculture beyond seeing the occasional cotton field growing up, and did not have a familial connection to agriculture until after he married. Max is an illustrator and admitted that he had a preference for illustrations over photographs, but his perceptions went beyond the medium of the image. When Max saw Figure

2, he commented,

> It [the helicopter] is detracting from looking like a farm. When I see a helicopter, I wonder if it is military, or the news, because that’s who flies helicopters. If I saw a crop-dusting plane, it would make it look like a farm because I’ve seen them flying around as a kid.

Figure 2. April 2014 cover of The Progressive Farmer magazine.

Ava grew up on 80 acres with pet donkeys, and while she was not exposed to production agriculture, her dad had a small Kubota tractor. When she saw Figure 3, she had reacted negatively. “Not scary tractors! I don’t like the plow ones or whatever. I guess I’m just a realist. To me that’s dangerous.” Max also reacted strongly to the John Deere tractor image. “What country are they attacking with that tractor? Who are we invading with that tractor?” Charlotte also grew up in a city, and although her grandparents had a vegetable and pecan operation, did not approve of Figure 3. She noted, “That doesn’t look fun. It looks like a tank.” Charlotte was also not a fan of the modern dairy equipment seen in Figure 4. “That is mass milking. I wouldn’t want to be at the south end of any of that.”

Figure 3. John Deere 4WD Track Tractor 9420RX. Retrieved from deere.com
Figure 4. Milking carousel in Wisconsin. Retrieved from www.milkproduction.com

Connected to life experiences. Many participants made personal connections to their own life experiences when viewing the agricultural images provided. Sophia connected the milking carousel in Figure 4 with a bad childhood memory of a school field trip.

> When I was probably in first grade, they took us to a dairy, and it was frightening. And they wanted us to drink the milk…I can't stand hot milk. I don't know that it was right out of the cow, but it wasn't far out of the cow, and it was not cold, there was no cookie, it wasn't pasteurized. Like this is like drinking hot cream. I've had some bad farming experiences as a child! I am a little jaded.

The images brought back other memories to many participants including memories connected to their childhood and books they had seen as kids. Alex recalled a picture book that his grandmother read to him as a young child. When she passed away, that book was one of the things he kept as a keepsake of her. Several participants recognized the Little Golden Book images either from their childhood or because they now are reading the same books to their children passing those images on to the next generation.

Discussions/Recommendations/Implications

The formation of our visual vocabularies is a complex process that defies definition. Research shows that exposure to illustrated books at a young age between child and parent points to success in education. Davis-Kean (2005) examined this connection and found the environment and parental relationship of children growing up serve as a predictor of their achievement. Interestingly, two of the participants in this study were siblings, which I was unaware of until halfway through the second sibling's interview. The results from the siblings were no closer than anyone else in the study. They grew up with the same environment and nurturing but had different points of view on agricultural practices and different visual vocabularies.

Images are hard-wired into our consciences from a very young age. Dooley (2010) and DeLoache (2002) found that images were recognizable from infancy. Today's parents are reading their favorite illustrated books with their children and thus continuing the cycle of pastoral fantasy images becoming a part of the new generation's visual vocabulary.

As Scott (1994) suggested, the images and layouts of advertisements are just to get attention. The use of images to get attention has become common with all the digital media we are exposed to today, and that is why research in the area of consumer understanding and misunderstanding of agricultural practices is essential. Communicators have an ethical responsibility to their audience

to share the truth through advertising and entertainment media.

The population researched in this study has been largely ignored in agricultural research. Media content impacts consumers by telling them what to buy, what is safe to eat, and most importantly, what to believe. The people who have their hands literally on the controls of the messages and visuals consumer see are visual communicators like those interviewed in this study. Many of whom have little to no real knowledge of the agricultural industry yet develop visuals of agriculture viewed by consumers. If a visual communicator starts down the creative road on a false premise or inaccurate information about the industry, it is likely that inaccuracy will ultimately reach consumers. If agricultural communicators want to educate consumers on the industry and provide accurate representations of agricultural practices, providing factual and accurate visual images is a good place to start.

The impact and influence of the media has been researched a great deal and that line of research should be continued. It is important to ensure accurate messages produced by communicators are reaching appropriate target audiences with intended results. This research went to the source of visual content creation, the creative people who design visual messages for consumers, and several recommendations can be made to expand the purview of this research.

Continued research on advertising content is important. Examinations of the ever-changing landscape of advertisements and entertainment content is imperative to the validity of the information consumers receive. Understanding the agricultural content portrayed in various media can arm agricultural communicators with information to counteract false accounts and better educate consumers on accurate agricultural information. Additionally, further research on the visual vocabularies and creative processes of visual communicators in large advertising agencies that serve the agricultural industry could provide important insight into the images and messages included in national campaigns that are more widespread than local ad campaigns and reach larger numbers of consumers. Research on the advertising agencies and visual communicators who represent industry giants, like Bayer, Tyson and others, would be advantageous to understand the research, standards, and proofing processes that go into creating messages for national ad campaigns. A study of the visual vocabularies of these visual communicators could help the industry understand the perceptions of the people who create their visual content on a national level.

According to Marcus (2007), the illustrators of a majority of the Little Golden Book titles lived in New York or Los Angeles and were far removed from agriculture. A better understanding of who creates the visuals depicted in mainstream children’s illustrated books should be researched as that content is shaping the visual vocabularies of our youth. An investigation of the accuracy and portrayal of the agricultural images in modern children’s literature could help the industry influence a better understanding of the industry in future generations of consumers.

This study was not a pronouncement that an image or illustration of agriculture cannot be beautiful, quite the opposite. Nothing is more beautiful than a freshly plowed field or cotton after a restorative rain heavy with the exhilarating perfume of rich, wet soil. Agriculture is beautiful, but we need to accurately portray the ever-evolving processes of modern agriculture. The growing diversity of the industry today should be shown at the forefront. We no longer see every

farmer as a white male clothed in denim overalls and a straw hat, and not all barns are red. Depicting the growing diversity of the industry helps to make agriculture more relatable to the changing audiences of consumers learning about agriculture.

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An Evaluation of Mentorship for Agricultural Communications Faculty

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Agricultural communications programs are expected to grow and emerge over the next decade. For these programs to find success, faculty leading them will need to be properly supported through effective mentoring. The purpose of this study was to evaluate the current mentoring of agricultural communications faculty across the country. In November 2019, an online survey instrument was distributed to a census of members of the Society of Agricultural Communications Scholars listserv. Survey respondents reported mentoring was not formally required, and most of the respondents received informal mentoring. Mentors were most frequently non-agricultural communications faculty in the respondents' respective department or an agricultural communications faculty at another institution. Mentees met with mentors as needed and typically discussed teaching, research, or administrative questions. However, the mentees perceived navigating promotion and tenure, work-life balance, and research as the most important topics for their success. Similar to past research, time was the biggest barrier to effective mentoring relationships. The findings from this study provide a baseline to understanding what mentoring looks like for agricultural communications faculty and can help administrators provide proper support for effective faculty mentor programs.

Introduction

Due to a growing demand for communicators to translate technical information about science and agriculture to consumers, the agricultural communications discipline has continued to grow over the past decade (Miller et al., 2015). In 2014, there were 40 agricultural communications programs in the United States, and expectations were that agricultural communications programs would continue to grow, both in enrollment and in faculty numbers (Miller at al., 2015). Miller et al. (2015) predicted there could be as many as 11 new agricultural programs by the year 2040 and that the discipline would continue to see growth. Additionally, these programs would vary in structure and departmental homes, and would require a wide variety of resources to ensure success (Miller et al., 2015). If these new programs continue to emerge, the newly hired faculty will need effective mentoring for their own success, as well as the success of the program (Lumpkin, 2011). However, if they are in a new program or a program that consists predominately of faculty outside the agricultural communications discipline, the question of who mentors these agricultural communications faculty needs to be asked.

Faculty mentorship has been consistently identified as a key component to job satisfaction, increased productivity, and faculty retention (Desselle et al., 2011). Faculty mentoring has historically focused on junior faculty (Law et al., 2014), where mentors help to guide or coach the junior faculty during their early career stage (Lumpkin, 2011). Some of the benefits associated with successful mentorship include facilitating the advancement of faculty, building relationships and networks for the mentors and mentees, integrating the mentee into the departmental unit, and increasing the productivity and professional growth of the mentor and mentee (Boyle & Boice, 1998; Luna & Cullen, 1995). While mentorship may often focus on helping junior faculty achieve tenure, tenured faculty, lecturers, professors of practice, and

research faculty can benefit through mentorship as well (University of Michigan-Dearborn, 2020). Reinvigorated research programs, improved technical skills, and exposure to new teaching ideas and methodologies are additional outcomes of successful mentorship than can benefit the faculty, the department, and the students (University of Michigan-Dearborn, 2020).

While universities have supported the implementation of formal mentor programs, most mentoring relationships form organically and are considered to be *informal* (Mullen, 2008). These informal mentor pairs are typically strong due to the natural fit of the individuals; however, faculty new to the institution may find it difficult to find an informal mentor during their few first few months on the job (Mullen, 2008). Formalized faculty mentor programs, where faculty are assigned a mentor from a third party (Cambell & Cambell, 2007), can pair new faculty with experienced faculty from the beginning of their academic career, but these relationships can often feel forced (Law et al., 2014). Regardless of if mentorship is formal or informal, Bean, Lucas, and Hyers (2014) proposed that an organizational culture emphasizing the importance of mentorship is necessary for faculty and program success.

Even though faculty mentorship was not included in Miller et al.'s (2015) research, one of the key recommendations from the authors was to conduct future descriptive studies of agricultural communications programs to understand their current standings. Therefore, the purpose of this research was to evaluate the current state of faculty mentorship in agricultural communications program across the US. Effective faculty mentorship can have a ripple effect and positively influence those outside the mentoring relationship and lead to productive programs (Bean et al., 2014; Zachary, 2005). The implications and recommendations from this study can aid administrators and agricultural communications faculty in understanding the current needs for faculty mentorship and support the American Association of Agricultural Education (AAAE) Priority Area 5 of the National Research Agenda: Efficient and Effective Agricultural Education Programs (Thoron, Meyers, & Barrick, 2016).

Conceptual Framework

The conceptual framework for this evaluation was guided by principles of best practices for faculty mentorship. Law et al. (2014) conducted an in-depth literature review of faculty mentoring at colleges and universities to develop a set of recommendations. One of the major recommendations was to develop a formalized approach to mentorship, where the mentor is assigned to the mentee and is formally supported/mandated by the department. However, administrators need to make sure they are appropriately matching the pair based on personality as well as interests. Another recommendation Law et al. (2014) made was that junior faculty have *internal mentors*, or mentors within the department, to help them understand the organizational structure or politics of the program. However, mid-career and senior faculty were recommended to have *external mentors* outside the department. These external mentors can provide objective or unbiased feedback and often serve as a safe space for the mentee to discuss concerns related to their institution. Additionally, tenured faculty appeared to have reduced pressure for mentorship, but the authors argue that mentoring should continue, and evolve, over the faculty member's career stages (Law et al., 2014). Finally, the authors recommended conducting periodic evaluations of faculty mentorship programs to make adjustments as needed (Law et al., 2014).

Lumpkin (2011) also researched best practices for faculty mentorship to develop a model for mentoring university faculty. Lumpkin (2011) concluded the key factors for a successful mentoring program included identifying a clear purpose/goal, appropriately pairing mentors and mentees, holding regular meetings, and evaluating the effectiveness of the program. Having administrative support has been a key factor to successful mentoring program, as well as identifying the needs of the mentees (Lumpkin, 2011). Additionally. Boyle and Boice (1998) recommended that scheduled weekly or monthly meetings were necessary for mentors and mentees to build rapport. When evaluating the effectiveness of a mentoring program, Lumpkin (2011) recommended asking mentees 1) how often they meet with their mentors, 2) what topics they discuss, and 3) what problems/issues have been experienced. Some of the barriers or problems associated with effective mentorship include lack of time, unclear expectations, and lack of interest from faculty, to name a few (Fountain & Newcomer, 2016).

Past research has been conducted to evaluate the effectiveness of mentoring programs outside of agricultural communications. Fountain and Newcomer (2016) looked at mentoring in public affairs programs and found that 34% of the programs had a formal mentoring policy. Additionally, they concluded that time was the biggest barrier to effective mentoring programs. Another evaluation by Bean et al. (2014) of a faculty program at a regional university found mentors were most commonly meeting/talking with their mentees on a monthly basis. Similar to Fountain and Newcomer (2016) the researchers also identified time constraints as a major challenge for the program (Bean et al., 2014). Additionally, Bean et al. (2014) recommended formal mentoring support structures be in place to help retain and develop junior faculty.

Faculty mentorship has been researched within the context of colleges of agriculture specifically, and DiBenedetto et al. (2019) recommended faculty mentoring be flexible, accessible, and incentivized to promote excellence in teaching. Additionally, in a study of a formalized leadership professional development program for land-grant faculty, Lamm et al. (2017) concluded mentors found their mentoring relationship to be beneficial to themselves as well as their mentees. However, the authors encouraged formalized programs to also provide mentors with guidelines or best practices to help the mentees get the most out of the relationship (Lamm et al., 2017). Research has also been conducted specifically looking at the faculty mentoring experiences of women within agricultural education and extension (AEE) disciplines (Cline et al., 2019). Most of the participants indicated they engaged in some type of formal mentoring program, but those who did not often felt isolated (Cline et al., 2019). Cline et al. (2019) determined that participants' feelings of success were linked to the quality of mentorship they had received. While there is a clear wealth of literature related to faculty mentoring experiences and best practices, there unfortunately has not been research on what mentoring looks like for agricultural communications faculty across the US in recent years.

To guide the evaluation of agricultural communications mentoring programs, a conceptual framework based on best practices for mentoring (Boyle & Boice, 1998; Law et al., 2014; Lumpkin, 2011) was developed. For faculty mentoring relationships to be successful, there will need to be institutional/departmental support for formalized mentor programs (Lumpkin, 2011). Additionally, how mentors are paired with mentees (internal vs external and formal vs informal pairs) will be important in understanding the effectiveness of the relationship (Law et al., 2014; Lumpkin, 2011). How often the pairs meet (Boyle & Boice, 1998) along with what topics are

being discussed are also critical to the success of the relationship (Lumpkin, 2011). Finally, barriers to the relationship or challenges that may arise could impede the success of the mentor/mentee pair (Fountain & Newcomer, 2016, Lumpkin, 2011).

Purpose and Objectives

The purpose of this research was to evaluate the current state of mentorship for agricultural communications faculty across the United States of America. The following objectives guided this study:

1. Describe how institutions approach faculty mentorship;
2. Identify the types of existing faculty mentor/mentee relationships;
3. Identify how often faculty mentor pairs meet;
4. Identify topics of discussion during mentoring meetings;
5. Describe perceived topics of importance for mentees; and
6. Identify the perceived barriers to effective mentoring.

Methods

To fulfill the purpose of this study, a quantitative survey instrument was distributed online to the Society of Agricultural Communications Scholars (SACS) listserv in November 2019. The SACS listserv is a continuously updated document of faculty teaching agricultural communications-related courses across the United States. SACS was established in 2018 to address an identified need from the 2017 Agricultural Communications Vision Consortium. The purpose of SACS is to provide ongoing professional development for agricultural communicators in academic settings beyond the research conferences these individuals regularly attend. SACS provides monthly online/webinar professional development opportunities for the academic agricultural communications community. The SACS listserv is comprised of the original list of agricultural communications programs from the Miller et al. (2015) study, a current list of National Agricultural Communicators of Tomorrow faculty advisers, and self-nominated individuals in agricultural communications academic settings. This list included tenure-track faculty, instructors/lecturers, professors of practice, and emeriti faculty (N = 99). Data collection procedures followed Dillman's tailored design method (Dillman et al., 2009), and each potential respondent received a personalized questionnaire link. The link was active for two weeks, and up to the three follow-up emails were sent requesting survey completion. After discarding incomplete questionnaires, there were a total of 42 responses (n = 42), for a 42.4% response rate. A full description of respondents has been reported in Table 1.

The majority of respondents were either tenure-track (26.2%, n = 11) or already tenured (45.2%, n = 19) and in an agricultural leadership, education, and communication (ALEC) department (or some variant; 82.9%, n = 34). The remaining respondents were from departmental units focused on strategic communication, general agricultural sciences, communication studies, mass communication, community sciences, and Extension. The majority of the respondents were female (75.6%, n = 31).

Table 1
Description of Respondents (Categorical Variables)

	%	*n*

Title (*n* = 42)		
Assistant Professor	26.2	11
Associate Professor	21.4	9
Professor	23.8	10
Instructor/Lecturer	11.9	5
Senior Instructor/Lecturer	2.4	1
Assistant Professor of Practice	2.4	1
Emeritus Faculty	4.8	2
Other	7.1	3
Gender (*n* = 41)		
Male	24.4	10
Female	75.6	31
Department (*n* = 41)		
ALEC[a]	82.9	34
Strategic Communication	2.4	1
Other	14.6	6

[a] or a similar departmental unit

Respondents reported an average of 17.92 faculty in their departments, but a large standard deviation (*SD* = 12.4) indicated a high degree of variation. Respondents reported the number of agricultural communications faculty in their department (including the respondent) ranged from zero to seven (*M* = 3.45, *SD* = 2.06). Respondents had worked in academia for an average 11.37 years (SD = 7.66), but the range was from zero to 28, and the average age was 42.42 years old (*SD* = 9.81). The average appointments for the sample were 59.5% teaching (*SD* = 30.7, *n* =36), 24.6% research (*SD* = 19.0, *n* = 32), 21.2% administrative (*SD* = 32.3, *n* = 24), and 16.9% Extension/service (*SD* = 23.6, *n* = 27).

The survey instrument consisted of 49 questions asking respondents about their experiences with faculty mentoring and information about their programs. At the beginning of the survey, respondents were given the following definitions for formal and informal mentoring:

- Formal mentor relationships are encouraged/required by your department (e.g. mentor committee).
- Informal mentor relationships are not mandated by your department.

Respondents were asked if they were currently serving as formal or informal mentors and if they currently received formal or informal mentorship. Display logic was used in the survey to show one set of questions to mentors and another set of question to mentees. Respondents who were both mentors and mentees answered both sets of questions. In this sample, 31 respondents identified themselves as mentors and 35 identified themselves as mentees. Questions on the instrument were researcher-developed and based on relevant literature (Fountain & Newcomer, 2016; Law et al., 2014; Mullen, 2008).

All respondents answered a question about how faculty mentorship was approached at their institution, and responses were based on common mentoring structures, such as informal

mentoring, formal mentoring, and formal mentoring committees (Mullen, 2008). Additionally, mentees were asked to describe who their mentors were with a check-all-that-apply question. The options represented both internal and external mentors (Law et al., 2014) and were based on the types of mentors most likely to be identified for agricultural communications faculty. Mentees were asked how often they met with their faculty mentor with the options of *as needed, once a week or more, a few times a month, once a month, a few times a year,* and *once every few years.*

Respondents were also asked to select from a list of 10 topics to identify what they talked about in a typical meeting with their mentor in a check-all-that-apply format. Topics included reflected faculty concerns identified in the literature, and represented both hard skills (e.g. teaching, research, etc.) and soft skills (e.g. work-life balance, navigating promotion and tenure, etc.; Fountain & Newcomer, 2016). Mentees were also asked to indicate how important discussing each topic with their mentor was for their own success on a 5-point, Likert-type scale. The labels for this scale were 1 = *not at all important*, 2 = *slightly important*, 3 = *moderately important*, 4 = *very important*, and 5 = *extremely important*. There was a "not applicable" option to account for different types of faculty appointments. These answers were excluded from analysis. Finally, there was a check-all-that-apply question that asked respondents about their perceived barriers or challenges associated with faculty mentorship, which included items like *lack of time* or *lack of interest* (Fountain & Newcomer, 2016).

Prior to distribution, the questionnaire was reviewed by a panel of experts to assess the content validity of the instrument (Ary, Jacobs, & Sorensen, 2010). This panel included a professor, associate professor, and assistant professor of agricultural communications, all of whom had expertise in survey design. Additionally, an assistant professor of environmental sciences reviewed the survey to provide feedback from an outside perspective. After including some suggested revisions (e.g. including additional topics of discussion or barriers to mentoring), the survey was electronically delivered to the census of SACS members.

Because the response rate was less than 80%, there was a potential threat for non-response error (Lindner, Murphy, & Briers, 2001). This type of error occurs when the sample does not accurately represent the population and can lead to biased responses. Because the characteristics of the population were not accessible to compare respondents to non-respondent (Koch & Blohm, 2016), early and late respondents were compared for variables of interest (Linder et al., 2001). No differences were identified between the first half and second half of respondents for those variables, so non-response error was assumed to be limited. All data were imported and analyzed in SPSS version 25. Simple descriptive statistics were reported for all objectives.

Results

Describe How Institutions Approach Faculty Mentorship

Approximately half of the respondents reported their departments encouraged faculty mentoring but did not require it (54.5%, n = 24; Table 2). The next most commonly used approach to faculty mentorship was a required mentor committee (13.6%, n = 6) or a required mentor (11.9%, n =5).

Table 2
Institutional Approach to Faculty Mentorship (n = 44)

	%	*f*
Department encourages faculty mentor(s) but it is not required	54.5	24
Department/University/College requires a faculty mentor committee (two or more mentors).	13.6	6
Department/University/College requires a faculty mentor.	11.4	5
Faculty Mentorship has not been discussed in my department.	9.1	4
Other	9.1	4
Not Sure	2.3	1

Identify Types of Existing Faculty Mentor/Mentee Relationships.

Formal and informal mentoring are reported in Table 3 and broken down by career stage. The largest percent of respondents who received formal mentoring were Assistant Professors (54.5%, *n* =6) and Instructors/Lecturers (40.0%, *n* = 2). Approximately one-third of Associate Professors received formalized mentoring (33.3%, *n* = 3). However, 100% of the Assistant Professors (*n* = 11), Associate Professors (*n* = 9), Instructors/Lecturers (*n* = 5), and Assistant Professors of Practice (*n* = 1) received formal mentoring. Additionally, 60.0% (*n* = 6) of professors reported receiving informal mentoring.

Table 3
Formal and Informal Mentoring by Career Stage (n = 35)

	Receive Formal Mentoring		Receive Informal Mentoring	
	%	*f*	%	*f*
Assistant Professor	54.5	6	100.0	11
Associate Professor	33.3	3	100.0	9
Professor	10.0	1	60.0	6
Instructor/Lecturer	40.0	2	100.0	5
Sr. Instructor/Sr. Lecturer	0.0	0	0.0	0
Assistant Professor of Practice	0.0	0	100.0	1
Other	0.0	0	66.7	2
Emeritus Faculty	0.0	0	50.0	1

Mentees were asked to indicate who their mentors were. External and internal mentor relationships have been reported in Table 4. This was a check-all-that-apply question, and respondents most commonly had internal mentors that were non-agricultural communications faculty (57.9%, *n* = 22), closely followed by external mentors who were agricultural communications faculty (50.0%, *n* = 19) and internal mentors who were agricultural communications faculty (47.4%, *n* = 18). Additionally, 28.9% (*n* = 11) reported their doctoral advisor still served as their mentor.

Table 4
Description of Internal And External Mentors (n = 37)

	%	*f*
Non-Agricultural Communications Faculty in my Home Department	57.9	22

Agricultural Communications Faculty at Another University	50.0	19
Agricultural Communications Faculty in my Home Department	47.4	18
Non-Agricultural Communications Faculty not in my Home Department	34.2	13
Previous Doctoral Advisor	28.9	11
Non-Agricultural Communications Faculty at another university	26.3	10
Communications faculty not in my home department	18.4	7
Other	2.6	1

Identify How Often Faculty Mentor Pairs Meet

How often mentees meet with their mentors is reported in Table 5. Most commonly, mentees were meeting on an "as needed" basis (62.9%, *n* =22). The second-most frequent meeting schedule was a few times a year (20.0%, *n* = 7).

Table 5
Frequency of Mentor/Mentee Meetings (n = 33)

	%	*f*
As needed	62.9	22
A few times a year	20.0	7
Once a week or more	5.7	2
A few times a month	2.9	1
Once every few years	2.9	1
Once a month	0.0	0

Identify Topics of Discussion During Mentoring Meetings

Table 6 reports what topics mentees discuss in their meetings. The topics most commonly discussed were teaching (68.6%, *n* = 24), research (68.6%, *n* = 24), and administrative/procedural question (65.7%, *n* = 23). Extension (31.4%, *n* = 11), advising (40.0%, *n* = 14), and service (42.9%, *n* = 15) were the least-discussed topics.

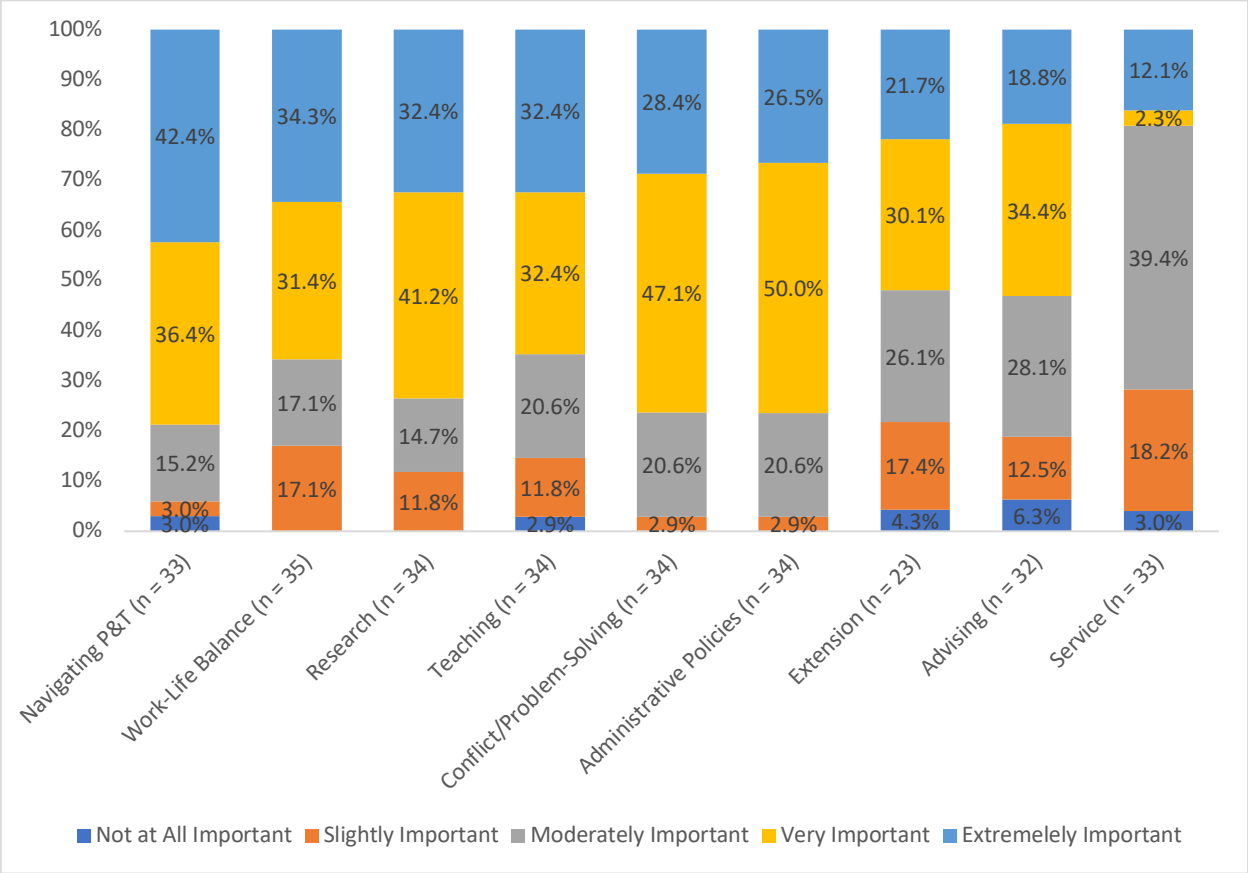
Table 6
Topics Discussed During Mentor/Mentee Meetings (n =35)

	%	*f*
Teaching	68.6	24
Research	68.6	24
Administrative/Procedural Questions	65.7	23
Work-Life Balance	62.9	22
Conflict or Problem-Solving Solutions	62.9	22
Navigating the Promotion and Tenure Process	60.0	21
Service	42.9	15
Advising	40.0	14
Extension	31.4	11
Other	0.0	0

Describe Perceived Topics of Importance for Mentees

Mentees were asked to indicate how important each of the topics reported in Figure 1 were for their own success. Navigating promotion and tenure had the largest group agreeing it was *extremely important* for their success (42.4%), followed by work-life balance (34.3%), research (32.4%), and teaching (32.4%). Nearly half of the respondents indicated conflict/problem solving (47.1%) and administrative/procedural questions (50.0%) were *very important* to their success. Extension, advising, and service were viewed as the least important, with at least 40.6% of the respondents reporting each topic to be only slightly or moderately important for their success.

Figure 1
Topics Mentees Perceive to be Important for Their Own Success



Identify the Challenges/Barriers to Effective Mentoring Relationships

The barriers to effective mentoring are reported in Table 7. The overwhelming majority of mentees selected time as a barrier to mentoring (88.6%, *n* = 31). Other notable barriers included feeling forced to engage in relationships (37.1%, *n* = 13), lack of structure (34.3%, *n* = 12), and lack of communication (25.7%, *n* = 9).

Table 7
Barriers to Effective Mentoring Relationships (n =35)

Barrier	*%*	*f*

Time	88.6	31
Feeling Forced to Engage in Relationships	37.1	13
Lack of Structure	34.3	12
Lack of Communication	25.7	9
Lack of Trust	17.1	6
Lack of Understanding Agricultural Communications	14.3	5
Too Much Structure	11.4	4
Different Interests	11.4	4
Lack of Openness	11.4	4
Personality Differences	11.4	4
Other	0.0	0

Conclusions & Implications

The purpose of this study was to evaluate the current state of mentoring for agricultural communications faculty. Approximately half of the sample reported their departments/institutions did not formally require mentoring and most of the mentoring that occurred, despite career stage, was informal. Best practices indicate a formalized mentor program is needed for faculty success (Lamm et al., 2017) and relying too heavily on informal mentoring can make it difficult for junior faculty to even identify potential mentors (Bean et al., 2014; Mullen, 2008). Additionally, formal mentorship appeared to decline after promotion even though informal mentoring continues. This may indicate a lack of institutional support for faculty mentoring across all career stages and a focus only on the mentoring of junior faculty (Law et al., 2014).

Individuals both internal and external to the department were identified as mentors, and a little less than half of the respondents reported their mentors were agricultural communications faculty in their department. However, the rest of the sample identified other types of mentors. Most often, the mentors were either non-agricultural communications faculty within the department or agricultural communications faculty at another university. Respondents who were the only agricultural communications faculty in their department or one of two may not have the opportunity to find internal mentors in the discipline. This reality is especially true for faculty teaching agricultural communications courses in departments of mass communication, strategic communication, agricultural sciences, etc. Additionally, just because there are one or two additional agricultural communications faculty in the department does not mean their personalities will be a good match for the mentee (Law et al., 2014).

Respondents in the study reported meeting with their mentors on an “as needed” basis. Boyle and Boice (1998) recommended mentors meet with mentees regularly each week or month to help build rapport. If mentees are only meeting with mentors when they feel it is necessary, they may be missing opportunities to strengthen their relationship and consistently receive feedback related to their role and responsibilities.

Topics most frequently discussed by respondents in their meeting with mentors included teaching, research, and administrative/procedural questions. However, the topics respondents believed were most important for their success were navigating promotion and tenure, work-life balance, and research. The topics being discussed in the meetings should reflect the needs of the

mentees (Lumpkin, 2011), but that does not appear to be happening. Teaching might be the most frequently discussed topic because that was the largest area of appointment for the sample and would be an easily accessible topic. Navigating promotion and tenure could be abstract for many, which might make it difficult for mentees to discuss despite its perceived importance. Similarly, administrative/procedural questions could easily come up in meetings with mentors, but more personal questions, like work-life balance, may be difficult to discuss if mentors and mentees are not appropriately paired. Another interesting finding was that respondents did not perceive discussing Extension efforts to be all that important for their success. Extension represented the lowest appointment in the sample, which may explain this finding. However, research appointments were not much higher than Extension, and research was discussed just as much as teaching.

Similar to past research (Bean et al., 2014; Fountain & Newcomer, 2016), time was identified as the most common barrier to effective mentoring. Additionally, feeling forced to engage in a relationship was a barrier identified that has been associated with formal mentoring programs (Law et al., 2014). Interestingly, respondents indicated another barrier to successful mentoring was a lack of structure instead. These different perceptions of barriers could be the result of differing personalities or needs depending on career stage.

While these findings align with past mentorship literature, they do unveil important realities for mentoring within the agricultural communications discipline that should be addressed. The somewhat lack of institutional support for formalized mentoring, limited availability of internal mentors with an agricultural communications focus, unstructured meeting times, divergence in topics being discussed and topics perceived as important, and the ever-present barrier of time, indicate agricultural communications faculty may not be receiving the mentoring needed to be successful in their programs. Considering the majority of the participants in this study were female, and Cline et al. (2019) emphasized the importance of quality mentoring relationships for female faculty to feel successful, there is an apparent need to strengthen the overall quality of mentoring available to agricultural communications faculty.

Recommendations

Based on the conceptual model developed for this study, there are areas of mentoring for agricultural communications faculty that could be strengthened. Having a formalized mentor program for faculty across institutions will be critical for the success of the discipline (Bean et al., 2014; Lamm et al., 2017). Because agricultural communications programs are expected to grow and new programs are anticipated to emerge in the near future (Miller et al., 2015), there is a high chance new agricultural communications faculty will be unable to identify agricultural communications mentors in their home department. There is an apparent need for a type of formalized mentoring on a discipline level if departments are unable to fully support the mentoring needs of agricultural communications faculty.

A discipline-wide mentoring program could connect faculty in emerging or new agricultural communication programs with senior faculty at other institutions. To address some of the barriers identified with mentoring, mentees and mentors should be invited to engage in the program so they do not feel the relationship is “forced.” However, those who do participate in

the program could feel like they have the support needed to build an effective working relationship with their mentor (Lamm et al., 2017). Additionally, mentors and mentees can be paired based on their type of program, research/teaching interests, life stage, and personality to help the pairs have more open discussions about concerns and questions.

Time may be a barrier for effective mentoring but setting expectations from the beginning of the mentoring relationship could help to address this issue (Lamm et al., 2017; Lumpkin, 2011). Scheduling weekly or monthly meetings may seem to take more time, but the accountability of having meetings scheduled may also reduce stress and help mentees answer questions they have on a more regular basis. Mentors and mentees should also determine what topics are most relevant to the needs of the mentees so discussions can focus on those areas of importance to make the best use of time.

Administrators of academic units with agricultural communications faculty should also consider the findings from this study. Facilitating a more formalized faculty mentoring program could help pair junior faculty with internal mentors early in their career. This could also help the faculty address their questions related to promotion and tenure or procedural policies that external mentors could not answer. Additionally, administrators should have clear expectations for the mentoring program that could include goals and a meeting schedule. Additionally, formal mentoring should not cease after faculty accrue tenure and should continue throughout their career. Similarly, faculty on non-tenure lines can equally benefit from mentoring and should be provided the same resources as pre-tenured faculty. If mentoring for agricultural communications faculty is effective, the discipline will likely experience a ripple effect that improves the quality of programs, scholarship, and graduates as well (Bean et al., 2014; Zachary, 2005)

This research provided a baseline for understanding agricultural communication faculty members' experiences with mentorship. Exploring the quality of these relationships, characteristics of effective mentors, and specific mentoring needs could provide an additional layer of understanding to this study. In-depth interviews with mentors, mentees, and administrators could also provide deeper meaning to the quantitative findings from this research. Asking mentees why they talk about certain topics with their mentors but perceive other topics to be more important could help guide how future mentor/mentee meetings are structured. Additionally, asking both mentors and mentees how to best support them could provide administrators with clear recommendations for a formalized mentoring program. This study should also be replicated in the following years to ensure the discipline and departmental units are meeting the needs of agricultural communications faculty (Law et al., 2014).

Future research should also seek to understand the influences on effective mentoring to develop a more comprehensive mentorship model. Extending the population to include agricultural education, Extension education, and leadership education faculty would provide a more comprehensive overview of the faculty mentoring experiences within the broad Agricultural Education discipline. Effective faculty mentoring will be needed across all discipline areas in AAAE to help produce the efficient and effective agricultural education programs outlined in priority area five of the national research agenda (Thoron et al., 2016).

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Crisis Communications in a Natural Agricultural Disaster: A Case Study

Wildfires in Texas, Oklahoma, and Kansas in the late 2010s caused seven deaths and catastrophic damage to millions of acres of ranch and farmland. Because of the rural location of these disasters, agricultural communicators were releasing information to media, internal stakeholders, social media, and other agricultural audiences. The purpose of this study was to explore the communications efforts made and subsequent lessons learned from agricultural communicators during the fires. Through a qualitative case study, researchers interviewed 14 agricultural communicators about their experiences in disseminating information about the fires. Most of the findings align with pre-existing literature; however the researchers found that communicators should be prepared to develop a system to communicate about and accept donations, develop a network of organizations that can be supportive in a crisis situation, and let people be the subject of the messaging. The data also indicate that an undergraduate course in crisis communications would be beneficial.

Introduction

Natural disasters are one form of crisis and can include tornados, flooding, hail, blizzards, hurricanes, and wildfires. For three straight years – 2016, 2017, and 2018 – a significant swath of the United States High Plains in Texas, Oklahoma, and Kansas experienced large-scale wildfires. In the three years, seven people and thousands of head of cattle died, nearly two million acres burned, and numerous homes, barns, and miles of fences were destroyed (Gabbert, 2017; InciWeb, 2017 & 2018; National Aeronautics & Space Administration [NASA], 2016).

In the summers preceding the fires, the High Plains had rainfall amounts that allowed for plenty of grass and vegetation to grow. However, the winters and early springs of 2016-18 saw little-to-no rainfall, converting the forage into fuel, and creating an environment for frequent and intense fires (Climate Signals, 2017). Although prairie fires have always occurred, climate change has intensified a typical weather event into wide-spread and catastrophic disasters with devastating impact to life, land, and livestock (Black, 2012). The total area burned on the High Plains rose 400% between 1984 and 2014 (Donovan, Wonkka, & Twidwell, 2017). When the fires occurred, flames were reported to reach more than 70 feet high, and the smoke and burn scars on the land were easily identified from space (King, 2018).

In all three years, the wildfires received national media attention and evoked a massive disaster relief response of money, hay, fencing supplies, milk replacer, bottled water, and other donations. Because these wildfires were in rural areas and involved livestock (mostly cattle), farmland, pastures, fencing, barns, and farm/ranch equipment, agricultural communicators were leading the information dissemination efforts. Those communicators were employed by Extension, livestock associations, state departments of agriculture, and other agricultural organizations, as well as agricultural journalists.

As the climate continues to change and weather events become more extreme (Climate Signals, 2017), communicating about natural disasters is becoming a more important, yet taxing, part of an agricultural communicator's job. The purpose of this study was to explore the communications efforts made and subsequent lessons learned from agricultural communicators

during the 2016, 2017, and 2018 wildfires in Texas, Oklahoma, and Kansas. This research was guided by three objectives:

1. Determine agricultural communications practitioners' efforts to create a natural disaster crisis communications plan.
2. Explore the practitioners' strategies to communicate during and after the wildfires.
3. Determine the lessons learned by communicators during the wildfires.

Understanding communications during a natural disaster is an important field of study (Terracina-Hartman, 2017), and investigating effective strategies can lead to better communications before and during an event (Steelman & McCaffrey, 2013). The knowledge gleaned from this study will help agricultural communicators develop a crisis communications plan centered around a natural disaster. This research addresses the AAAE National Research Agenda Priority 7: Addressing Complex Problems (Roberts, Harder, & Brashears, 2016). Specifically, the researchers have investigated methods to deal with an acute issue (wildfires) related to a broader problem (climate change).

Although massive fires occurred in other parts of the U.S. in the same years, this study is limited to Texas, Oklahoma, and Kansas in 2016, 2017, and 2018 for three reasons. Geographically, the fires occurred in a relatively close region (see Figure 1). Although wildfires occur every year, it is unusual to have fires of that scale three years in a row. Finally, the fires occurred in rural areas and mostly damaged livestock, fencing, barns, feed and hay, and other agricultural entities, rather than homes and municipalities. Specifically, this study focused on seven fires (see Table 1).

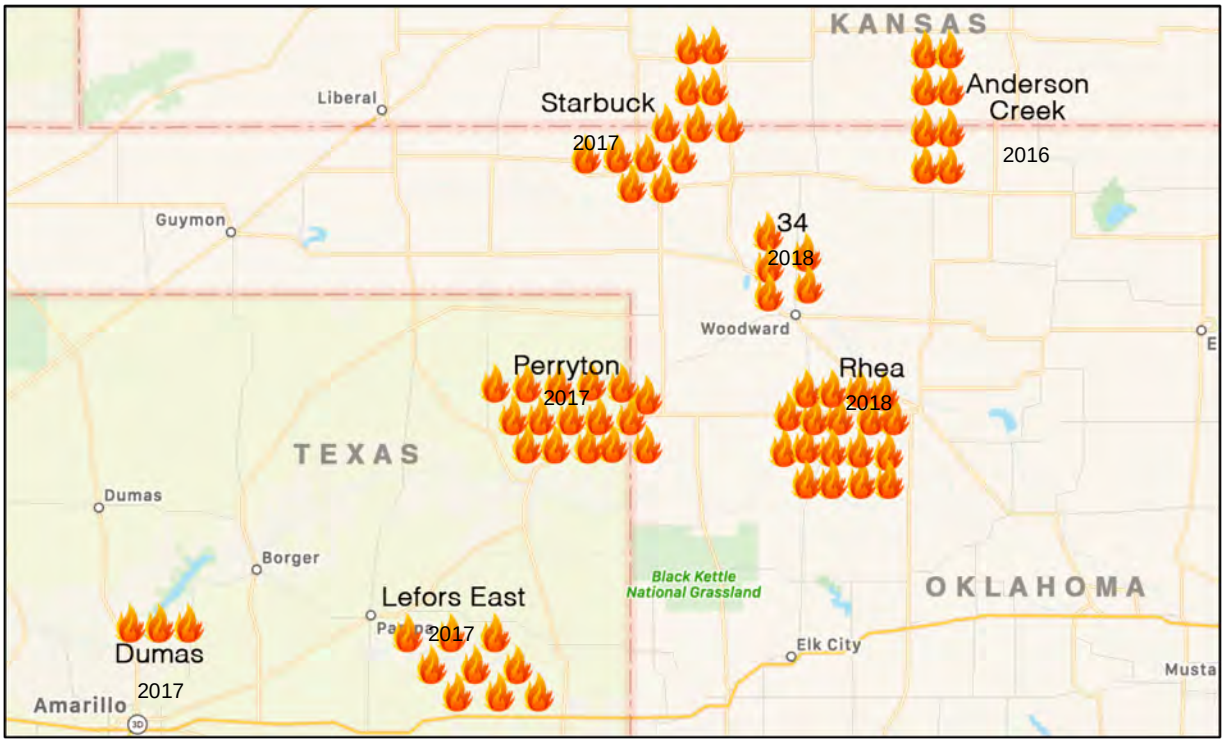

Figure 1. Locations of 2016, 2017, & 2018 fires.
Note. The spots on the map are not exact in location, scale, or shape. This figure is author-created to provide a general visualization of the geographic area impacted.

Table 1
Dates and descriptions of wildfires

Date	Fire Name	Location	Number of Acres
2016 – March 22	Anderson Creek Fire	Woods Co., OK; Barber & Comanche Cos., KS	397,420
2017 – March 6	Starbuck Fire	Beaver Co., OK & Clark Co., KS	779,292
2017 – March 6	Perryton Fire	Ochiltree, Lipscomb, & Hemphill Cos., TX	315,135
2017 – March 6	Lefors East Fire	Gray Co., TX	92,571
2017 – March 6	Dumas Complex	Potter Co., TX	29,197
2018 – April 12	34 Complex Fire	Woodward Co., OK	62,432
2018 – April 12	Rhea Fire	Dewey Co., OK	286,196

Gabbert, 2017; InciWeb, 2017 & 2018; NASA.gov, 2016.

Conceptual Framework: Crisis Communications

Agriculture has seen its share of crises, and the efforts of communicators have been studied to further the knowledge base of these communications strategies. Animal diseases (Ashlock, Cartmell, & Kelemen, 2006; Cannon & Irani, 2011; King, Cartmell, & Sitton, 2006; Ruth, Eubanks, & Telg, 2005; White & Rutherford, 2009) and foodborne illnesses (Irlbeck, Akers, Baker, Burris, & Brashears, 2014; Irlbeck, Akers, & Palmer, 2011; Irlbeck, Jennings, Meyers, Gibson, & Chambers, 2013; Eyck, 2000) are commonly researched topics in agricultural communications literature. There is research regarding natural disaster communications (Cathey, Coreil, Schexnayder, & White, 2007; Gibson, Irlbeck, Meyers, Akers, & Price, 2019; Telg, Irani, Muegge, Kistler, & Place, 2007), but few focus on wildfires (Steelman & McCaffrey, 2013; Terracina-Hartman, 2017). Regardless, a natural disaster is a crisis (Coombs, 2019), and information exists to tell us how to prepare for and manage such an event.

Coombs (2019) argued that an organization is careless if it has not assessed its risk and created a plan. Without a crisis plan, there is rarely enough time to train employees about the proper response to the crisis (Sandman, 1998). In a natural disaster without a plan, employees reported confusion, lack of clarity in their roles, and ineffective communications (Telg et al., 2007). Although there is not one accepted definition of a crisis (Coombs, 2019), generally, a crisis is unexpected (Adkins, 2010), could damage an organization's reputation and/or financial standing (Jacques, 2010), creates an imminent need for information (Coombs, 2007), creates uncertainty, and could produce negative outcomes (Adkins, 2010). Coombs (2019) divides crises into two categories: organizational crisis and disaster. Disasters are sudden, disrupt systems, require new

ways of thinking, and require a response from multiple governmental agencies (Coombs, 2019). Seeger (2006) defined events such as wildfires, flooding, earthquakes, and other events that occur in nature as a natural hazard event.

The fires in this study all occurred in the spring after an unusually dry winter. Therefore, there is a fire "season," a known risk, and adequate time to educate the public about fire hazard reduction. There is also time to prepare a crisis communications plan (Steelman & McCaffrey, 2013).

There is plentiful literature based on previous crises to assist a communicator in preparing a crisis plan:

- First, have a crisis plan. Although it is true that no crises are alike, a simple plan is necessary (Gibson et al., 2019; Sandman, 1998). At a minimum, name a team with responsibilities, create a stakeholder and media contact list, designate the crisis control center, gather standard company information, and write key messages (Coombs, 2019).
- Ensure all involved in the communications efforts know their roles (Telg et al., 2007).
- Train pre-designated spokespeople so that they are prepared *before* a crisis occurs
    - Reporters prefer to speak with a farmer or rancher; have several ready
    - Crises can occur anywhere; media are everywhere. If possible, have spokespeople trained in various geographic areas (Irlbeck et al., 2013).
- Be active and consistent on social media to establish an audience. If a crisis occurs, the organization already will have an established and trusted medium to release information for stakeholders, media, and the general public (Gibson et al., 2019).
- Develop relationships with other states, national, and similar organizations. These relationships have been a support system in previous crises (Irlbeck et al., 2013).
- Have a library of generic photos and video that can be provided to media on short notice (Irlbeck et al., 2013).
- Develop relationships with media. When the media know the organization's contact person, it is much easier to get critical information out (Irlbeck et al., 2013; Seeger, 2006; Seeger, Sellnow, & Ulmer, 2003).

Although an organization may never move from "pre-crisis" to "in-crisis," natural disasters are possible anywhere, and agricultural communications literature instructs the following in a crisis:

- Send a daily email to stakeholders and potential spokespeople with a list of all interviews granted in the last 24 hours and the talking points for the day (Irlbeck et al., 2013).
- Fulfill all interview requests if possible (Irlbeck et al., 2013).
- Write press releases. Send them to the media; however, post that same information to Facebook, Twitter, and the website (Chambers, 2015).
- Proactively contact media with subject matter experts. This is even more helpful if web-based interview with experts are possible, as the media may not be able to travel for an in-person interview (Irlbeck et al., 2014).
- Create an incident hashtag and reference it in press releases, press conferences, and other contacts with media so they can easily locate information (Chambers, 2015).

Specific to a natural disaster, literature suggests the following:

- Create a unified plan for all potential natural disasters (Telg et al., 2007).
- Provide information about protection against the physical threat of the disaster (Coombs, 2007).
- Communicate concern for victims (Coombs, 2007).
- Know that in the moment, some of the more important messaging is to simply state the conditions (Seeger et al., 2003).
- Expect reporters to focus on loss in terms of size, such as loss of lives, animals (livestock and domestic), homes, and acres burned (Terracina-Hartman, 2017).
- If needed, print extra recovery materials that can be helpful to victims of a disaster, such as information on do-it-yourself fire cleanup (Cathey et al., 2007).
- Prepare the extension office in the affected county to be the first place those impacted by a disaster will go for information on preparedness, mitigation, and/or recovery (Eighmy, Hall, Sahr, Gebeke, & Hvidsten, 2012).
- Depending on the situation, provide information to help constituents deal with stressful emotions (Cathey et al., 2007).
- Be able to account for all personnel during a prolonged disaster (Cathey et al., 2007).
- Distribute all employees' contact and emergency contact information before a disaster occurs (Cathey et al., 2007).
- Have a plan to communicate about donations (Cathey et al., 2007).
- Seek different methods to distribute recovery information as the media rarely reports disaster recovery information (Terracina-Hartman, 2017).
- Ease stakeholder stress by releasing information on corrective action as the psychological threat of a disaster creates a need for information (Coombs, 2007).

Methodology

A basic qualitative research study was designed to meet the research objectives. This study particularly focused the agricultural communications practitioners that communicated about the 2016, 2017, and 2018 fires in Texas, Oklahoma, and Kansas. The data collection procedures involved interviews, documents, news articles, and observations and followed the structure set by Creswell and Poth (2018). Because the wildfires occurred in rural areas, the researchers purposefully sampled communicators that work for agricultural organizations or ag news outlets. To identify participants, the researchers first examined agricultural news publication archives during the fires and found individuals or organizations that were frequently quoted. From there, those individuals' email addresses were located, contact was made, interviews were scheduled, and suggestions for other additional interview participants were requested. Additionally, agricultural journalists that reported on the fire were identified from news archives and contacted. A total of 14 agricultural communicators were interviewed, an ideal number as suggested by Stake (2006). Five women and nine men participated: four worked for livestock organizations, four agricultural/weather journalists, three extension communicators, two communications directors for general agricultural organizations, and one public information officer for a state department of agriculture.

Due to time and budget constraints, not all that communicated about the fires were interviewed; however, data saturation on several themes occurred in the fifth interview.

The lead researcher conducted the interviews. Eight were in the participant's office; one participant worked from home and was interviewed in a coffee shop; the remainder were interviewed via telephone. The participants signed the IRB-approved consent form, and their rights as a research participant were reviewed. The researcher used a semi-standardized interview protocol that sought to address each research objective. Questions were scripted; however, the interviewer adjusted and/or eliminated questions based on the unique story of each participant (Merriam & Tisdell, 2015). Questions were written to understand each participant's role in communicating the fires, lessons learned, best practices, and suggestions for others that would address natural disaster communications. During and after each interview, the researcher wrote reflexive notes.

Most interviews lasted approximately 60 minutes and were recorded with a pocket-sized audio recorder. The audio files were transcribed using an online transcription service, verified, then saved on a password-protected computer. To analyze the data, the researchers first read through all the transcripts to reflect on the overall meanings. Using NVivo software, the researchers then organized the data using open and axial coding to first organize the data, then create themes. In all, 11 themes emerged and seven sub themes.

Trustworthiness

According to Lincoln and Guba (1985), a qualitative research study must establish procedures to ensure trustworthiness: credibility, transferability, dependability, and confirmability. Credibility was established through triangulating the various interview transcripts and addressing researcher bias. A rich description of the findings is provided below to achieve transferability. Protecting the identity of the participants accomplished dependability. Confirmability was achieved with the researcher's audit trail, transcripts, audio files, and NVivo files.

Researcher Bias

Since the researcher is the instrument, mistakes can be made and personal biases can interfere (Merriam, 1998). The lead researcher is originally from Northwest Oklahoma and her family lives very near to several of the fires. Her entire family is involved in High Plains agriculture and family members have twice had structures and livestock threatened by wildfires. Although the researcher has an emotional connection to the topic of this study, those emotions and biases were set aside to learn about the participants' experiences in communicating about the wildfires.

Findings

RO1: Determine agricultural communications practitioners' efforts to create a natural disaster crisis communications plan

To address the first research objective, five themes emerged from the participants regarding the crisis plan preparation: Have a plan, take pre-crisis measures, establish and train spokespeople, assign roles for staff, and pre-plan messages.

Have a plan.

The state department of agriculture and the extension communicators had a crisis plan prepared. The livestock and general ag organizations said they did not have an official, written plan, especially for a wildfire. With large-scale fires occurring in three consecutive years, each state viewed 2016 as a learning situation, and they all developed a more detailed plan after that.

Take pre-crisis measures.

Based on the participants, pre-crisis measures can include developing media relationships, establishing partner organizations, creating social media presence, and pre-planning the website.

> It's important you develop those relationships [with media] on the "blue sky days" when things aren't going haywire. Those relationships you build on those days serve you so well. Anything you can do to build a relationship on the blue sky days are really going to serve you right (Charlie, state department of ag communications director).

If weather conditions are conducive to fire for several months, Liz, a regional extension communications director, will pitch fire prevention stories to area media and release video via social media. In addition to developing media relationships, several participants discussed the partnerships they developed. For example, Maggie's (livestock association communications director) organization worked with the state's Farm Bureau to coordinate volunteers to distribute donations. Cooperative extension was mentioned as a partner for all interviewed. Likewise, two extension communicators described the networks they had developed:

> Elected officials, commissioners, judges, they're part of our network. They fund those [county] agents so there's a lot of communication that happens. We have two trainings a year here where all the judges and commissioners come in here and a lot of our training over that time period pertains to fire…That partnership, I think that's why…we kind of became the central communication point (Phil, regional extension director).

> We know who the [ag] communications people are…And pretty much everything they put out comes to me, and so we were communicating and hopefully have the same kind of messages. (Liz).

Social media was mentioned by several participants as part of their regular communications, and has a purpose in the crisis plans. Charlie used social media on the "blue sky days," by posting regularly and sharing information from partner organizations to build an audience. With a pre-built audience, sharing critical information about the fires and recovery efforts was easier. Updating social media is a simple task; however, updating a website may be more difficult. Several participants said someone on staff should know how to quickly update the website multiple times a day in the event of a crisis.

Establish and train spokespeople.

Almost all participants said that pre-training spokespeople was a key part of their crisis plan. Some participants were strategic in the geographic locations of their spokespeople. When fires were happening in remote parts of the respective states, having people on the ground proved critical. In addition to training spokespeople on *what* to say, it is also important to train them on

the location of interviews. For example, Maggie urged members to suggest interview locations that were away from deceased cattle. Tony, a communications director for a statewide ag association, felt it was an invasion of privacy to shoot video of a rancher's burned home. Beyond media interviews, some groups trained members about social media posts.

> From an association standpoint, that's something you have to think through…maybe you try to educate your members all along the way before there's any kind of crisis on, you know, it's probably not best that we post a dead animal on Facebook (Maggie).

Assign roles.

In the fires in 2016, many of the participants said office staff members' roles emerged. After that, many established a clear set of responsibilities as to who would do what in a crisis. Mary, a state extension communications director, said her office takes rotating vacations. For example, photographers cannot take vacation at the same time; there must be someone in the office that can take photos.

Pre-plan messages.

With weather events, there is usually a "season." Liz said she pulls extension wildfire resources and has them ready to distribute via social media or to regional media. Katie, a communications director for a state livestock association, said that she created a standard set of talking points. Maggie reiterated the point: "In any kind of situation, whether it's an issue or whether it's a crisis, we will always have talking points if we think there's a chance media is going to contact us"

RO2: Explore the practitioners' strategies to communicate during and after the wildfires

Every crisis is different, and even with a plan in place, each crisis requires a set of strategies to communicate. In a wildfire, a state or federal agency will manage the firefighting efforts and all communication relevant to fire. Extension, department of agriculture, livestock, and general ag organizations managed the communications efforts regarding people, livestock, homes, and land. The participants' strategies emerged into three themes: people first, get and give information quickly, and stay out of the way.

People first.

Every person interviewed for this study somehow reinforced the fact that the human aspect must come first. Al, a farm radio reporter, summed up the human factor simply: "Understand that you are dealing with people under incredible stress." With that in mind, the participants were sensitive to the messages they were sending.

> One of one of the things that I think is very important, and it's become a very important part of my life, is pulling the name from the number. Don't leave a situation as just a statistic. They're not known as number 54 number 16 or whatever. They had a name and a family (Charlie).

Will, a marketing director for a state livestock association, said his office hosted a town hall meeting with a meal. The used extension, USDA, and other specialists to answer questions

regarding disaster assistance, helped fill out paperwork, and simply listened. “I think that sense of community really helps to let the conversation lines be open,” he said.

Get and give information quickly but accurately.

Several participants said their office would do a daily internal briefing. In those meetings, they would have a fire status update, handle misinformation, and update talking points. Maggie’s office sent a daily (more if needed) email to the newsletter mailing list. Under this theme, three subthemes emerged: social media, media relations, and internal communications.

Social media.

Because of social media’s immediacy and reach, it is a critical piece of crisis communications. Mary said it was her office’s main communications strategy. Charlie said he posted to Facebook 242 times in the 2018 fires. Some were re-posts of other agencies to get all information out.

> Facebook is almost a clearinghouse for information. You're still more than welcome to call us for information if you're a member of the media. But since we know there's a 24-hour news cycle we would put that information on Facebook…You could pull off photos, you pull off videos, you pull off text (Charlie).

Some of the fires had an incident hashtag. Others did not. All interviewed agreed that a consistent hashtag is beneficial to search for information.

Media relations.

Media relations is another critical component in crisis communications. “We need them, they need us,” said Liz. Maggie estimated that she and her executive director took at least 150 media calls in the two fires. Tony stressed the importance of helping reporters by providing ranchers’ contact information. All the communications directors said they sent press releases, and Anna, an ag newspaper reporter said “news releases are very helpful and a necessary way for a reporter to get information.”

Internal communications.

Internal communications can mean staff, but it can include a board of directors that may also take an inquiry. Charlie and Maggie both sent daily messages of what they communicated that day. They said this strategy kept the office informed in the event they fielded questions.

Stay out of the way.

In some situations, it is necessary for a communicator to be at the scene. In others, it is best to be out of the way. None of the participants went to the scene while the fire was in progress. “I just don't feel like you need to be there in the way of first responders and all the people that are trying to help the people that are actually physically involved with a disaster,” said Anna. Mark said he did not want the firefighters to have to take care of him when they were trying to protect the lives, property, and animals of those that actually lived there.

RO3: Determine the lessons learned by communicators during the fire.

Managing donations was a resounding theme from the participants. Two other themes emerged as lessons learned or unexpected factors in communicating about the fires: the emotional toll the fires took, managing request for updated numbers

Donations.

People will help and want information to do so. Help came in the form of monetary donations, supplies, and volunteers. In three of the situations, the communicator managed the donations.

Monetary donations.

A website was needed so people could donate online. Maggie managed her office's donation website and had to build it quickly. She said she had to consider the look and set the online form up so that it could accept donations from other states and countries. Will added that file management is crucial, as well as a system to send receipts for tax purposes. He added it is vital to understand the state's tax laws.

Once monetary donations were received, Will had to establish protocols to distribute funds. He also said to seek help from partner organizations so they can direct donors to the website. "Do a social media thank you for a larger donation, it makes people more inclined to give, because they see legitimacy when they see buy-in from other companies," said Will.

Supplies.

When it comes to supplies, all advised to be very specific about what is needed.

> The first thing they think is let's gather up water. Let's gather up things that firefighters need. Well, the fire was over in a day. So, when you bring a truckload of water to the livestock supply point, we got nowhere to put it, we don't need it (Phil).

Establishing a supply point and communicating its location was the second step. Liz warned to avoid listing personal cell phones as the contact for donations. Hay donations arrived by the semi-truckload at all hours, and one volunteer took calls when trucks would arrive, often in the middle of the night.

Distributing donations.

The participants noted a curious phenomenon surrounding donations. Because ranchers are very proud, many would not pick up the donated supplies.

> What we find is, is that folks aren't really telling us how bad it is. So, they're like, "I'm fine. I'll be okay. The guy over there, he lost a barn. You need to go talk to him. And this guy's lost 20 miles and fence and 400 bales of hay." It's an humble attitude but we've actually had extension folks tell us you know, "No, no, this dude is suffering. We really need to help him, and he put in his application only because I twisted his arm to put one in" (Henry, director of a state livestock association).

> Nobody's going to come to the livestock supply point and pick up anything. They will come and pick it up for their neighbor. But they won't pick up their own. So, the agents just automatically got with their ag committees are like, "All right, we're gonna take it to

> them." And so they just started running hay to ranches or a location somewhere where guys can get it anonymously. You knew that they lost cattle. You knew their ranch was burning up. When you'd call they'd say "no, you need to check with someone else because there's is worse than mine" instead of just taking it (Phil).

Emotional toll.

All participants described the emotional toll that seeing burned cattle, homes, barns, fences, and pastures took. They know their members, listeners, and/or readers well, and when the participants heard victims' stories, it stayed with them.

> The other side of that is that, putting one [calf] down is one thing, having to put 30 down…We had ranchers who called their neighbors and said, "I can't do this. Can you come do it for me?" (Henry).

> Sometimes [the ranchers] just break down because they've lost so much. And they just say… decades of work just go up in flames in a matter of 15 minutes. So that was the hardest thing to do. But I'll probably say the most useful thing I did was put a face and a person in that position that a reader can say, "God, these people are hurting." (Mark).

Disasters are a reality in the agricultural industry, and communicators will have to deal with traumatic situations. The participants recommended to keep the victims in mind and know they are going through worse. Also, focus on the positive stories that come from a disaster, such as rain that followed fires, volunteers, or donations.

Requests for numbers.

Three of the participants said they fielded numerous media calls requesting numbers of acres, homes, and/or cattle burned. "The fire's not even out. We can't count cattle if the fire's not out, and so people don't know [better]," said Katie. Phil said individuals were making estimates that proved very wrong. "They want that information immediately in number of acres, number cattle. That took weeks. It really took a month to get that data firm," said Phil.

Even when statistical data was ready, Henry suggested putting numbers in context. For example, providing the monetary value of a mile of fence or one calf.

Conclusions

It is important to acknowledge the participants do not communicate about fire on a day to day basis. Fire is one crisis an agricultural communicator may face. At the same time, massive wildfires have occurred in multiple years; they should be expected and included in all risk assessments in the High Plains region. The researchers recommend that all communicators assess potential severe weather risks and develop a plan accordingly.

Most of the findings aligned with previous crisis communications literature. In the pre-crisis phase, establish a plan (Gibson et al., 2019; Sandman, 1998), develop relationships (Irlbeck et al., 2013, Seeger, 2006; Seeger et al., 2003), train spokespeople from a wide geographic area

(Irlbeck et al., 2013), assign roles (Telg et al., 2007), and plan messaging where possible (Coombs, 2019). The data yielded a new pre-crisis strategy: develop networks with partner organizations, such as with other ag organizations, extension, or other communicators. These people can be a valuable help and support system in a crisis situation.

The in-crisis strategies employed by the participants of this study aligned with the literature: use social media and press releases regularly (Chambers, 2015); communicate with internal audiences (Irlbeck et al., 2013); create an incident hashtag (Chambers, 2015); and reporters will want data quickly (Terracina-Hartman, 2017). To add to the literature, this study found that it is of utmost importance to keep people first. "You are dealing with people under incredible stress," said one participant. Keep the human side of agriculture top of mind in all messages. In today's standard of instantaneous news, the general audience expects photos and videos immediately from the fire site. The participants said gathering images while fires are burning may cause more of a problem. Avoid becoming the story.

Finally, the more impactful findings from this study are those regarding donations and the emotional toll of communicating about a wildfire. People want to help those in a catastrophic situation. Be prepared to accept monetary and material donations. Fill out the necessary tax paperwork and know tax laws in advance, then set up a website that makes it easy to donate. When asking for materials, be very specific about what is needed.

Because of Facebook's algorithm, a message can be viewed for several days after it was posted, and then others share the post, so someone may see a request for donations that is five days old. Liz and Phil said this caused a steady stream of donations – sometimes for two weeks – even though the request had been fulfilled within a day or two. They both said in future disasters they will clearly communicate when all needed supplies have been received.

Seeing a tragedy like a massive wildfire is very upsetting, and many participants were still sad when they talked about it, a year-and-a-half later. Although a person can never be truly prepared for seeing the images or hearing the stories that a fire causes, Mark said that it is a great service to the ag industry by telling the stories.

Canon, Specht, and Buck (2016) found only six crisis communications courses nationwide. As programs continue to grow and improve, preparing students to communicate about a crisis is an important topic that agricultural communications educators should include in curriculum. Only a few participants had a plan, and it is likely the participants were never taught how.

Recommendations for future research

This research was limited to the wildfires in the late 2010s; however, much can be learned from other natural disasters, such as floods, blizzards, tornados, or fires in other parts of the world. Studying news patterns surrounding these events is a valuable way to learn how to craft messages (Terracina-Hartman, 2017).

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A Multi-State Evaluation of Secondary Agricultural Education Students' Performance on Industry-Based Standards

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Abstract

This examination of secondary agricultural education students' performance was used to determine if students could perform up to industry standards. In this study, the industry standard were blueprints created by engineers at the National Institute for Occupational Safety and Health. Students had to fabricate a Cost-effective Roll-Over Protective Structure (CROPS) to be placed on a tractor within their community. All the pieces of the CROPS were inspected by an outside consultant with experience with inspecting projects and visual inspection of welds. It was found that students struggled the most with fabricating the axel brackets. The axel brackets required the most drilled holes and cuts of all the pieces therefore creating more areas where mistakes could be made. Students fabricated the vertical support tubes with the most accuracy. According to the Data-Driven Decision Model (DDDM), teachers analyzed student work, provided feedback, and need to incorporate this new knowledge into their future instruction to increase the accuracy of their students' fabrication skills. Teacher trainers are recommended to incorporate this performance data into the summer training to better prepare teachers. The inclusion of teaching strategies need to be created for secondary teachers such as peer evaluation of measurements prior to drilling and cutting.

Introduction

Once a student graduates and enters the workforce, are they ready for the daily requirements of a job? Educational institutions strive to provide academic, technical, and employable skills to prepare students for careers after secondary education (Dibenedetto & Myers, 2016). The expectation of students is to successfully transition after the completion of their secondary education; however, the measurement of the successful transition are limited to the simple affirmation of the transition being obtained with limited to no assessment. Per Lynch (2000), 50% of students in college fail to obtain a degree. Unfortunately, students are entering the workforce, considered by their school as successfully transitioning, with insufficient knowledge and skills needed to be productive workers (Gardner & Liu, 1997); thus, leading to collaborative work of industry leaders, educators, and policy makers to correct this unpreparedness of graduating students (Dibenedetto & Myers, 2016).

Over the last decade, one method for measuring successful transition that is becoming more popular is the inclusion of industry-based certifications, also referred to as IBCs. (Wilcox, 2006). The premise behind IBCs is to ensure students have been adequately prepared for the current workforce. Many certifications exist that can be obtained through Career and Technical Education (CTE) courses and many companies provide a certification examinations (Foster & Pritz, 2006; Wilcox, 2006). One such organization that is used nationwide to create and

administer the certification exams is the National Occupational Competency Testing Institute (NOCTI) (Foster & Pritz, 2006). NOCTI examinations have further added creditability by matching their test items to other national standards across the core academic areas such as math, science, and language arts. These certifications are based on several principles one which is quality. Quality of these certifications refer to how tightly aligned the certification is tied to industry standards which are highly valued by employers.

IBCs also utilizes an outside evaluation system to determine the level of skill and knowledge acquired according to the standardized skill and known objectives (Wilcox, 2006). The examinations which are based on industry standards are used to assess standards-based knowledge and associated skills. The IBCs help educators build the content knowledge among their students in order for them to meet an entry level industry standard upon graduation. In return, the student obtains an edge in the job market and increase their marketability among industry (Foster & Pritz, 2006). According to Wilcox (2006), these credentials are nationally portable and not just tied to local industry. In addition, Dibenedetto and Myers (2016), acknowledged that the industry certifications provided new opportunities for underserved and underprivileged youth that would not desire the obtainment of a post-secondary education.

Most states have implemented the utilization of IBCs as the end of pathway examinations in CTE courses. States that started the technique were Virginia, Pennsylvania, Georgia, Texas, and Louisiana (Foster & Pritz, 2006, Wilcox, 2006). Although there is not a universal technique or practice, most states assess IBCs at the junior and senior level (Wilcox, 2006).

Theoretical Framework

Over the last decade, industries and school infrastructures have transitioned to using Data-Driven Decision Making (DDDM) to influence decisions within their respective institutions. Using data to drive decisions provides a quantifiable trail for decision makers to follow an understanding of progress or regression in their fields. Data-Driven Decision Making pertains to the systematic collection, analysis, examination, and interpretation of data to inform practice and policy in educational settings (Mandinach, 2012). Mandinach believed that it was no longer acceptable to simply use anecdotes, gut feelings, or opinions as the basis for decisions. DDDM provides educators the opportunity to synthesize student information in one form or another to improve classroom instruction and ultimately the educational performance of students (Wohlstetter, Datnow, & Park, 2008).

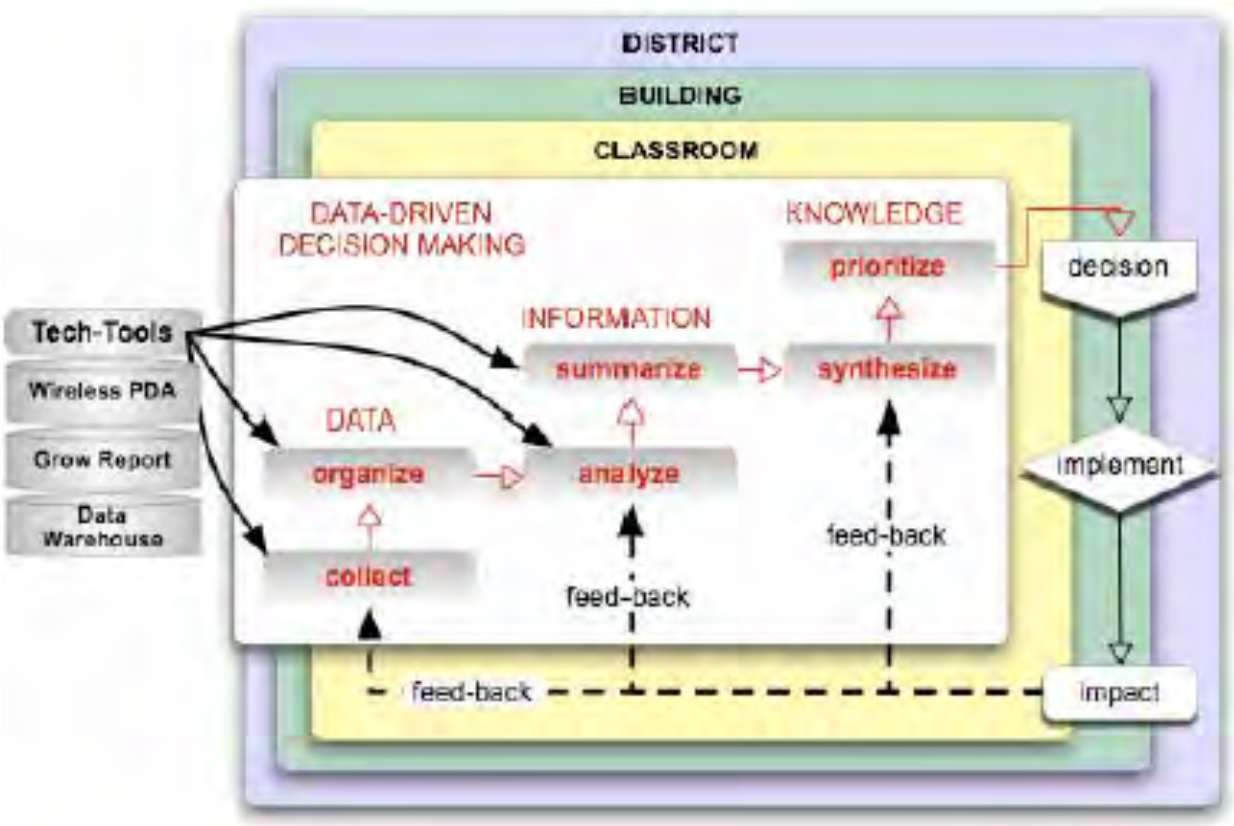

FIGURE 1. Conceptual framework for data-driven decision making. Reprinted with permission from A Conceptual Framework for Data-Driven Decision Making by E. B. Mandinach, M. Honey, D. Light, and C. Brunner. Copyright 2008 by Teachers College Press

DDDM has a continuum that allows data to be transformed and utilized to inform practice and policy. Along this continuum there are three levels data, information, and knowledge (Mandinach, 2012; Marsh, Pane, & Hamilton, 2006). The initial level of data is where individuals collect all the data in its raw form and organize it in some manner. In the information level, the organized data is given context to help glean different trends from the data so that performance can be summarized. In the final level, knowledge, the performance summaries are synthesized and prioritized to allow individuals to make decisions to impact practice and policy. According to Marsh, Pane and Hamilton (2006) some of the possible decisions could address assessing progress toward goals such as a teacher assessing student performance to identify areas of remediation or to identify enhancements to improve outcomes within industry settings. Once the decisions have been implemented they will be examined to determine the impact which will start another reiteration of the DDDM process (Mandinach, 2012).

Purpose and Objectives

The purpose of this study is to examine secondary agricultural education students' accuracy to fabricate a Cost-effective Rollover Protective Structures based on industry standards set by the National Institute for Occupational Safety and Health (NIOSH), a branch of the Center for

Disease Control. The study aligns with the American Association for Agricultural Education National Research Agenda Priority Area 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century (Roberts, Harder, & Brashears, 2016). From the purpose, the following objectives were created.

1. Based upon the industry-based standards set by the National Institute for Occupational Safety and Health, describe the accuracy in the students' fabrication component of the CROPS curriculum project.
2. Based upon the industry-based standards set by the National Institute for Occupational Safety and Health, describe the weld accuracy in the students' fabrication component of the CROPS curriculum project.

Methods

The study is part of an overarching five-year project funded by the National Institute for Occupational Safety and Health, a branch of the Center for Disease Control and Prevention. The project encompasses ten states, primarily in the Southeast region of the United States. Rural secondary agricultural education classrooms in resource-depleted communities serve as the target population of the project. For the benefit of the reader, the following study was conducted during Year 1 of the five-year undertaking.

Secondary agricultural education students were assessed using industry-based standards through the process of fabricating a Cost-effective Roll-Over Protective Structure (CROPS) to be placed on a tractor within their community. The industry standard that was used as the basis of the assessment was the CROPS blueprints created and tested by mechanical engineers from the National Institute for Occupational Safety and Health (NIOSH) Division of Safety Research and Protective Technology Branch (NIOSH, 2016). The blueprints are in accordance with the Society of Automobile Engineers (SAE) industry standard performance test SAE J2194. There are four blueprints available on the NIOSH website which include the following tractor models: Ford 3000 series, Ford 4000 series, Ford 8N, and Massey Ferguson 135 series. Each blueprint has a list of tractor models within each series that the CROPS will fit. Table 1 outlines the total number of tractor models the schools fabricated for their community during the Year 1 project.

Table 1
CROPS Fabricated by Tractor Model, Year 1 (n = 11)

Tractor Model	*f (%)*
Ford 3000 Series	4 (37%)
Ford 4000 Series	3 (27%)
Ford 8N Series	2 (18%)
Massey Ferguson 135 Series	2 (18%)

Secondary agricultural education programs in three rural Appalachian states were selected due to the number of continued roll-over accidents with a total of 10 schools participating. The participating schools represented the following states: Alabama, Georgia, Kentucky, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. Programs were selected through a selection criteria which consisted of a) recommended by state staff and/or university faculty as a proficient teacher in agricultural mechanics; teaching

at the school for at least four years; an agricultural mechanics course set to be offered the following academic year; located in the Appalachia or Delta Region; a reported tractor fatality occurred in the county within the last two-years; and teacher was willing to attend a three-day training on a pre-developed and award winning curriculum project (Mazur, Vincent, Watson, & Westneat, 2015), which included the process of constructing the Roll-Over Protective Structure. Once a teacher met the criteria, the school district was contacted to ascertain permission to participate in the project.

Preparation of teachers

The researchers provided a three-day training prior to the start of secondary schools beginning. The purpose was for teachers to engage in the entirety of the curriculum as well as an immersion exercise in the laboratory, which served as the formative assessment of the state-mandated standards. One of the objectives from the three-day training was to assist the teachers in the fabrication and the standards prior to classroom implementation. Prior to the orientation, the secondary teachers sought farmers from their community whom own and utilize a tractor that is recognized as eligible for CROPS.

Curriculum Implementation

During the school year, the secondary teachers were shipped all the base materials needed to teach the CROPS curriculum, including fabrication materials. The base materials included up to 20’ sections of metal based on the model tractor CROPS blueprints being used, grade 5 and 8 bolts, flat and locking washers, and nuts. Upon completion of the CROPS projects, the agricultural educators would contact the research team to schedule an inspection. The assessment of the students’ abilities to perform at an entry level industry standard was conducted by an outside evaluator. The outside evaluator was an agricultural mechanics professor with a background in inspecting agricultural mechanics fabrication projects and visually inspecting welds.

Instrumentation

The evaluator utilized the CROPS blueprints to create an evaluation instrument served to evaluate the students’ ability to accurately fabricate the CROPS in accordance to NIOSH’s industry-based standards. The evaluation instrument, driven by the DDDM framework, was approved by the National Institute for Occupational Safety and Health, including the engineers who designed and tested the blueprints. Based upon the project constructs, established by NIOSH engineers, the plans were divided into three separate sections: axel mounting components (part numbers 1, 2, 3, 4, 5, and 7); vertical support components (part numbers 6, 8, 9, 10, and 11); and welded components (part number 12) for inspection and reporting purposes (for a visual of part numbers, see Figure 1). To determine intrarater reliability, the researcher randomly selected three of the participating schools to facilitate a test-retest. The schools were selected in North Carolina, Kentucky, and Tennessee. Following the test-retest, the researcher obtained an intrarater reliability score of 0.88 (K = 0.88). Kappa statistics are commonly used to evaluate the same observer’s ratings at multiple time points for nominal-level items. The Kappa scores range from -1 to 1 with higher scores reflecting the greater agreement. A Kappa score that is within the range of 0.80-1.00 is considered *almost perfect*, as determined by Landis and Koch (1977). According to Moskal and Leydens (2000), an intrarater reliability score provides context to the test-retest, but it doesn’t address that steps were taken to assure similar external factors

were constant each time an evaluator uses an instrument. As a result, the researcher had all fabricated CROPS to be laying at the center of the agricultural mechanics shop and not painted. In addition, the instructor and students were to be silent during inspection.

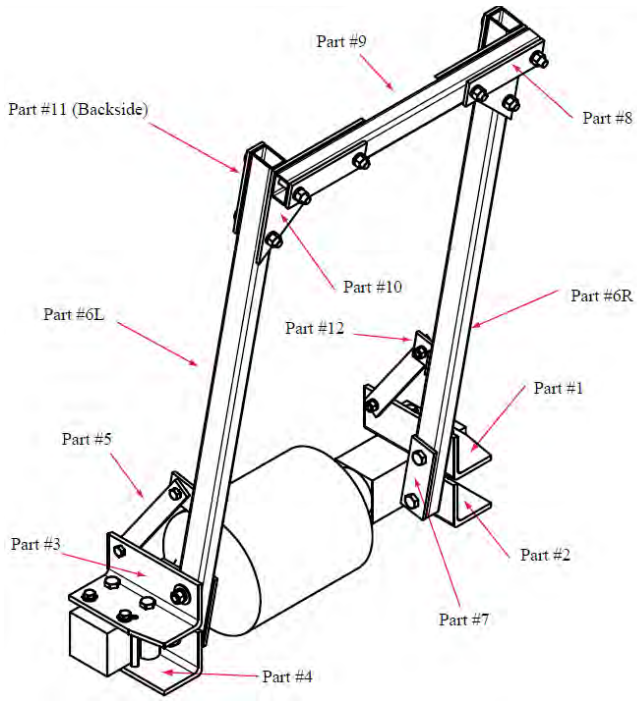

Figure 2. Ford 3000 Series drawing of completed CROPS project. Adapted from the blueprints for Cost-effective Rollover Protective Structure (CROPS) for Wheeled Agricultural Tractors Ford 3000 series Technical Drawings retrieved from: https://www.cdc.gov/niosh/topics/aginjury/crops/pdfs/ford-3000/Ford-3000-Technical-Drawings.pdf

The inspection factors included correct overall measurement of the part being fabricated, correct placement of drilled holes, correct placement of a welded bracket, visual inspection of welds, and correct torque applied to mounting bolts. The checklist was separated by 1/16" increments of >1/4, >3/16" <1/4", >1/8" <3/16", >1/16" <1/8", <1'16" to evaluate the overall measurement of the CROPS parts (N = 15), placement of drilled holes, and the welded bracket. The largest increment off from the blueprints was marked on the designed evaluation instrument. Like industry standards, if one part of a component is off the whole component would be rejected until the part was refabricated. As set by NIOSH, any part with an evaluation greater than 3/16" was rejected and did not meet the industry standard. The same rejection measurement was applied drilled holes as well as the measurement of the two welded brackets.

Visual inspection of the welds looked for any discontinuities and utilizing a fillet gauge to measure leg length and face fill. The welds must have leg lengths of at least 3/16" to pass inspection and be the full length of the piece. Welds were also inspected for visual discontinuities such as porosity, undercut, and lack of fusion. Dependent on the size of the discontinuity present the weld could not meet the industry-based standard. The bolt torque was checked with an appropriate torque wrench. For parts that had to be refabricated or rewelded programs either completed the task the day of inspection or the evaluator came back after the piece(s) were corrected to meet the industry standard set; however the results of this study is based upon the initial findings.

Results

Objective one sought to describe the students' abilities to fabricate the CROPS based on the industry standard of the related NIOSH blueprints. The results are broken up into three sections including axel mounting components, vertical support components, and welded components. Overall, most mistakes in fabrication of the CROPS projects were found within the axel mounting components. It was found that the parts with the least amount of fabrication needed were the most accurately made by the secondary agricultural education students. Table 2 illustrates the abilities of students to fabricate the axel mounting components.

Table 2
Inspection Frequencies and Percentages of the Axel Mounting Components (N = 11)

	>1/4"	>3/16" <1/4"	>1/8" <3/16"	>1/16" <1/8"	<1/16"
	Unacceptable		*Acceptable*		
Part	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*
Top Right Axel Bracket					
- Piece Specification	1 (9%)	1 (9%)	2 (18%)		6 (54%)
- Hole Placement	1 (9%)		2 (18%)	2 (18%)	4 (36%)
Bottom Right Axel Bracket					
- Piece Specification		1 (9%)	3 (27%)		5 (45%)
- Hole Placement	1 (9%)	1 (9%)		3 (27%)	4 (36%)
Top Left Axel Bracket					
- Piece Specification	2 (18%)		1 (9%)	1 (9%)	6 (54%)
- Hole Placement	1 (9%)		3 (27%)		5 (45%)
Bottom Left Axel Bracket					
- Piece Specification	2 (18%)		3 (27%)	1 (9%)	4 (36%)
- Hole Placement				4 (36%)	5 (45%)
Vertical Tube Bolted Brace					
- Piece Specification			1 (9%)	1 (9%)	9 (82%)
- Hole Placement			1 (9%)	2 (18%)	7 (64%)
Right Bottom Vertical Tube Backing Plate					
- Piece Specification				2 (18%)	8 (72%)
- Hole Placement				3 (27%)	6 (54%)
Left Bottom Vertical Tube Backing Plate					
- Piece Specification				2 (18%)	8 (72%)
- Hole Placement				3 (27%)	6 (54%)

Note: N = 11. Not all projects were completed at the time of inspection; frequencies of each piece may not equal 11.

Within the vertical support components, the most variation of accuracy can be seen with the crossbar and corner plates. The most accurately made pieces within the vertical support components were the right and left vertical tubes. Most of the parts were within 1/8” accuracy of the NIOSH blueprints. The accuracy frequencies for the vertical support components can be seen in Table 3.

Table 3
Inspection Frequencies and Percentages of the Vertical Support Components (N = 11)

	>1/4”	>3/16” - <1/4”	>1/8” - <3/16”	>1/16” - <1/8”	<1/16”
	Unacceptable			*Acceptable*	
Part	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*
Right Vertical Tube					
- Piece Specification				1 (9%)	10 (91%)
- Hole Placement				4 (36%)	6 (54%)
Left Vertical Tube					
- Piece Specification			1 (9%)	1 (9%)	9 (81%)
- Hole Placement				4 (36%)	6 (54%)
Right Crossbar Backing Plate					
- Piece Specification				2 (18%)	9 (81%)
- Hole Placement			2 (18%)	2 (18%)	6 (54%)
Left Crossbar Backing Plate					
- Piece Specification		1 (9%)		2 (18%)	8 (72%)
- Hole Placement		1 (9%)	1 (9%)	1 (9%)	7 (63%)
Crossbar					
- Piece Specification				4 (36%)	6 (54%)
- Hole Placement	1 (9%)		3 (27%)	1 (9%)	5 (45%)
Right Corner Plate					
- Piece Specification			1 (9%)		9 (81%)
- Hole Placement	2 (18%)				8 (73%)
Left Corner Plate					
- Piece Specification	2 (18%)		1 (9%)		9 (81%)
- Hole Placement				1 (9%)	7 (64%)
Top Vertical Backing Plate					
- Piece Specification	1 (9%)				9 (81%)
- Hole Placement	1 (9%)			2 (18%)	6 (54%)
Right Vertical Tube Brace					
- Piece Specification	1(9%)		1(9%)	1(9%)	7(64%)
- Hole Placement				3(27%)	7(64%)
Left Vertical Tube Brace					
- Piece Specification					
- Hole Placement			1 (9%)	1 (9%)	8 (72%)
				3 (27%)	7 (64%)

Note: Not all projects were completed at the time of inspection; frequencies of each piece may not equal 11.

The second objective sought to examine the students' ability to accurately weld the specified parts together, as set by the industry-based standard. There are four fillet welds (tee position) that must be completed, according to NIOSH. These welds must be continuous (one solid bead) and have leg lengths of at least 3/16". All the inspected welds had leg lengths of at least 3/16". The inaccuracy of the students were present in creating a weld that went the full length of the weldment. All but one of the pieces were fabricated within 3/16" accuracy in regards to weld length and all welds passed visual inspection. There were four welds identified as unacceptable and were reconstructed because of the inaccuracy of the placement brace on the vertical tube. The accuracy of students' welds and visual inspection results, as set by the NIOSH approved industry standard, are displayed in Table 4.

Table 4
Inspection Frequencies and Percentages of the Welded Components

	>1/4"	>3/16" <1/4"	>1/8" <3/16"	>1/16" <1/8"	<1/16"	Passed Inspection
	Unacceptable		*Acceptable*			
Part	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*	*f(%)*
Right Vertical Tube Welds						
- Leg length					8 (100%)	
- Weld length			6 (37%)	4 (25%)	6 (37%)	8 (100%)
- Inspection result						
Left Vertical Tube Welds						
- Leg length					8 (100%)	
- Weld length			4(25%)	6 (37%)	6 (37%)	8 (100%)
- Inspection result						

Conclusions, Discussion, and Recommendations

All participating had a pre-trained secondary agriculture teacher approved to teach the curriculum and identified as proficient in agriculture mechanics education. Each school successfully fabricated 1-2 CROPS for their community and most components of the CROPS projects met the industry standard put forth by the NIOSH blueprints on their first attempt.

When it comes to the three areas of the evaluation, the axel mounting brackets were the components where the most variation in the results occurred. The mounting brackets entail a variety of drill points, cuts, and designated tapped holes making the section the most complex pieces to fabricate. Based upon Data-Driven Decision Making (Mandinach, 2012), the conclusions infer that teachers were utilizing the data and information portions of the DDDM continuum. The teachers monitored student progress, data level, and gave feedback once they analyzed the students' work, information level. With all the requirements of the piece if an

individual is not conscientious and diligent in being precise with their work it is easy to make a mistake. It is recommended that teachers take their feedback and incorporate this knowledge into their future instruction to help illustrate to students that the axel brackets requires a high level of precision to accurately fabricate. Another recommendation is to incorporate this information about the level of difficulty of the axel brackets into future teacher trainings. Sharing this further ready the teachers to prepare their students. Teaching strategies that could also help increase the accuracy of the fabrication of the axel brackets need to be included in the teacher training such as allow students to work on sample pieces before cutting pieces for the final product or having students create a mockup of the placement of the required drill holes on paper.

The most accurately fabricated components were the vertical tubes, part 6L and 6R. One possible reason that these parts were the most accurate is that piece only had four holes drilled on either end of the tube. With the provided drill bit, students can drill two holes at one time making holes on either side of the tube to allow the required bolt to pass through. With less drilling required, the students may have less chance of making mistakes during the fabrication process. For the vertical tubes, students still need to be more precise in their placement of the drilled holes. According to DDDM (Mandinach, 2012), teachers need to incorporate this information into their instruction to further enhance their students' ability to accurately measure and place the drill holes to create a more highly accurate piece.

The welded component was consistently accurate in leg length but not in weld length. There could be several reasons why students did not complete welds to the full length of the piece. Such reasons could include the student was in a bad position to see where they were at the end of their weld, not using a new electrode to complete the weld, or being nervous while welding. Teachers are recommended to allow all students to practice welding a similar weldment prior to fabricating the welds on the CROPS project. Allowing students to practice would allow the teacher to follow DDDM (Mandinach, 2012), by analyzing each students' welds, provide feedback, and then incorporate this information into their instruction of future projects. In future teacher trainings, it is recommended to instruct teachers on possible strategies and hands-on practice to create a more accurate weldment in regards to weld length so they have experience they can share with their students.

Teachers should be fluent in the fabrication procedure and should allow students pieces to practice on before fabricating a final product. This could mimic the initial training employees would receive upon obtaining an industry related job. Teachers should also implement an internal inspection procedure throughout the process to ensure pieces and hole placements are correct. This would also mimic how an industry would monitor manufacturing lines. Since programs are only completing one or two projects at most implementing the steps that industry use in manufacturing may allow students to become readier for the workforce.

It is recommended to include a method of evaluation for the welds on the CROPS project to further validate the structural integrity of each weld. Since the projects are to be installed on a tractor upon completion destructive testing is not an option. Therefore, methods of non-destructive testing would be the only option such as Ultrasonic Testing or X-ray evaluation techniques. Researchers also recommend continuing the project to further validate this study's findings that secondary agricultural education students can fabricate a project to industry standards.

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Breaking the Cycle: A Narrative Synthesis of Women's Experience in Postsecondary Agricultural and Extension Education

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Abstract

The "leaky educational pipeline" metaphor refers to the steady tapering off of women obtaining graduate degrees and reaching the level of a tenured faculty member, although the number of women earning college degrees has surpassed males since the 1980s.Women are disproportionately represented among faculty and leadership at land-grant institutions and in the agricultural education profession. The purpose of this study was to provide a synthesis of women's experience in postsecondary agricultural and extension education (AEE) by describing the common and diverging challenges, opportunities, and mentoring experiences of women faculty and graduate students in the profession. The study was a textual narrative synthesis of two preliminary studies which provided an updated profile of the current organizational climate and mentoring experiences of women faculty and women graduate students in AEE. Three overarching themes with 11 categories emerged to summarize the experiences of women in AEE: (a) navigating a traditional academic system, (b) operating in a male-dominated discipline, and (c) influencing change in the profession. These findings challenge the AEE profession to critically acknowledge women's experiences and begin looking outside academia for solutions to create a more inclusive organizational culture that values gender diversity.

Introduction

Extensive literature surrounds the "leaky educational pipeline" metaphor (Blickenstaff, 2005; Gasser & Shaffer, 2014; Massachusetts Institute of Technology, 1999; Pell, 1996), suggesting that over time, a steady tapering off occurs of fewer and fewer women who are involved in the sciences, are seeking and obtaining graduate degrees, and are reaching the eventual level of a tenured faculty member. When it comes to the number of women seeking college degrees, enrollment trends have been steadily increasing, with total female enrollment numbers beginning to surpass male enrollment beginning in the 1980s (National Center for Education Statistics, 2017). In 2019, 56.7% of all college students enrolled in the U.S. were female and 60% of all master's degrees and 54% of all doctoral degrees will be awarded to women in 2019-2020 (NCES, 2018). However, while women have now matched and even surpassed men in terms of educational attainment, men have continued to constitute the majority of graduate degrees in engineering, mathematics and computer sciences, physical and earth sciences, and business (Bettinger & Long, 2005; Bradley, 2000; Council of Graduate Schools, 2018).

A phenomenon noted with female graduate students is the increasing length of time it takes for completion of a doctoral degree (Maher, Ford, & Thompson, 2004), particularly within the fields of education and other non-science and engineering degrees (National Science Foundation [NSF], National Center for Science and Engineering Statistics [NCSES], 2018). It is estimated that at least 40% of students who begin a doctoral program fail to complete it (Golde, 2005). This time constraint means a delay for women to enter the workforce and earn to their full

potential, thereby perpetuating the cycle of gender parity in the labor market (Maher et al., 2004; Bradley, 2000). Some of the reasons attributed to this extenuating length of time include availability of funding opportunities, advising/mentoring relationships, adequate research preparation/opportunities, and individual student concerns about family and/or health issues (Maher et al., 2004).

Workforce/workplace misalignment is another factor contributing to the leaky pipeline (Cabrera, 2009). Today's workplace environment is very different from that of the antiquated, misogynistic stereotypes of the past, which usually depicted a patriarchal figure as the sole breadwinner (Cabrera, 2009). According to a 2019 report from the Bureau of Labor Statistics, the labor force participation rate of mothers with children under age six was 69%, compared to the participation rate for married fathers, at 94%. While men are expected to take on more domestic responsibilities with dual-income households, women still shoulder the brunt of these activities and often cannot compete with escalating work demands (Cabrera, 2009).

In examining the prevalence of women who have managed to navigate the myriad challenges associated with remaining within the pipeline to reach the professorial ranks, researchers have found that women faculty tend to be concentrated in the assistant and associate professor ranks and only comprise 26.5% of tenured faculty at research institutions (Bilen-Green, Froelich, & Jacobson, 2008). Representation is even lower for women faculty at land-grant institutions; 23.7% of female faculty are tenured and only 16.7% have achieved the rank of full professor (Bilen-Green et al., 2008).

The pipeline narrows further still when examining the prevalence of women within the postsecondary ranks of the agriculture and natural resources disciplines. The inclusion of females into the predominantly male-oriented realm of agricultural education, specifically, has uncovered multiple barriers related to gender (Enns & Martin, 2015), namely that women have been significantly under-represented (Foster & Seevers, 2003; Kelsey, 2006b; Seevers & Foster, 2003;). In 2003, Seevers and Foster reported 14.6% of the total membership in the American Association for Agricultural Education (AAAE) were women faculty. When examining an updated profile of AAAE members in 2017, the percentage of female postsecondary agricultural and extension education (AEE) instructors was 21.9% (Cline et al., 2019).

Foster (2001b, 2003) identified challenges or barriers experienced by female secondary agricultural education instructors related to acceptance by peers and other males within the agricultural industry, acceptance by administrators, and balancing family and career. Additionally, many female agricultural education teachers have faced criticisms from colleagues and administrators, sexual discrimination and bias, and inequity in terms of professional status and benefits (Baxter, Stephens, & Thayer-Bacon, 2011; Kelsey, 2006b, 2007; Seevers & Foster, 2003). Many women also believe they must work harder than their male counterparts in order to prove their competence in agriculturally-related subject matter and have often been overlooked as the point of authority (Seevers & Foster, 2003).

An additional factor attributed to women's late entrance into the field of agricultural education is a lack of strong female role models to advocate for advancement to higher educational levels (Enns & Martin, 2015; Seevers & Foster, 2003). Many women pursuing studies in a more male-

dominated major are likely to face difficulties, owing to a lack of female teachers to serve as role models (Hall & Sandler, 1982). Numerous studies have cited the need for the implementation of a mentoring system in order to help females overcome real or perceived barriers in agricultural education (Baxter et al, 2011; Foster & Seevers, 2003; Stephens, Brawner, Dean, Stripling, & Sanok, 2018). Research has indicated that successful mentoring relationships consist of a combination of personality (e.g. compatibility and similar values) (Eastman & Williams, 1993); community and access (e.g. belongingness, access to mentors); and trust and communication (e.g. delegating responsibility, accurate feedback) (Jones, Kelsey, & Brown, 2014).

Foster and Seevers (2003) provided a profile of women faculty in AEE by examining the challenges and opportunities experienced within the profession at the time. Additional studies focused on the factors contributing to success for women leaders and tenured faculty in AEE (Kleihauer, Stephens, Hart, & Stripling, 2013; Murphrey, Odom, McKee, & Wilkens, 2016). In response to the slight increase in gender diversity within the profession, Cline et al. (2019; 2020) conducted a study in 2017 to update the profile of women faculty in postsecondary AEE. Two preliminary components comprised the overall study, and expanded the work of Foster and Seevers (2003) by exploring the experiences of women graduate students in the AEE discipline and women faculty members.

Preliminary Study 1: Women Faculty in Agricultural and Extension Education

A recent study of women faculty in AEE described the unique challenges, opportunities, and mentoring experiences of women faculty in agricultural extension education (Cline et al., 2019). Women faculty's perceptions of the unique challenges, opportunities, and mentoring experiences in AEE were identified as: (a) c*ontributors to a positive work environment,* (b) *contributors to a toxic work environment,* (c) *mentoring experiences in the profession,* and (d) *work-life integration.* The women faculty valued encouragement, collaboration, transparency, and mentorship within the profession, but identified sexism, marginalization, and unhealthy competition as common barriers. Perspectives on work-life integration were conflicting among the women faculty. While some women did not view work-life integration as an issue, others described their experiences as burdensome or a major sacrifice of their personal and/or family lives. The findings of this preliminary study suggested the encouragement and satisfaction experienced by some women faculty did not negate the toxic workplace behavior and concerns for work-life integration experienced by other women faculty in the AEE profession.

Preliminary Study 2: Women Graduate Students in Agricultural and Extension Education

Cline et al. (2020) conducted a second preliminary study to describe the perceptions of the unique challenges, opportunities, and mentoring experiences of women graduate students in agricultural and extension education. The perceptions and experiences of women graduate students in AEE emerged as (a) *reflections on graduate school,* (b) *realities of graduate school,* (c) *future in academia,* and (d) *the pursuit of mentorship*. Common perceptions varied as they related to the students' decisions to attend graduate school, the realities of graduate school, a future in academia, and mentorship. Women graduate students described postsecondary AEE as a man's world, or as a *good ol' boys club,* and often mentioned gender-based microaggressions and questioning of women's competency. The outlook on a career in postsecondary AEE varied among the women graduate students, with a concern for the disproportionate number of women

leaders to serve as role models in AEE expressed. This study suggested a less-than-positive experience and reality for women graduate students in postsecondary AEE based on the perceived imbalance of power due to gender, which is of concern when considering the "leaky educational pipeline" metaphor (Blickenstaff, 2005; Gasser & Shaffer, 2014; Massachusetts Institute of Technology, 1999; Pell, 1996). It also appeared from the findings of the study that not much progress since the earlier studies (Foster & Seevers, 2003; Kleihauer et al., 2013; Murphrey et al., 2016; Seevers & Foster, 2003) has been made to improve AEE mentoring and support networks for women.

The findings of the two preliminary studies conducted by Cline et al. (2019; 2020) revealed a need for a systematic review of the profile of women in postsecondary AEE to include faculty and graduate students.

Purpose of the Study

The purpose of this study was to provide a synthesis of women's experience in postsecondary agricultural and extension education (AEE) by describing the current organizational climate and mentoring experiences for women in the profession. The study was conducted as a textual narrative synthesis (Popay et al., 2006) of two preliminary studies presenting an updated profile of women faculty (Cline et al., 2019) and women graduate students (Cline et al., 2020) in AEE. One research question guided this synthesis: *What are the common and diverging challenges, opportunities, and mentoring experiences of women faculty and graduate students in postsecondary agricultural and extension education?*

Epistemological and Theoretical Perspective

We approached this textual narrative synthesis from the epistemological perspective of constructionism. Through this lens we determined truth to be what was created collectively between the individuals in our social context (Crotty, 1998). Meaning was defined as the collective experiences and truth of the participants as described in the findings of the two preliminary studies (Cline et al., 2019; Cline et al., 2020). Critical inquiry (Patton, 2015) as a theoretical perspective was used by the two preliminary studies (Cline et al., 2019; Cline et al., 2020) to better understand the power dynamics between genders in the AEE profession. Therefore, this synthesis was approached from a critical inquiry perspective to suggest how predominant beliefs and values related to gender in the AEE profession can be transformed (Kincheloe, McLaren, Steinberg, & Monzó, 2018; Patton, 2015). Crucial to the aim of this synthesis were the shared meanings among women faculty and graduate student experiences in AEE.

Methods

This study is the synthesis of two preliminary studies conducted to update the profile of women in postsecondary AEE. The two studies were conducted simultaneously (Cline et al., 2019; Cline et al., 2020) and closely followed an original research protocol (Foster & Seevers, 2003; Seevers & Foster, 2003) briefly described for context. The questionnaire was slightly modified to improve its meaningfulness and relevancy and administered electronically through the Qualtrics

survey platform. Likert-type and open-ended questions comprised the five sections of the questionnaire. Qualitative analysis was used to interpret 10 open-ended mentoring and workplace experience questions from the questionnaire. Perceptions of women faculty and women graduate students were described through common themes and patterns following basic interpretive qualitative methodology (Merriam, 2002). For both preliminary studies (Cline et al., 2019; Cline et al, 2020) first cycle concept coding and second cycle axial coding were used to indicate emerging dimensions and properties with shared characteristics and attributes (Saldaña, 2016). Eight unique axial codes and 29 unique dimensions and properties described the experiences of women faculty and women graduate students in AEE (Cline et al., 2019; Cline et al, 2020).

A textual narrative synthesis was conducted to compile the two studies (Cline et al., 2019; Cline et al., 2020) into more homogenous groups for analysis of findings. Narrative synthesis is a systematic approach to synthesizing evidence from two or more studies and can be utilized for qualitative or quantitative data (Barnett-Page & Thomas, 2009; Popay et al., 2006). Characteristics and findings across the studies are compared for similarities and differences during the textual narrative synthesis process to develop a structured summary (Barnett-Page & Thomas, 2009). When compared to other synthesis methods, textual narrative synthesis provides a more systematic and transparent approach to minimize interpretation bias (Barnett-Page & Thomas, 2009), which improves the overall trustworthiness of qualitative findings (Barnett-Page & Thomas, 2009; Lincoln, 1995). An adapted four-part framework (Popay et al., 2006) guided our narrative synthesis process: (a) identifying theory relative to the context(s) of the preliminary studies; (b) developing a preliminary synthesis; (c) exploring relationships within and between studies; and, (d) assessing the robustness of the synthesis summary (Rodgers et al., 2009). We kept and reflected on detailed analytic memos during interpretation to systematically guide the synthesis (Popay et al., 2006; Saldaña, 2016). Several iterations of pattern coding were followed to narrow emergent themes and categories. Trustworthiness was maintained by confirming member voice and analyzing the positionality of truth from the findings of the preliminary studies. In addition to commonalities we sought divergent views among the findings of the preliminary studies in order to not imply universal or majority viewpoints in our summary (Lincoln, 1995). Three overarching themes and 11 categories emerged to develop our textual narrative synthesis of women's experiences in postsecondary AEE.

Participants

The population for the two preliminary studies consisted of all women faculty and graduate studies in agricultural and extension education programs. The 2017 American Association of Agricultural Education (AAAE) member directory provided an initial list of 216 women (37.8% of the total membership). University websites listed by AAAE as having an agricultural education, communication, extension, leadership or similar program were searched to identify AEE women not included in the AAAE membership; an additional 83 participants were identified. It was important to include AAAE and non-AAAE members from agricultural education, extension, communications, and leadership as participants to conduct a census (N = 299) of women representing the extensiveness of postsecondary agricultural education (Barrick, 1993; Mannebach, 1990; Newcomb, 1993). Sixteen women (5.3%) opted out of the study. We agreed to take out questionnaires less than 50% completed *a priori* and removed 14 (4.7%). A response rate of 51.2% was achieved (n = 153). Non-respondents were contacted by phone to

solicit completion of the questionnaire. An additional eight women (5.5% of the non-respondents) completed the questionnaire. Differences between early and late respondents were not detected (Lindner, Murphy, & Briers, 2001). An overall response rate of 53.8% (n = 161) was reached. Sixty percent (n = 130) of the women membership in AAAE for the year 2017 were represented in the preliminary studies based on self-report. Further descriptions of the participants can be found in the preliminary studies (Cline et al., 2019; Cline et al., 2020).

Statement of Subjectivity

Qualitative research is an inherent subjective perspective (Peshkin, 1988), and as such, we acknowledge the potential influence of our personal perspectives related to this study. The need for this study was supported by our own personal experiences in AEE at the postsecondary level as female agricultural leadership graduate students, instructors, and faculty. Our personal experiences in the AEE profession have varied and are as complex as the participant's stories reflected in the findings; because of this, we strive to conduct research that will foster inclusion in the profession. Additionally, we recognize the influence of societal women empowerment movements since 2017 and the impact it may have on interpretation of the data. We were diligent to mitigate biases before, during, and after data collection and interpretation by noting, discussing, and challenging our biases throughout the process. The findings of this narrative synthesis fully reflect our collective interpretation of the perceptions and experiences of women faculty and graduate students in postsecondary AEE.

Limitations

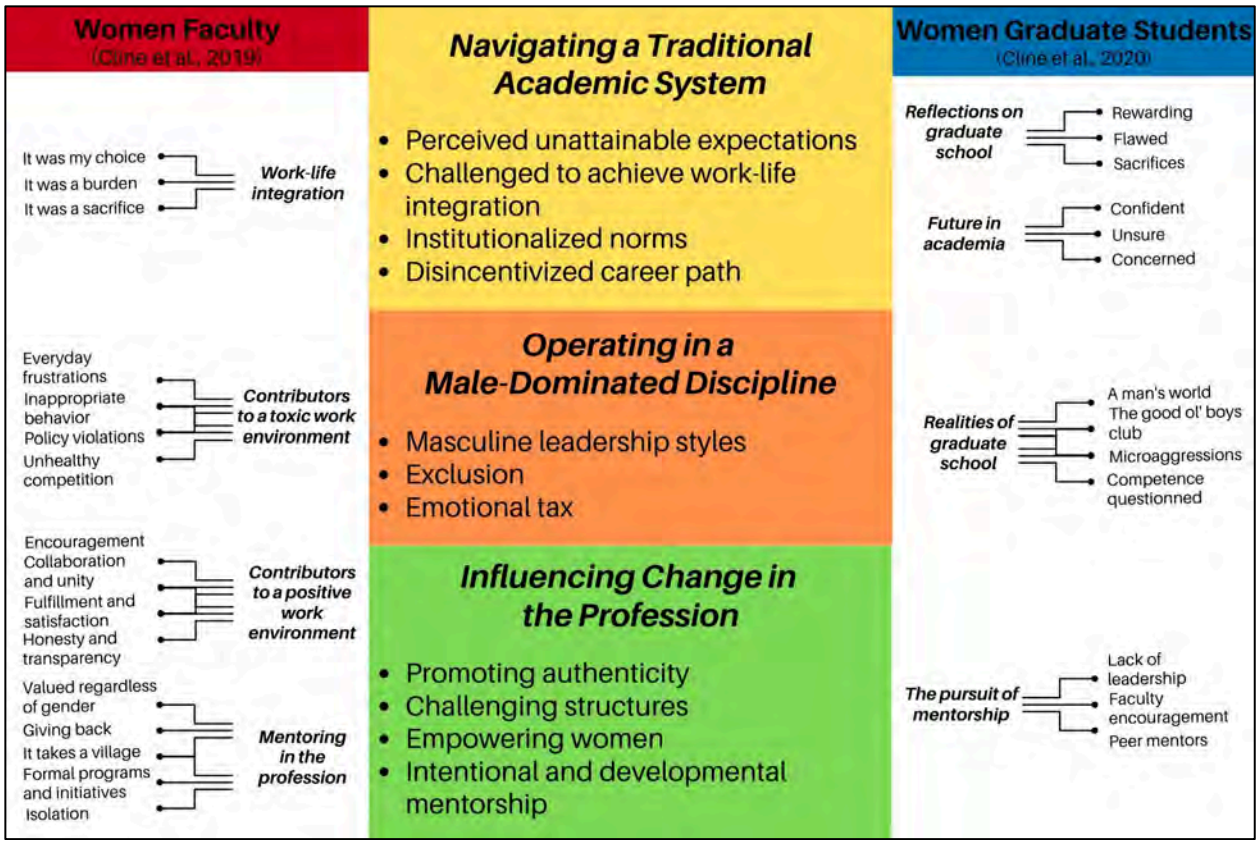
Generalization of findings is not suggested in qualitative research (Patton, 2015) and readers are encouraged to determine transferability of the findings within their context. The synthesis lacks contextual information as a result of the methodological design of the preliminary studies and the constraint of resources to conduct follow-up one-on-one interviews or focus groups with women. It is also noted that while the questionnaire was administered as a census among women faculty and graduate students in AEE, the entire population did not respond. While the use of the narrative synthesis approach was deemed best for this study because of its ability to describe and account for strong evidence across studies, while the most beneficial analytical method to identify differences between studies, its limitations in identifying commonality across studies are acknowledged (Lucas, Baird, Arai, Law, & Roberts, 2007).

Findings

Three overarching themes with 11 categories emerged during the textual narrative analysis to summarize the common and diverging experiences of women faculty and graduate students in postsecondary agricultural and extension education: *(a) navigating a traditional academic system, (b) operating in a male-dominated discipline,* and *(c) influencing change in the profession.* Figure 1 depicts the relationship between the emergent themes and categories from the synthesis and the axial codes and dimensions reported in the two preliminary studies. Direct quotes from the participants in the preliminary studies (Cline et al., 2019; Cline et al., 2020) are included with the summary to support the emergent themes. Confidentiality was maintained by removing potential identifiable information.

Figure 1.

Relationship between Emergent Themes and Categories from the Narrative Synthesis and the Axial Codes and Dimensions Reported in Two Preliminary Studies



Note. Three emergent themes and 11 categories synthesize the experiences of women faculty and graduate students in postsecondary agricultural and extension education reported in two preliminary studies (Cline et al., 2019; Cline et al., 2020) as *navigating a traditional academic system, operating in a male-dominated discipline,* and *influencing change in the profession.*

Navigating a Traditional Academic System

A major theme to arise from the narrative synthesis of women's experiences in postsecondary AEE were descriptions of the challenges faced when navigating a traditional academic system. Three related categories interpreted as *professional success at the expense of personal well-being, challenged to achieve work-life integration,* and *disincentivized career path* summarize the major barriers faced by women in postsecondary AEE. One faculty member stated, *"Our conceptualization[s] of leadership have changed a great deal over the years and are more welcoming to women. However, in our field, change is slow."*

Analysis of the two preliminary studies revealed a pursuit of *professional success at the expense of their personal well-being*. Participants in each study voiced deep concern for the toll demands in the AEE profession take on the personal lives of women faculty and graduate students. While

faculty attributed the demands of the profession to the promotion and tenure process, graduate students voiced concerned about the unrealistic expectations placed on them to perform in graduate school. As Cline et al. (2019) found, "The perceived expectation to be 'twice as good' resulted in many participants forgoing their personal needs and well-being to spend more time at work [while trying] not to neglect family or personal responsibilities" (p. 10). It was a shared sentiment between the women that perceived requirements for professional achievement in the academic system could and may have already led to significant personal neglect and concern for mental health.

Whether viewed as a barrier to success or an attainable goal, women faculty and graduate students in AEE also felt *challenged to achieve work-life integration* as professionals in the academic system. Women faculty shared the complexities of integrating their professional lives with their personal lives, with some more satisfied with their experiences than others. The graduate students were observant of the challenges faced by women faculty members and were not naive to the reality of *second-shift responsibilities* common among women in academia. The necessity for women in AEE to have a strong support system in order to succeed was ubiquitous. Many of the women faculty and graduate students rationalized challenges with work-life integration by maintaining the hope that their choices would pay off further in their academic career.

Another barrier expressed by the women faculty and graduate students was a *disincentivized career path* in the academic system at both the macro and micro levels. Given the increasing demands and resulting trade-offs in the profession, many women vocalized concern for the sustainability of faculty members in postsecondary AEE, regardless of gender. As one student stated, *"the professional demands of work coupled with second shift responsibilities are a recipe for disaster and increased attrition rates."* A portion of faculty and graduate students were satisfied with their chosen career path and accepted the challenges they experienced. However, the remaining women either expressed sincere regrets for their professional choices or strong apprehension about pursuing a career in academia. The challenges expressed in the earlier categories of navigating a flawed academic system (professional success at the expense of personal well-being and feeling challenged to achieve work-life integration) contributed to the women's mild disenchantment with academia. Factors such as poor leadership, toxic workplace environments, a commitment to the status quo, and the amount of red tape and "hoops" to jump through disincentivized graduate students' desire to pursue a career in postsecondary AEE, while also causing some faculty to question tenure in the profession. A graduate student said she witnessed *"women navigate this* [the academic system] *successfully, but it seem[ed] a daunting task."*

Operating in a Male-Dominated Discipline

The second major theme to arise from the narrative synthesis of women's experiences in postsecondary AEE was the reality of operating in a male-dominated discipline. The women's experiences in AEE as a male-dominated discipline resulted in three distinct categories describing the reality of *gendered stereotypes and biases, exclusion,* and an *emotional tax.*

The findings of the two preliminary studies suggested gendered stereotypes and biases are still prevalent in postsecondary AEE based on the visceral experiences shared by women faculty and graduate students. The perception of an imbalance of power among genders in the profession was suggested as the discrepancy between a majority female student body and a predominantly male faculty and administration was mentioned often. Women participants also reflected on specific instances they believed they were denied opportunities, responsibilities, or professional respect because of their gender. The traditional male expectations of the profession led some graduate students to feel as though feminine approaches to agricultural and extension education were not valued. *"Agriculture and academia are both male dominated. Some men simply do not treat women as equal, especially smart, accomplished, independent women,"* reported a participant. It was perceived that approaching postsecondary AEE with unique or innovative styles beyond the dominant masculine traditions was a risk women could not afford if they wanted to be successful a leader or achieve tenure in the profession.

Perceived exclusion was another significant barrier for women in postsecondary AEE as a result of operating in a male-dominated discipline. It was common for faculty and graduate students to share personal experiences of being excluded from social and professional networking opportunities by male tenured faculty members. Women faculty were discouraged from attending AEE conferences and cited many instances when female faculty were excluded by male faculty (whether perceived as purposefully or not). The women seemed to resent an invisible standard of the AEE organizational culture that approached professional interactions between genders cautiously and conservatively. One participant described the repercussions of this standard:

> *Male peers of mine have received different treatment, seemingly because of their gender and that they can fit into the "good ol' boys club." It seems that quite a few men in our profession belong to this club with invisible rules, but it does seem advantageous to be white, male, from a rural setting, and [. . .] to be a member of this club . . . it does seem that my peers who have membership in the good ol' boys club have been given preferential treatment compared to myself.*

This synthesis of women's experiences in postsecondary AEE prompted consideration of the heavy emotional tax, or constant state of being on-guard against potential biases, many women were carrying while operating in a male-dominated discipline. Gender biases *"seem to be magnified in this field,"* shared a participant. These perceived biases resulted in women faculty and graduate students feeling the pressure to be *"twice as good"* to avoid being marginalized, overlooked, or disregarded in the workplace. Numerous examples of the faculty and students' professional and technical competencies being actively and passively questioned were shared. As one participant stated, many women learned to *"deal with the patriarchy institutionalized in the system of academia"* in order to handle the frequent microaggressions, sexist comments, condescending remarks, policy violations, and hostile workplace cultures that were a reality of their lived experiences.

Influencing Change in the Profession

The third significant theme of influencing change in the profession helps summarize women's experiences in postsecondary AEE. The change inspired by the women are categorized as

promoting authenticity, challenging systems, empowering women, and *pursuing intentional mentorship.*

In describing their experiences as women in postsecondary AEE, a sense of fulfillment and satisfaction from their work resonated among the participants. Faculty felt a responsibility to represent the profession authentically with honesty and transparency. Graduate students sought increased collaboration opportunities with faculty for their personal and professional improvement. It seemed women in postsecondary AEE valued authenticity in the workplace and yearned to see the profession's organizational culture shift in this direction with more honest and transparent interactions between colleagues and students.

Apparent when synthesizing the findings of the two preliminary studies was the change women in postsecondary AEE advocated for by challenging the existing social system of the profession. Faculty and graduate students referenced a disproportionate representation of women faculty in leadership at the AEE programmatic level and larger level of academia. Cline et al. (2020) purported "*a consensus that postsecondary AEE needed 'more women in leadership positions'*" (manuscript not yet published online in conference proceedings to determine page number). The participants emphasized the need for an increase of tenured women in the profession to serve as positive role models for the majority female graduate and undergraduate students in AEE programs.

> *I have encouraged women to be involved in the development of programs related to leadership and to mentor other women. Our conceptualization[s] of leadership have changed a great deal over the years and are more welcoming to women. However, in our field, change is slow. We need more female role models to show young women that we belong in the profession and that we have important contributions to make.*

Women also tried to use their influence to create a more inclusive work environment by combating a perceived unhealthy level of competition among colleagues in postsecondary AEE. The desire for more collaboration and inclusive networks of professionals demonstrated a need for strategic efforts developed and led by women in AEE at the academic level. The participants consistently challenged more women to pursue leadership roles in order to diversify and change AEE's organizational culture through infiltration of existing systematic structures.

Graduate students and faculty were like-minded with the perceived importance of empowering women to influence change in the AEE profession in the two preliminary studies. However, differences in attitude toward how the empowerment of women in AEE should be approached existed between the studies. The women faculty's perceived need for empowerment among women in the profession appeared pragmatic and slightly jaded, as represented by the frequently referenced Madeleine Albright (2006) quote, *"there's a special place in hell for women who don't help each other."* On the other hand, the graduate students felt the need for empowerment among women in the AEE profession as mandated. "Many students shared a personal policy to *'to uplift other women'* and ascribed to the motto, *'women should empower other women'"* (Cline et al., 2020, 437) Creating a positive work environment, sense of community, and unity among women in the profession were common ways the participants sought to empower women and influence change in postsecondary AEE.

In summary, the mentoring experiences of women in postsecondary AEE were valued and positively described, but a desire for more intentional mentorship among women in the profession was shared. Mentoring was valued by the women regardless of their mentor's gender. Just as the faculty noted the significance of tenured faculty's mentorship in their academic success, graduate students acknowledged the important role encouragement from faculty played in their success during graduate school. However, the graduate students felt reciprocal mentoring among peers was of most benefit to women graduate students during their graduate studies. The faculty also identified the largest need for mentorship to be intentional efforts between new women faculty and more tenured women faculty, without much mention of mentoring graduate students. Conversely, the graduate students agreed on the need for more women faculty at various tenured levels to invest intentionally in the mentorship of women graduate students. Yet, the women from both preliminary studies shared the desire to pursue intentional mentorship as an act of service and means to change the AEE professional experience for women. A graduate student reflected, *"I have had the benefit of excellent mentors, both men and women, who have provided direction and opportunities in my career. I highly believe in paying those experiences forward."* A faculty member shared similar sentiments:

> *I have benefitted from a variety of mentors and friends. People had already walked the path I chose and people who walked by my side down this career path. I do not believe I would have survived, let alone achieved any success at all without their help . . . Truly this has not been a path I walked alone.*

Conclusions, Implications, and Recommendations

In synthesizing the findings through a critical lens, the complexity of the participants' experiences described in this study are acknowledged. No experience of any two women in postsecondary AEE were alike and perceptions varied in the degree they navigated a traditional academic system, operated in a male-dominated discipline, and influenced change in the profession. The perceived challenges to achieve work-life integration and the sacrifice of personal well-being to reach professional success were identified as major barriers contributing to the traditional academic system's lack of attractiveness as a viable, long-term career path for women. Gendered stereotypes and biases were identified as still pervasive in the AEE discipline, with many women either observing or having experienced felt exclusion in the profession by male colleagues. For many women in the profession, the awareness of the impact their gender had on workplace activities and constant need to prove oneself in order to be respected was emotionally taxing. Despite these barriers, many women in postsecondary AEE were committed to changing the organizational culture of the profession. Women in AEE were challenging the male-dominated profession by seeking more leadership opportunities, questioning old workplace policies, supporting women in the pipeline to continue in academia, and pursuing intentional mentorship developed for women in the profession.

This updated profile of women has significant implications for the future of the AEE profession as we strive to build a more inclusive culture among faculty and graduate students. When considering our findings with previous research (Baxter et al, 2011; Enns & Martin, 2015; Foster & Seevers, 2003; Hall & Sandler, 1982; Kleihauer et al., 2013; Murphrey et al., 2016; Seevers & Foster, 2003; Stephens et al., 2018) it appears that although the profession is making progress through increased representation of women in agricultural and extension education, the

organizational culture of AEE does not appear to support gender diversity in the workplace as we well as we had hoped when we began this project. Acts of gender-based marginalization described from previous decades by women faculty are still occurring today, as proven by the similar experiences of women graduate students at the time of this study. One quote from the first preliminary study captured an account of these aforementioned recurring experiences among faculty:

> *A faculty member in the agriculture program told me that I had 'no business being in graduate school, that I would never get a job in the industry, and that I should be a nurse because it was an appropriate job for a woman'. . . He also expressed concern that I was not married already, saying it was his opinion that 'women needed to be serviced at least twice per week in order to be able to think properly.' That is a direct quote, because I have never forgotten it. He used the word 'serviced,' like the service for a stallion or bull.*

In the second preliminary study, graduate students revealed both overt and covert sexist remarks they had experienced and not knowing how to handle them. Women graduate students had been accused of pursuing graduate degrees in agriculture only to "*find a farmer husband"* or having their credibility degraded when implying marital status.

> *I have been approached many times while at professional workshops or industry conferences where individuals automatically assume I am only in attendance because I am with my husband, even though I am not married, and I am there completely on my own.*

We also recognize, as pointed out in many studies (Bilen-Green et al., 2008; Cabrera, 2009; Maher et al., 2004), the concern for gender equity among faculty extends beyond the agricultural and extension education discipline and is prevalent throughout most areas of academia. The answers to addressing this problem are multi-dimensional and complex; we should begin to look outside our departments, and perhaps outside of academia all together, for answers on how to create a more equitable work environment for women. Investigating corporate efforts that have leveled the playing field for women in the workplace may serve as models for our departments to follow.

It is vital the agricultural and extension education profession recognize this cycle and that gender-based discrimination in the workplace has not ceased. Cultural norms of a profession can be both invisible and pervasive, which lend to their continuation from generation to generation in the workplace, regardless of shifts in societal values. As a result, if norms and values of an organization that marginalize or lessen opportunities for an underrepresented group are to change, they must be identified, addressed and mitigated directly by the members. The AAAE membership and leadership should use the findings from this synthesis to critically address why such behavior is continuing to permeate the profession from a systematic perspective. More intention should be focused on including and engaging women (and all underrepresented groups) in *all* levels of the AAAE organization to ensure representation and voice if the agricultural and extension education profession is to move forward toward true inclusion. The women entering the profession appear to have a strong sense of optimism toward the profession and are motivated to influence change; AAAE should capitalize on this shift by providing more

opportunities for young professionals to serve in leadership roles and in spaces where a diverse set of perspectives can be shared.

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Emotional and Psychophysiological Responses During Cognition

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Abstract

Researchers have long recognized the need to consider both the cognitive and affective dimensions together in education (McKeachie, 1976). Metacognitive activity occurs when students consciously adapt and manage their thinking strategies during problem solving and purposeful thinking. There is opportunity in the emerging field of psychophysiological measurement to find reliable physiological response indicators of psychometric constructs. This study was conducted as a pre-experimental, one-group pretest-posttest design. Data were collected in the psychophysiological lab in the Department of Agricultural Education and Communications at Texas Tech University. A repeated measures ANOVA was employed to test the effect of intervention (pretest-posttest), the effect of time (repeated measures), and the interaction effect (intervention X time) for each of the three dependent measures of respiration, skin conductance, and heart rate. Using this culmination of measures, we can accurately depict the connection between human emotion and cognition used within education today. This study was quantitative in nature, with 41 voluntary subjects were selected to measure psychophysiological outcomes from the metacognitive learning strategy of survey, question, read, respond, record, recite, and review (SQ5R). With an overall research intent to measure increased comprehension in student learning strategies within the classroom.

Introduction and Theoretical Framework

In 1983, *A Nation at Risk* identified concerns for education for the future generations of students (Gardner, Larsen, Baker, Campbell, & Crosby, 1983). This education reform agenda called to action a need for deeper learning by students within the classroom. These past efforts in research have contributed to metacognitive strategies that can assist in overall student engagement, knowledge retention, and comprehension of the learning materials.

Even though education has responded to this challenge, it faces on ongoing evolution of an advancing society and adapting student. Our education system was not designed to teach the type of student in today's classroom (Monaco & Martin, 2007). A variety of descriptions have been used to illustrate the emerging differences in learners; such as Generation X (Howe & Strauss, 1992), Digital Natives (Prensky, 2012), and the Net Generation (Tapscott, 2005). While each captures a unique perspective, they confirm students today are experiential learners, multi-taskers, and are immersed in technology (Zheng, Yang, Cheng, & Huang, 2014).

Fried (2013) posited that students learn what is important to them, suggesting there is an emotional connection to learning. Fried further explained that one of the essential elements of

learning included “emotional engagement that allows students to be intrigued, confused, mystified, or upset by the information” (p. 4).

Upon this announcement of a need for research in the area of metacognition, there was a dramatic shift in our educational studies. Students need to cognitively think about their education and be a partner in the building of their own knowledge. Semerari et al. (2003) created the metacognition assessment scale (MAS) to accurately measure cognitive thinking skills, where they argue that metacognition has a modular structure that can be measured through metacognitive thoughts and actions.

Metacognition can be fully defined as one’s own ability to be in charge of their own learning process (McCord & Matusovich, 2013). Studying metacognition in a natural setting can lead to the understanding on how students fully apply these constructs in the classroom.

Bloom distinguished between the cognitive and affective domains of learning (Bloom, 1956). Even so, researchers have long recognized the need to consider both the cognitive and affective dimensions together (McKeachie, 1976; Vygotsky, 1962). The cognitive domain includes knowledge and the development of intellectual skills (Bloom, 1956). The affective domain considers how people deal with learning emotionally; such as feelings, values, appreciation, enthusiasms, motivations, and attitudes (Krathwohl, Bloom, & Masia, 1973). Evidence exists that affect can influence cognition (Boyd, Dooley, & Felton, 2006).

Each level of Bloom’s Taxonomy leads to a higher level of cognitive learning. There are three overall learning domains represented in Bloom’s Taxonomy. The cognitive domain, the affective domain, and the psychomotor domain (Bloom, 1956). Within the area of the cognitive domain, there is a lower and higher level of cognitive learning domain (Gogus, 2012). These learning constructs assist in the overall understanding of metacognition in an educational sense to be utilized by students in the learning process.

Metacognition is commonly referred to as ‘thinking about thinking’ or ‘knowing about knowing’ (Flavell, 1999). Metacognition includes knowing how to reflect and analyze, how to draw conclusions from analysis, and how to apply learning to practice (Noushad, 2008). According to Noushad (2008), “In order to solve problems, students often need to understand how their mind functions. They need to perceive how they perform important cognitive tasks such as remembering, learning and problem-solving” (p 4). Metacognitive activity occurs when students consciously adapt and manage their thinking strategies during problem solving and purposeful thinking. When students become aware of their own learning, they can “manage their own strategies during problem solving and thinking” (Santrock, 2004, p. 248).

One highly effective metacognitive learning strategy is the SQ5R learning technique. SQ5R represents survey, question, read, respond, record, recite, and review. These learning techniques are vital to a highly engaging cognitive learning strategy in the classroom.

The essential need for cognitive load research comes from generational differences with this new generation of students who are exposed to such high volumes of multisensory stimuli throughout their daily lives (Matusz et al., 2015). The effects of cognitive load in the classroom has a

drastic effect on the learning outcome for student engagement. Matusz et al. (2015) discovered that when children and young adults are exposed to multiple stimuli, the learning outcome is substantially decreased. Therefore, we can conclude that educational materials should be concise as well as age appropriate for their intended audiences when looking at the cognitive load of students in a classroom setting (Matusz et al., 2015).

The most common approaches to measuring metacognition have been subjective beliefs about cognition (Fleming & Dolan, 2012). Questions about the accuracy of the psychometric approach to measuring metacognition have led scholars to call for a systematic comparison of measures of awareness (Sandberg, Timmermans, Overgaard, & Cleeremans, 2010). A number of theorists have asserted that cognition is a necessary element of emotion (Lazarus & Folkman, 1984; Frijda, 1994; Roseman, 1984; Scherer, 2005). There is opportunity in the emerging field of psychophysiological measurement to find reliable physiological response indicators of psychometric constructs.

The Schacter-Singer Two-Factor Theory of emotion (Schachter & Singer, 1962) posits emotions are the result of two factors: physiological response and cognitive labeling. According to the theory, these two factors occur as a result of an arousal and occur simultaneous but independent of each other. In a classic example, when an arousal is encountered (ex: snake), there is a physiological response (heart pounding, sweating) and a cognitive label process (thoughts of "I'm scared"). The resulting emotion is fear. (Lumen)

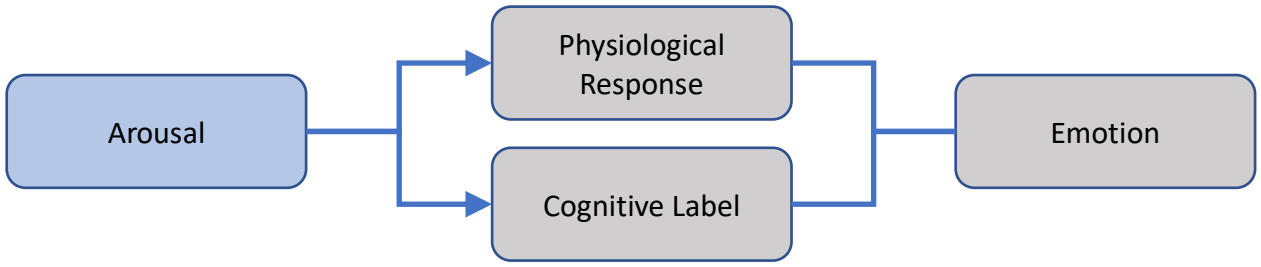

Figure 2. Schacter Singer Two-Factor Theory of Emotion.

Cognitive performances can be affected by emotional responses (Cohen et al., 2015). By analyzing the relationship between cognitive tasks conducted by a participant, because of an arousal, followed by an emotional response outcome, we can depict the overall cause and effect relationship between these principles. Cohen et al. (2015) use a model of a simulated 520-day Mars mission on participants to depict the cognitive demands needed and the emotional responses based on these circumstances. While being well beyond the cognitive demands of the classroom, we can analyze the general principles of the correlation made between these overall ideas.

Task performance is a high arousal pressure. Especially for high achieving students. The ability to prioritize and focus on the task at hand allows a student to succeed on the cognitive demands that are needed for student success. The emotional responses that are an outcome can be

measured through the field of psychophysiology. Using skin conductance, heart rate, and respiration rate, we can analyze the outcome of a cognitive arousal, measure physiological responses, identify the cognitive task that was needed to complete the task, and place a value on the emotional response as an outcome.

Purpose and Objectives

This study addresses the American Association of Agricultural Education National Research Agenda (2016-2020) Research Priority 4: Meaningful, engaged learning in all environments. The purpose of this exploratory study was to explore the psycho-physiological response during a meta-cognitive reading exercise. This study was guided by the following objectives:

1. Describe time spent reading both before and after a metacognitive intervention.
2. Describe emotional engagement during reading both before and after a metacognitive intervention.
    - H_{O1} There was no significant main or interaction effects of intervention or time in respiration (arousal)
3. Describe arousal during reading both before and after metacognitive intervention.
    - H_{O2} There was no significant main or interaction effects of intervention or time in skin conductance (emotional engagement)
4. Describe attention during reading both before and after a metacognitive intervention.
    - H_{O3} There was no significant main or interaction effects of intervention or time in heart rate (attention)

Methods and Procedures

This study was conducted as a pre-experimental, one-group pretest-posttest design. In this design "differences attributed to application of the experimental treatment are evaluated by comparing the pretest and posttest scores" (Ary, Jacobson, Sorensen, & Walker, 2014, p. 326). It is important to recognize the limitation of this design. Ary et al. (2014) describe this design as weak because of a lack of ability to control for extraneous variables. The large amount of data collected were reduced to deviations from the baseline measures at designated points of time across the data collection period. This time-series design allowed for a repeated measures ANOVA to analyze the data.

The target population for the study was college students. The target sample of 40 was set and students from Texas Tech University were recruited to participate in the study. The students were randomly assigned to one of four conditions based on the order of reading passages.

Data were collected in the psychophysiological lab in the Department of Agricultural Education and Communications at Texas Tech University. Individually, students were briefed about the procedures and consent was obtained. Electrodes and transmitters were attached to the participant and baseline measures were taken during calibration. The experiment began with pre-intervention data collection occurring during the reading of a difficult reading passage (pretest). At the conclusion of the reading, participants were asked three questions about the reading passage. Participants then watched a video describing the SQ5R reading strategy (intervention) and asked to apply the SQ5R strategy during the second reading passage. The

SQ5R strategy consists of survey, question, read, respond, record, recite, review. Data were again collected during the reading of a second difficult reading passage (post-intervention). Finally, participants responded to three questions about the second passage.

Figure 3. SQ5R Metacognitive Strategy

Physiological response data were collected using BioPac transmitters. Respiration (arousal) was measured with a respiration strap placed external to the participant clothing just above the nipples. Skin conductance (emotional engagement) was measured by two electrodes placed on the palm of the left hand. Electrocardiogram heart rate (attention) was measured by electrodes placed on the left and right forearms and the left wrist. All data were recorded in the BioPac AcqKnowledge software while the timeline and delivery were controlled by Tobii Pro software.

The data were analyzed as a whole, not for individual participants. Data were reduced to time intervals and were represented as baseline deviations at the given time interval. A repeated measures ANOVA was employed to test the effect of intervention (pretest-posttest), the effect of time (repeated measures), and the interaction effect (intervention X time) for each of the three dependent measures of respiration, skin conductance, and heart rate.

Findings

Objective One

The first objective was to describe time spent reading both before and after a metacognitive intervention. Table 1 shows the means and standard deviations of time-spent reading. The mean time spent reading during the pre-intervention exercise was just under 72 seconds (SD = 22.30). In contrast, time spent reading after the intervention increased to just under 142 seconds (SD = 63.69). The time spent reading the difficult passages increased dramatically after the SQ5R intervention (see Table 1). The sample average time spent nearly doubled from the pretest reading (*M* = 71.95) to the posttest reading (*M* = 141.92).

Table 1
Time (Seconds) Spent Reading Difficult Reading Passages

Observation	Mean	Standard Deviation
Pre-intervention	71.95	22.30
Post-intervention	141.92	63.69

Objective Two

The second objective was to describe emotional engagement during reading both before and after a metacognitive intervention. Emotional engagement during reading, pre and post-test, measured

using Skin Conductance. Table 2 shows the means and standard deviations for the time trial of skin conductance pre and posttest and the first six, five-second time cycles. The pre-test means display a repeating, alternating pattern of decreasing then increasing. The means were highest pre-test in the first and sixth cycle. The post-test means display a similar repeating, alternating pattern.

Figure 4 illustrates the estimated marginal means for skin conductance, pre-test and post-test over six, five second time cycles. For both pre-test and post-test, there was a decrease within the first time cycle with an increase between the second and fifth time cycle. In the sixth time cycle, there is a decrease for post-test and an increase for pre-test.

Table 2
Skin Conductance During Pre and Post Test In 5 Second Time Cycles

	Pre		Post	
Time Cycle	*M*	*SD*	*M*	*SD*
1	-.17	2.36	-.02	3.23
2	-.62	2.69	-.36	3.74
3	-.48	2.12	-.21	3.22
4	-.39	1.78	-.05	2.98
5	-.27	1.91	.07	3.13
6	-.21	1.95	-.08	3.09

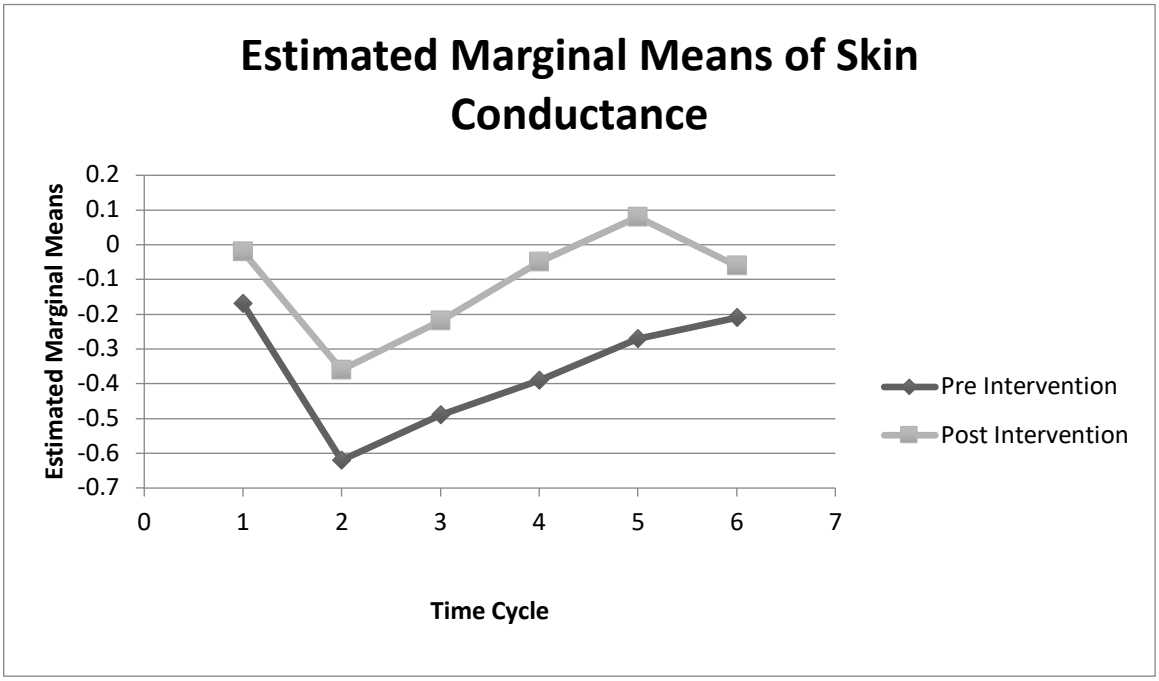

Figure 4. Baseline deviations of skin Conductance over time and intervention.

A repeated measures ANOVA was conducted on skin conductance (emotional engagement). The null hypothesis stated there was no significant main or interaction effects of intervention or time in skin conductance (emotional engagement). The alpha level was set *a priori* at .05. The effect of intervention ($F_{1,37} = .44$) was not significant ($p = .513$). The effect of time ($F_{2.18,80.55} = 1.72$) was also not significant ($p = .183$). The null hypothesis was not rejected. There was no significant main or interaction effect for intervention and time on skin conductance (emotional engagement).

Objective Three

Objective three sought to describe arousal during reading before and after a metacognitive intervention. Arousal during reading both before and after was measure by respiration. Table 3 shows the means and standard deviations for the time trial of respiration pre and post-test over 5 second cycles. Mean scores for pre-test displayed an increase after the first and fourth time cycle. Pre-test means initially increase before a decrease after the second and third time cycle. Similarly, post-test means increased after the first time cycle.

Figure 5 shows the estimated marginal means for respiration, pre-test and post-test. For both pre-test and post-test, there was an increase within the first time cycle. For the pre-Test, there was a decrease in the second through the fourth time cycle, an increase in the fifth time cycle, and finally a decrease in the final and sixth time cycle. For the Post-Test, there was a repeating, alternating pattern beginning with an increase in the first time cycle, a decrease in the second time cycle, following this pattern and ending with a final increase in the sixth time cycle.

Table 3
Respiration During Pre and Post Test In 5 Second Time Cycles

	Pre		Post	
Time Cycle	*M*	*SD*	*M*	*SD*
1	-1.56	4.28	-.79	4.84
2	.89	2.97	1.85	4.06
3	.42	2.41	1.41	3.85
4	.26	3.54	1.51	3.83
5	.64	3.26	1.43	3.68
6	.55	2.87	1.52	3.63

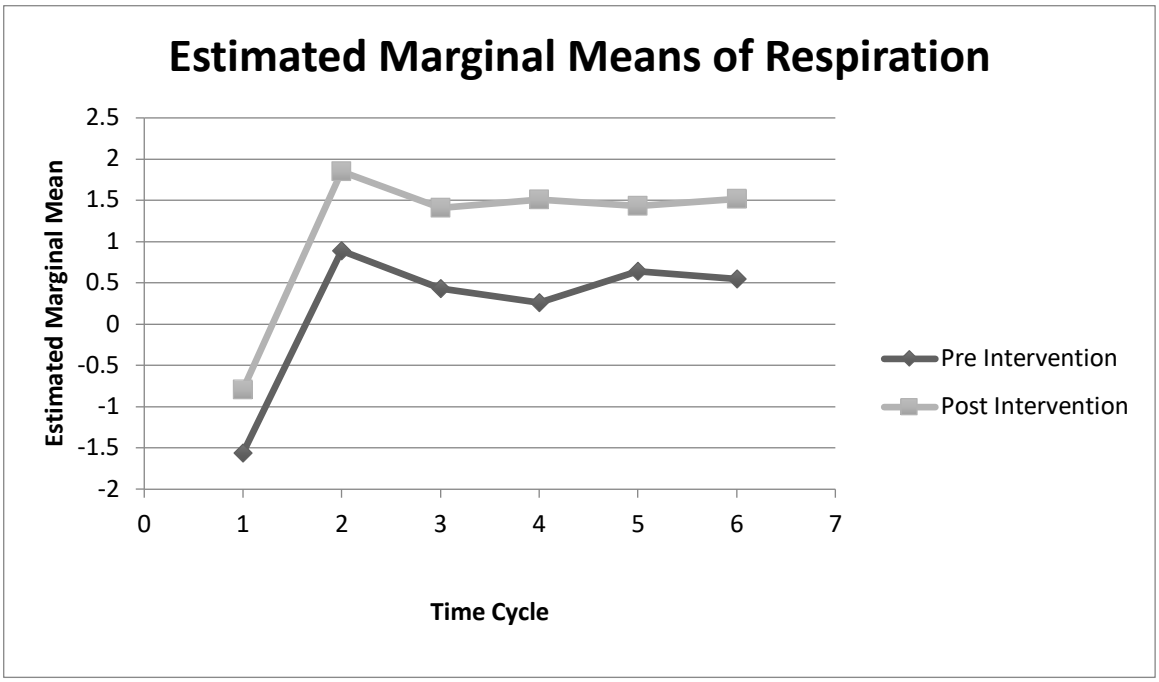

Figure 5. Baseline deviations of respiration over time and intervention.

Table 4 displays the repeated measures ANOVA findings for respiration (arousal). The null hypothesis stated there was no significant main or interaction effects of intervention or time in respiration (arousal). The alpha level was set *a priori* at .05. The effect of intervention ($F_{1,37}$ = 6.02) was significant (p = .019). The effect of time ($F_{5,123.88}$ = 6.34) was also significant (p = <.001). The null hypothesis was rejected. There was a significant effect for both intervention and time on respiration (arousal).

Table 4
Repeated Measures ANOVA of Respiration for Time over Pre-Post Intervention

Source	*SS*	*df*	*MS*	*F*	*p*	ω_p^2
Pre-Post Intervention						
Within Groups	104.16	1	104.16	6.02	.019	.11
Error	639.47	37	17.28			
Time						
Within Groups	324.66	5	64.93	6.34	<.001	.17
Error	1895.43	123.88	15.30			
Pre-Post Intervention X Time						
Within Groups	2.84	4.42	.64	.24	.929	-.02
Error	436.71	163.39	2.67			

Objective Four

Objective four was to describe attention during reading both before and after a metacognitive intervention. Attention was measured using heart rate. Table 5 shows the means and standard deviations for the time trial of heart rate, pre-test and post-test over five second cycles within the first six cycles. The means pre-test decreased after the second, third, and fifth cycle, increased after the first, and fourth time cycle. The standard deviation for the pre-test decreased after the first, second, fourth, and fifth time cycle and increased after the third time cycle. During the post-test, the means increased after the first, third, and fifth time cycle, and decreased after the second and fourth cycle. The standard deviations for the post-test continually decreased.

Figure 6 represents the estimated marginal means of pre and post-test of heart rate. During the pre-test and post-test, the marginal means first increased in the first cycle, decreased in the second time-cycle, increased in the third time cycle, and finally decreased within the fifth and sixth cycles. Participants were also asked to rate their previous knowledge of the materials prior to reading the passage. Then following the completion of the study, participants were asked, to what extent did they utilize the SQ5R reading strategy.

Table 5
Heart Rate During Pre and Post Test In 5 Second Time Cycles

	Pre		Post	
Time Cycle	*M*	*SD*	*M*	*SD*
1	-27.18	48.64	-32.45	44.17
2	-8.80	35.63	-19.08	33.21
3	-13.31	41.13	-21.78	36.62
4	2.26	41.84	-6.94	39.04
5	-12.42	40.00	-17.97	38.10
6	-21.62	40.35	-23.49	42.38

Figure 6 illustrates the deviation scores for respiration by pre and post observation and by time series. While both observations began with a slightly negative deviation, both indicated a peak and trail pattern. The post-intervention observation was higher at all points.

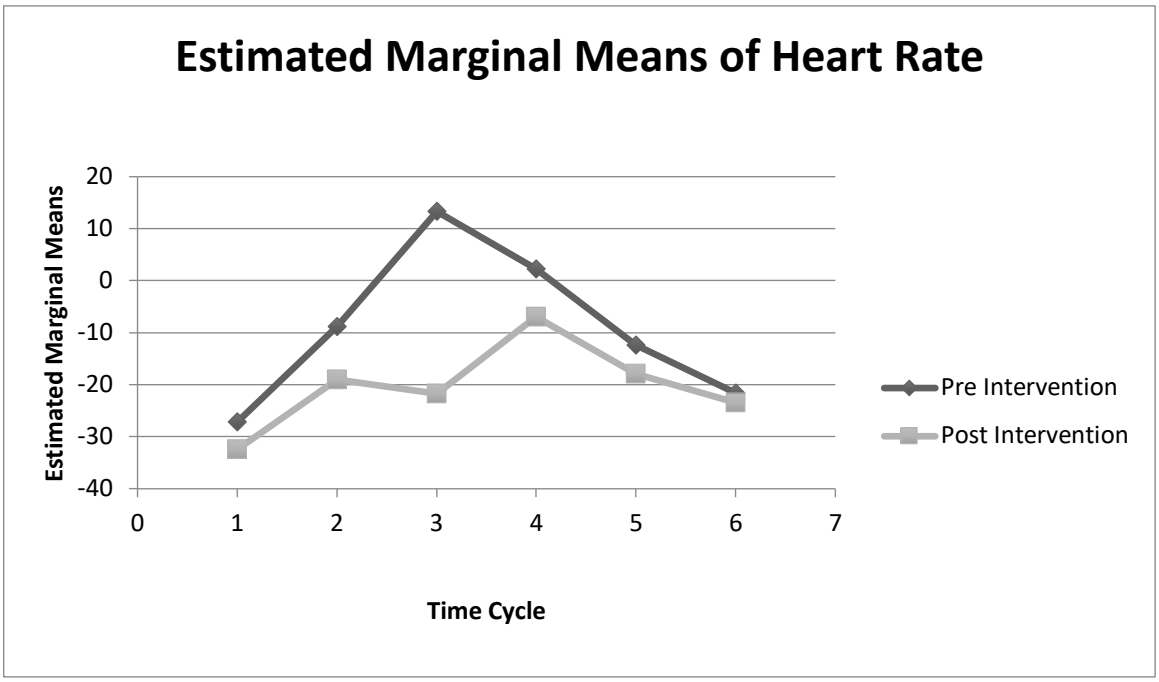

Figure 6. Baseline deviations of heart rate over time and intervention.

Table 6 displays the repeated measures ANOVA findings for heart rate (attention). The null hypothesis stated there was no significant main or interaction effects of intervention or time in heart rate (attention). The alpha level was set *a priori* at .05. The effect of intervention ($F_{1,37}$ = 7.38) was significant (p = .010). The effect of time ($F_{4.45,164.76}$ = 2.34) was not significant (p = <.001). The null hypothesis was rejected. There was a significant effect for intervention but not for time on heart rate (attention).

Table 6
Repeated Measures ANOVA of Heart Rate (Attention)

Source	*SS*	*df*	*MS*	*F*	*p*	ω_p^2
Pre-Post Intervention						
Within Groups	5235.29	1	52345.29	7.38	.010	.14
Error	26256.89	37	709.67			
Time						
Within Groups	32153.59	4.45	7220.89	2.34	.051	.03
Error	508195.18	164.76	3084.54			
Pre-Post Intervention X Time						
Within Groups	928.00	5	185.60	.44	.765	-.02
Error	78378.64	135.87	576.89			

Conclusions/Recommendations/Implications

Research has shown there is greater comprehension with the use of a metacognitive strategy (Sanacore, 1984). When analyzing the differences of means and standard deviations of time spent reading the first passage and second reading passage, the average time spent reading the first passage was 71.95 seconds (*SD* = 22.30). The average time spent reading the second passage was 141.92 seconds (*SD* = 63.69). Students took more time to process after the intervention. The SQ5R metacognitive strategy required more focus. Therefore, we would expect to see the time spent, psychophysiological measures, and scores to be consistent with this.

Emotional engagement during this study was measured by skin conductance. Regardless of the pre-post intervention, initial drop was followed by steady recovery. Potter and Bolls (2012) suggests encountering specific stimuli evokes emotional engagement. The specific stimuli presented in this study had no effect on emotional engagement.
The first null hypothesis was there was no significant difference on emotional engagement before an intervention and after. Emotional engagement was not an indicator of changes in metacognition. According to Potter and Bolls (2012), the eccrine sweat gland should respond to cognitive processing. This presents questions about the type and duration of stimuli necessary in a laboratory setting to evoke an emotional engagement response.

Arousal was measured using respiration. Both pre and post-intervention scores displayed a rise within the first cycle. As explained by Wienjtes, mental tasks can influence arousal. The second null hypothesis was there was no significant difference in arousal before an intervention and after. Arousal changed over the course of time. According to Wientjes, stressful mental tasks can affect responses like arousal (Wientjes, 1992). Therefore, the mental tasks presented in this study had an effect on arousal.

Attention was measured by heart rate. Heart rate is the most common measurement to analyze cognitive processing (Potter & Bolls, 2012). During both, pre and post-intervention, there was a steady increase displayed. The initial start of the pre- and post-intervention increased interest and attention. According to Potter and Bolls (2012), fluctuation of heart rate represents higher cognitive processing. The constant fluctuation in the post-intervention suggests there was greater cognitive processing and attention post-intervention than pre-intervention. The third null hypothesis was there was no significant difference in attention before an intervention and after. There was a significant difference between pre and post test on attention. As explained by Potter and Bolls (2012), cognitive tasks such as visual attention and mental imagery has an effect on attention.

In order to use metacognitive strategies in the most effective way, the strategy should be discussed, modeled, and practiced (Block & Parris, 2008). By allowing a student to discuss, model, and practice a metacognitive strategy, a learner may have better control, which enhances the reasoning process and comprehension (Karbalaei, 2011).

It may be beneficial to allow a longer amount of time for the educator to instruct the learner how to use the strategy, students to model the metacognitive strategy and the student to practice it before using it in a testing method. The subjects saw a 4:02 minute video that explained the SQ5R metacognitive strategy and how to implement it into the post-test treatment. It is important to allow students to continually practice the strategy to ensure use of the strategy (Shaughnessy, Veenman, Kleyn-Kennedy, 2008). In addition, metacognitive strategies should be implemented into the teaching methods and guidelines. Metacognitive strategies promote comprehension, retention, and could improve student achievement.

This research study utilized SQ5R in a research setting. By implementing the SQ5R strategy in a classroom setting, understanding the role of the strategy in a live setting could alter the results on psychophysiological measures. Therefore, a different learning environment and change in surrounding could be a factor on the effect of SQ5R.

Further research should be conducted to explore other metacognitive strategies and how they affect attention, emotional engagement, and excitability. This could give awareness on how varieties of metacognitive strategies can affect biological process and how affective they can be. In addition, this could help with additions to teaching strategies and techniques for students. If future research uses the SQ5R metacognitive strategy, studying emotional engagement should be omitted. Emotional engagement was not affected by the SQ5R metacognitive intervention specifically. Therefore, other biological processes or measures, such as facial muscle movement, can used to test metacognitive strategies. In addition, further research should be conducted on alternative metacognitive strategies to test if they affect emotional engagement.

The video in this research study only present 4:02 minutes of information. Therefore, it is recommended to continue analyzing arousal, emotional engagement, and attention with a longer intervention video or face-to-face treatment with application beyond the study. By allowing more time to present information, the subject could learn more about using the strategy effectively.

Finally, the researcher extracted the first six, five-second time cycles pre- and post-intervention. Essentially, this was the first thirty seconds for both. For future research, there should be more time-cycles extracted from the data. This could conclude different or more fluctuations for attention, arousal, or emotional engagement.

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Reframing AgriCULTURAL Experiences and Narratives for African American Youth: A Study of Community-based Program Leaders' Perspectives

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African Americans' educational experiences differ from their White counterparts and other minority groups in terms of opportunities to pursue agriculture and related STEM fields. In addition, agriculture has a negative connotation amongst African Americans. Community-based agricultural programs, however, have engaged this specific population in agriculture and STEM education. These programs can be viewed through the theoretical framework of social and cultural capital. In this multi-case study, eight leaders of agriculture and STEM focused, African American-operated, community-based programs were interviewed to explore their motivations and the need for their programs. Program leaders expressed the need for agricultural education for cultural purposes but also as ways to afford opportunities for youth to grow professionally and to physically grow their own food. A primary theme that came across all participants was the ability to have control of their circumstances and develop their communities through the teaching of hands-on agricultural practices.

Introduction and Theoretical Framework

Agriculture-related organizations, including the American Association for Agricultural Education, address issues of diversity and inclusion by asking questions such as "What strategies are effective in recruiting diverse populations into agriculture and natural resource careers?" (Stripling & Ricketts, 2016, p. 31). African Americans are underrepresented in agriculture and, for example, earned only 3.47% of U.S. postsecondary degrees in agriculture in 2017 (Data USA, 2020) while representing ~14.6% of 18-24 year-olds (Harper & Simmons, 2019). Similarly, only 4.2% of FFA members in 2018 were Black (National FFA Organization, 2020). Family, community, and educational experiences influence African American adolescent career development (Bounds, 2017). Perceptions of agriculture careers being limited to "farming" (Conroy, 2000; Fraze, Rutherford, & Wolfskill, 2011) are compounded for African Americans by associations with slavery and sharecropping (Brown & Scherer, 2018; Outley, 2008; Jordan, 2014) and lack of elders to foster new generations of farmers (Gilbert, Sharp & Felin, 2001). Also, scholars have established that histories and cultures of students of color have been undervalued, misinterpreted, or omitted from formal educational settings (Delgado Bernal, 2002).

Creative and passionate leaders have made progress in developing communities (Borrup, 2006) and community-based programs are engaging youth in activities to promote social change and provide education (Christens & Dolan, 2011; Kirshner, 2009). Agriculture can be a component of this work in urban and rural contexts (Ohmer, Meadowcroft, Freed & Lewis,

2009). To address issues of food security and food deserts, community gardens have been used as an integral part of local food production (Eanes & Ventura, 2015) and as sites for science learning and skill development for urban youth (Krasny & Tidball, 2009). While this work has predominantly been documented within majority White areas (Ohmer et al., 2009), community activists and educators also provide spaces for African American youth to engage with agriculture and community development. Our study is an important first step in documenting the work that is already being done in African American communities and sharing the collective expertise of program leaders with the broader agricultural education community.

In this study, Bourdieu's (1986) description of social and cultural capital is used to investigate what affordances community-based programs provide for African American youth's awareness of and interest in agricultural and STEM career options. Bourdieu's concept of social capital was centered around social class and other forms of inequality that are socially reproduced (Bourdieu, 1986) with little consideration for one's racial and ethnic background. Subsequent scholars have examined capitals in association with one's racial and ethnic identity and distinguished capital as dominant and non-dominant (Lamont & Lareau, 1988; Carter, 2003). Carter (2003), used the term "dominant cultural capital" to correspond to Bourdieu's conceptualization of high-status cultural attributes, codes, and signals (p. 138). Carter (2003) made the argument that African American students lower their aspirations for school because they believe that only Whites are capable of succeeding academically. In conjunction, Ogbu (1988) based differences in capital values as going beyond social, economic, and political conditions, and directly inserted racial and ethnical differences. For example, African American youth culture is not valued as "dominant" capital; thus, gaining cultural capital for successful career explorations occurs in other spaces.

Bourdieu (1986) conceptualized social capital as access to institutional resources and suggested that if one has prestigious and well-developed networks, then one would also have more social capital. Emdin (2016) used Bourdieu's generalization of shared capital being based on one's background and experiences. He also included Coleman's (1988) definition of dense networks as tight knits and bonds of human beings that share the same social capital to represent how youth's bonds are strengthened by their shared frustrations of traditional schooling. Such networks are then turned into social capital, which can be dominant in certain spaces where it is valued, such as community-based programs. For example, Glover (2004) described community gardens as vehicles to deliver social capital, because they bring people together. Urban African American youth, however, are unlikely to have social networks related to agriculture that are as easily assessable as their rural, white counterparts in FFA. This results in African American youth from inner cities needing to access dominant capitals to impact their career explorations in STEM and agriculture. Using Bourdieu's theory as an analytical frame, we can view agricultural education, within community-based organizations with majority of their participant's being African American youth, as an alternative learning experiences to get African American youth involved in agriculture and STEM education.

Purpose and Research Questions

The purpose of this study was to investigate the structure of community-based programs that address agriculture and STEM through the lens of program leaders in order to gain insight

on best approaches to encourage and support African American youth to pursue careers and studies in agriculture and STEM. Research questions are:

1. What are the program leaders' motivations to create a space for African American youth to learn and engage in agricultural and STEM practices and professional opportunities?
2. How do program leaders of agricultural and STEM educational community-based programs view their activities in relation to the traditional classroom experience of African American youth?
3. From the perspective of program leaders, how are agricultural and STEM educational community-based programs and their activities providing forms of social and cultural capital to steer youth participants' interests in agricultural and STEM studies and careers?

Methods

In this research, the nature of how one views their work in relation to the purpose of the organization or program they are serving was explored through a critical paradigm by preforming qualitative research (Denzin & Lincoln, 2011) with a multi-case design (Yin, 2014). Critical theorists focus on realities that are mediated by power relations that are socially and historically constituted (Denzin & Lincoln, 2011).

Case and Participant Selection

Potential cases (programs) were identified through purposeful sampling, including word of mouth referrals. Cases were selected through a formal case study screening procedure guided by set criteria (Stake, 1995). Programs included in this study were community-based (non-formal learning environment, separate from formal curriculum, programming not provided by school district), established (operating for at least 1 year), target underserved (signaled by terms such as "at risk" or "low-income") African American (at least half of the population served) youth (ages 2-20), and focus on agriculture and STEM education. This screening was conducted by reviewing online resources, such as news articles and websites, and making phone calls. Within each selected case, program staff were asked to identify someone in the organization with decision authority and/or direct responsibility for the program (Greene, 2005).

Instrumentation and Data Collection

We utilized multiple sources of evidence to enhance understanding of individual cases (Yin, 2014). Interviews were the primary data source for the study. The interview was a standardized open-ended interview (Patton, 2015), using an interview guide that included standard questions developed from the theoretical framework and literature supplemented by questions tailored to the specific case. Interviews were 30-60 minutes in length, conducted in person or via telephone, audio-recorded and transcribed by the researcher, and member checked. Materials on the design of the program (e.g. objectives, lesson plans, itineraries) that were not gathered in the screening process were collected from websites and/ or program staff.

Data Analysis and Trustworthiness

A line by line coding process was used for analysis of interview transcripts. Program materials did not have a full textual analysis, instead were used for triangulation and development of detailed descriptions of what occurred in the programs. Analysis was guided by social and cultural aspects included in the program's activities, the programs' structure, and program leader's motivations, along with the research questions and a priori propositions. The concepts of social and cultural capital from the interviews and documents were used in the development of the coding scheme. In addition, emergent themes were generated based on open codes (Miles & Huberman, 1994). Next, codes were grouped into focused codes and a code book was developed. Peer debriefing sessions of the initial codes helped form categories directly from the data collected. This investigator triangulation (Stake, 1995) was established by having a research group session with peers. A group of five researchers added multiple perspectives to enrich the proposed themes (Atkinson and Delamont, 2005; Creswell, 1998). Cross-case analysis was then performed by conducting second-cycle coding using focused codes in Atlas.ti. Final themes and subthemes reflect commonalities found across multiple cases. Credibility was addressed through double-checking themes and making sure that the results reflect the data and not researcher interpretations during debriefing sessions (Lincoln & Guba, 1985). In addition to double checking transcripts (Creswell, 2014), all steps in the data collection and analysis process were documented (Yin, 2014). The interpretation begins with one's background and the assumptions they may bring to the study (Creswell, 2014). The primary researcher has been involved in agriculture and social justice focused community-based organizations. Potential for bias was addressed in the study by including self-reflection and memoing in the research process.

Study Participants and Program Descriptions

Eight programs were included in the study. Descriptions represent their roles at the time of data collection (Spring, 2018). Pseudonyms were used for participants and their organizations.

Arionne, Founder/ CEO, LLC Farm. Arionne is a business owner of many hats, as she describes "I am a community organizer, public relations practitioner and community development practitioner, as well as a master gardener, and urban farmer". With all these roles, she serves as multiple role models for youth in her programs that are located at two schools within urban communities. Arionne has one program located within the area that most of her students reside in, whereas the other program is situated within the community where the youth participants attend school but do not live. Both programs engage African American youth in urban gardening activities which are now developed into small networks of gardens and local farmers to form markets and alternative revenue streams. The programs operate throughout the year, afterschool and during the summer.

Roger, Executive Director, FruitPicks. Roger is the son of the founder of the 30-year-old program FruitPicks. Originally a rural farm, Roger's father founded a non-profit for youth to expand the farm operations to teaching. Roger runs student after school tutoring programs, educational field trips/ tourism, and a summer academy. FruitPicks serves a wide range of youth from different backgrounds, but there are specific routes and funding set to engage youth from low-income areas and low performing schools. At the farm the youth are engaged with various

outdoor activities. There are small facilities within the city where urban gardening is being implemented by the youth. FruitPicks includes an annual career day and college tours.

Shavon, Founder, JustFree School. JustFree School is in an urban community that has been identified as a food desert, low-income, and underserved. The program has been in existence for two and a half years, increasing student's performances in school and sending students home with agricultural prizes from the state fair. JustFree School takes place during the summer and after school for all young people within the community. The program takes place at a community church where a small plot of land is granted to the youth to garden and the church's halls and kitchen are used as classroom space. JustFree partners with a local non-profit organization with a mission to direct youth to college careers through community engagement and social justice awareness. Throughout the year the program involves youth in practices of gardening and farming and the school hosts three annual farmer's market programs where the students can sell their produce and value-added products.

Que, Farmer. Que is a farmer that has decided to provide gardening skills to youth that have to serve court orders of community service. With this targeted population, Que does not only serve African Americans but, due to his location, the youth in his program are predominantly Black. Students shadow him on the farm, which is located outside the city, to plant and harvest and the youth to follow him to sell what is harvested. Que make it point to teach the youth skills, so he teaches them about adding value to the crops. Que teaches the youth about the unique topography of the land and sustainable practices to grow in such climates. Que also emphasizes historical lessons behind food and its production.

Tanisha, Program coordinator and co-founder, FoodFighter. Tanisha one of the co-founders of a private charter school the program coordinator of their FoodFighter gardening program. The school and program are 10 years old and serve Black urban communities. FoodFighter was created to engage youth in community development activities and to help provide food for the community. The program is located in the city serving youth from low-income and underdeveloped communities and also has a 70 acre farm that is located outside the community. The program operates at various locations; church, schools, and community centers throughout the city. Throughout the year the students grow, deliver, take orders, and build gardens throughout the city. Students are heavily engaged with African principals as a form of discipline and order and African American history as a motivator.

Taron, Founder, new 501c3. Taron is expecting to file for his own 501c3 soon as he wishes to gain more funding to implement more community gardens in underserved and low-income communities. Taron started his work by taking advantage of the capital he saw in the community such as abandoned sidewalks and turned them into gardens. Through this work he recruited young men from the streets. Eventually, Taron made such efforts "cool" and more youth became involved. As a leader in the community, Taron educates the youth with hands-on and outdoor lessons. His program has been running for about five years. He partners with local non-profits in the area for knowledge exchanges and guidance. The program operates during the day, after school, and during the summer. Gardens are in the city and Taron has access to land outside of the city for further educational opportunities in farming, such as beekeeping.

AJ, farm employee. AJ, originally involved in social justice and restorative justice activism, decided to work with youth because he saw the need to empower communities where Blacks live. AJ is a new employee on farm that has been in operation for more than 5 years. AJ's youth program operates during the school year and the summer. Throughout the year students maintain urban gardens that are throughout the city and then return to the farm, located in the suburbs of the city, to grow and harvest mass crops for sale. Students engage in agricultural and STEM education through the work they perform such as building raised beds and planting seeds. AJ serves African American and Brown youth that are underserved and labeled "at-risk". However, youth that are passionate about community development and social change are also involved in the agricultural and gardening program.

Jamaal, Founder/CEO, Back to Your Roots. Jamaal purchased an operating farm that he turned into an afterschool and summer program that has been running for three years. As an agricultural teacher, he wanted to expand learning outside the classroom and deliver practical skills to young Black males. Jamaal's school, "Back to Your Roots" now serves both boys and girls and is grounded in African and African American principles and history. Jamaal's farm and the students he serves are located in smaller but modern rural areas. The youth that Jamaal serves are underserved within the community and the school system. At Jamaal's farm the youth raise livestock and grow crops for the community to eat and learn about sustainable practices.

Results

Generational Guidance

Elders were an important aspect of the motivations of participants in this study.

Leaders received guidance and education from elders in their family. We found elders to be major influences for the program leaders. Roger described his father as the foundation to his role today "What led me to this work in particular is that my father started the farm." Early childhood influences introduced agriculture as a source that can generate resources for the community and to also sustain the land. For example, Tanisha described her exposure to agriculture at an early age and the practice of learning while doing alongside of experts, her elders.

> I always spent my time with my grandparents and great grandmother, they weren't farmers but my grandparents grew everything that they primarily ate. They had chicken, big gardens, no cows, but occasionally there was a hog. But just those experiences from maybe 5 years to 13 years had a deep impact on my life. Just being in that rural environment and always being out in nature helping the great-grand mother and grandmother with any harvesting and planting that had to be done, and always remembering that the food we ate were fresh from the garden and the chicken. And sitting and talking with the great and grandmother and learning how to can. (Tanisha)

Leaders serve as an elder influence for the youth. Program leaders also articulated that they were helping guide youth by introducing them to agricultural practices and community

development. For example, Roger frames his role in the program as way to offer his skills and provide opportunities for youth:

> [I've] been working in the community for about 16-17 years. Related to food justice, food access, but mainly my focus has been on youth education and development....What led me to this work in particular is my father started the farm...It was never my goal to pursue this career but when I saw the need and that I had some skill and temperament for the kids, and working with the kids, and a desire to help them achieve their goals that is what kind of led me to this field. (Roger)

Changing the Condition of African American Communities

Many of the program leader's motivations revolved around the idea of community activism and empowerment to create change in underserved communities. Whether the conditions of the community require health, spiritual, educational, or life skills development of the people, program leaders wanted to help develop communities where Blacks convene.

> As a Black American that came here from the diaspora I wanted to reach a particular folk. I feel that being in touch with the land is healing and I always wanted my work to be concentrated in a community that I am a part of, aligned with, and culturally adjacent to. (Arionne)

Furthermore, AJ had a background in community advocacy and saw agriculture as a way to provide one with power and control of their community and environment.

> I started doing what I do 'cause I was involved in a lot of political activism and Black Lives Matter and like police stuff. And I thought "it has to be a better way than marching in the streets." Which isn't bad but it's like I needed a better strategy and I felt like growing food could really empower people. If you start looking around, you'll see that there is no nutritional value in neighborhoods, no fruit trees. All your food ships thousands of miles away from you… You have no connection to it. (AJ)

These factors are why they are educating youth who have been seen as powerless or worse in the Black community; they are seen as criminals. To prevent or change such trajectories, community-based programs are critically analyzing the pipelines that have been set for Black youth and in places where agriculture has demised.

Black Culture

Black culture can comprise of anything that is related to African American norms, however, in this paper Black culture is related to historical events and narratives that have kept African Americans out of agriculture and STEM. Reframing the image of agriculture, science, and nature are done through cultural teachings and historical lessons of Blacks in agriculture and the science.

Reframing Blacks in AgriCULTURE. Programs are providing education that includes historical reference of Black greatness for children to model, and as a way to reframe African Americans in agriculture. Taron describes the mission of his program as "to change the narrative

of agriculture for our people, the adults, and especially for the younger people." Program leaders expressed that the culture and history of Africans and people of visual African descent are at the center of the teachings at the farm and in their programs. This cultural identity is even taught as a source of discipline from proverbs and principles rooted in African traditions. For example,

> Our program is grounded in the 7 principles of Kwanza...So teaching our children who and what they are, and teaching them the greatness of who we were will only allow them to have the vision of the greatness of who they can become. Using that as a frame to help them understanding of who we are and food. (Tanisha)

All participants spoke of slavery being the core reference of agriculture by youth. All program leaders concluded that agriculture itself had to be reframed in all aspects such as environmental justice, food systems, and STEM education as a tool for solutions. It is clear that the program spaces encourage culture in the education process by addressing history and what the future can look like around agricultural practices.

> We wouldn't be who we are today without cotton that was the whole money system. It is from cotton, it came from agriculture, it came from sugar cane and tobacco, so it's…my goal to re-narrate how people feel about agriculture especially in the black community. (Que)

Participants spoke about how they were reframing agriculture for youth in a way that is engaging and "not associated only with slavery" (Que).

Reframing Nature. Connecting back to the roots and the culture of African people was the core of the program leader's goals. Central to this was fostering a reconnection with the land and reframing the relationship that youth have with nature. As AJ described,

> They brought a number of us here through the institution of slavery so we were still able to hold some of our values but our values often times were closer to ways of how we adopt to our environments, so once you separate us form the land you separate us from our culture. (AJ)

This component of AJ's program is what builds the passion for the youth and sets the foundation for them to explore all areas of life, for the development of human kind. As stewards of the land, respecting nature is a piece of the program that connects the students to responsibility and ownership of their natural resources that they have in their environment. However, program leaders made it clear that youth and African Americans in general have been separated from these principles that are core to African culture through the institution of slavery. As AJ stated, "you have to understand that…a lot of African Americans have a disconnection with the soil; every time we look at it, we think of slavery."

Nurturing. Program leaders expressed and repeated the importance of having a bond and true relationship with the student that is focused on the student's success and community education. The program leaders made it clear that this is space created specifically for the students to learn and engage in learning within a caring environment. As Roger describes, "it is a place where once you come you don't want to leave." This is not what children are exposed to at school.

Instead they are faced with harsh disciplinary methods. Such nurturing is implemented in the programs by having small talk with the student as shown below:

> We sit down and talk. They want to talk and grow food. I talk with the parents and we talk about respect between all parties. The parents say their child's demeanor totally changed, [from] talking back [to] not talking back. This is all credited to how our leadership team and elders in the school engage with the youth. We build relationships with them and their families so we can nurture the kids. (Shavon)

In addition, the environment encourages students to support each other's learning.

Experiential Learning and Educational Delivery

The programs are providing a hands-on and natural learning approach though activities such as growing and building for agricultural production. They provide the youth with a learning environment and that encourages them to want to learn, according to the participants.

Natural and Authentic Teachings. A hands-on teaching style that keeps the youth engaged was described by program leaders in contrast to their views of traditional classrooms with a form of book and lecture with, sparingly, some group activities. In their community-based programs, teaching is done by doing and during the process of solving real life issues that the youth are facing. Roger described "hands on activities and outdoor learning areas" in his program and AJ explained: "I wouldn't say we dive in the chemistry books but we teach them that nothing has waste, everything is renewable to energy to resources, and to being sustainable and being one with the land." Furthermore, the youth are educated on the wonders of nature and what the earth has to provide. They are taught about problems that arise from nature, such as pests and diseases, and created by society, such as pollution, that require solutions from people like themselves. However, in order for the youth to develop solutions, they have to be equipped with knowledge. Jamaal describes his teaching method as being "able to pull ag concepts and help and relate them to STEM." By connecting the material that is being taught to the youth to their actual living conditions, youth are more passionate about learning and making a difference.

Space for Creativity. Youth are able to be in a space where they can be creative with their peers and leadership teams. Everyone is able to bounce ideas and learn. The data shows that youth are able to explore their interest by learning about other's interests as well. Taron explains, "the kids want to be here to learn and ask questions, no one is ever embarrassed when they have questions, it [the learning space] just sparks more questions to be asked." Program leaders encourage to youth to be creative about solving issues that are on the farm and issues with homework. Shavon and Taron mention the importance of providing the opportunity for creativity they provide to the youth, "I created the school so children can pick what they want to do and when they want to do it. And so they are creative" (Shavon) and "A lot of these kids have not had the chance to be creative." (Taron). Such creativity is possible because of the space that the youth are in, where there are built relationships of trust and honesty.

Industry Exposure and Knowledge

The programs are situated to provide multiple avenues for youth to explore careers related to agriculture and STEM. All the programs afforded youth opportunities to interact with professionals and to gain hands-on experience in agriculture. But most importantly, they all encouraged the youth to be contributors to society. Jamaal explains, "These other concepts [STEM] are important because it is what society is moving towards. So, if we can push our kids, from my perspective, our kids will have a voice in making effective change in our society." This urgency describes how Blacks have been left out and underrepresented in STEM and agriculture. Jamaal even specifies this by stating "My focus is on creating a space for black youth to grow, because we don't have that in society."

Role Models in Agriculture. Agricultural program activities and leadership teams provide access to mentors within agriculture and STEM. Program leaders all serve as role models of farmers and gardeners and youth connect to outside networks of professionals through program activities.

> We had a few presenters and visits to the farms, which is an organic farm, and a female farmer… [The] majority of mentorship is done with me… so I am [a] mentor [for] the seven students I am close with and I have brought them to vegan businesses, which are potential customers that are open enterprises around plants and plant-based diets so there is this the cultural lens of seeing people who looks like them. As a master gardener female facilitating this class, I think that their perspective on what a teacher looks like, what a farmer looks like, an educator, an organizer just by facilitating and mentoring has been eye opening. (Arionne)

Jamaal describes a characteristic that makes it easier to connect to the youth as a role model: "I think…most effective thing in relating to these kids, is that I have [my] youth." Program leaders are setting the best example that they can for young people to develop careers, passion, and knowledge of the environment and its sciences. The role that the programs play is to provide the foundation for youth to explore agriculture with positive imagery and guides.

Career Development. Program leaders express the goals of educating youth about what agriculture and science is about and how it can feed, shelter, clothe, and heal people. One major career aspect was being owners of their skills and work. Taron describes career development as a form of self-reliance, stating: "we are raising them to create careers with ownership. Ownership is the most important thing." Educational activities expose youth to new disciplines and career fairs introduce professionals in such careers. These activities promote personal career exploration, which is not afforded in traditional learning spaces for Black youth. For example, one participant describes a specific aspect of career development as:

> [letting] our children know there is nothing wrong with being a farmer, and being involved in NBA if that is what you want. But to understand you don't have to use your body to get your wealth, you can use your mind too. (Taron)

Tanisha connects her program to career exploration, stating: “we want our young people to look at the various careers in ag, and to [find] meaningful careers to them and of course they learn of the different careers that are available to them through agriculture.”

Economic and Community Development

All program leaders expressed their passion to create ownership in agricultural production and form new streams of revenue. There is a need for collaborative economics within African American communities, which also relates to community development.

Avenues for Economic Development. Program leaders express the need to self-sustain and to be self-reliant through agriculture. Leaders expressed the goal of educating the youth in agriculture and STEM related skills that they can use to develop their community and to end generational poverty with multiple career options. Roger, for example, framed agricultural career opportunities this way: “it’s not just putting your hands in the dirt, it is a part of it but there is soil science, there is distribution, marketing, economics, customer services, technologies, and the growing…on and on.” In his program he is “linking afterschool activities to a career that would end the cycle of generational poverty.” Agriculture is taught as providing the necessities to survive, food, shelter, and clothing. Such principles are taught to the youth as entrepreneurship skills or as skills that are necessary to have to survive. Either way, economic stability is needed to create generational wealth and to afford opportunities that have not been afforded to Black youth in particular.

Community Education and Stewardship. Through the programs in our study, youth learn about the importance of community work. They learn that they can have control of their environment and what the community looks like as far as development and beautification. Arionne stated, “we are trying to sustain the parts of community that are positive and adding to the ecosystem…changing the idea of what civic engagement looks like and seeing that we are eco-friendly and how we contribute to the environment.” Seven participants tied their project work to teaching ownership of the community. One participant described their gardening work as a response to what they saw happening in their community:

> Young white suburbanites were moving into the city and establishing community gardens. And starting a garden is really a great thing, but what was disturbing to us was that…they were not engaging with the people of the community, so we saw it as disrespectful. (Tanisha)

Youth are then challenged to come up with solutions to community issues through food, again sparking creativity. Such efforts teach a variety of life skills that may lead to greater opportunities. Through programing, youth are able to build networks and gain status by participating in programs which contain and hold valuable capital. Program leaders also wanted to involve youth in food justice and insecurity issues as it also relates to the health of the community. For example, Que stated that “it is important for the youth to know where they food comes from and how they can control different aspects of that or to know about it. Having more control of what is going on in their life.” The social justice piece contributes to the learning experience as well where students are developing skills through hands-on experiential learning.

Such outcomes situate agricultural programs in communities a tool to engage minority and underrepresented populations in agricultural education. Although this is not the focus, it is an attempt to direct students into a pipeline that offers multiple career options in community activism and community development.

Careers in STEM and agriculture are also connected to community development. Programs allow youth to explore solutions to community issues with the knowledge of agriculture and STEM that is provided through the programs' activities. Such activities also include entrepreneurial components, for example Arionne was able to expand her program address various barriers or characteristics of African American communities and businesses within agriculture and STEM. She

> tie[d] in an enterprise for black farms to say 'hey, we have to have another way to make money besides going to the markets,' [incorporating] jelly and jam that was made from local farmers that were growing products and creating value added products, and folks who were scientist[s] and using local ag to formulate body butter and beauty products and I was just really plugging in a lot of local farmers in a way that set revenue streams for them and informed curriculum for the class the way it was taught about black farmers so that they see and didn't have this romantic idea of what farmers are. (Arionne)

Arionne makes it a point to operate her business and programs year-round as a sustainable stream of economic wealth and educational pursuits for the youth to provide to the community.

Conclusions and Recommendations

Overall, the main driver for program leaders was to better the conditions of the Black community, starting with teaching young people about culture and nature. It was evident that program leaders knew that there was a disconnect between African Americans and the land that needed to be addressed and bridged. This disconnect was heavily embedded in the influence of slavery and sharecropping systems that have deterred African American interest in agriculture (Outley, 2008). As Black American communities are typically underdeveloped and hold less capital (Yosso, 2005), the community-based programs were situated as a tool to build the community (Christens and Dolan, 2011) and disrupt the generational course of poverty (Desmond, 2012) by starting with the youth. Program leaders expressed that their role included serving as a parent, role model and elder for the young people to counteract negative influences (Le & Stockdale, 2011) and lack of support system (Desmond, 2012) that African American youth face. Through their programs, they afford the youth social capital (Lin, 2000) that allows them to be challenged in an academic, civic, and nurturing environment. In contrast to traditional classrooms where Black youth are tolerated (Leonardo, 2013) and Black history teachings are limited (King, 2017), youth are invited to the space to learn and grow through hands-on exploration. Their personal development and educational experiences are centered around African and African American teachings and principals within agricultural education. It is a place where, as Carter (2003) describes, Black cultural capital is recognizable and rewarding. This approach creates a network that supports creativity for the youth in an educational and nurturing environment. Participants are given the opportunity to literally reimage and reframe what a farm or community garden looks like in their community (Glover, 2004). Within the

study, capital was not necessarily situated as access to careers or mentors in the agriculture industry; instead program leaders described their educational practices as capital that can generate better influences on career decisions overall. Agriculture was reframed as the foundation of liberation and self-sustainable practices.

Recommendations for future research include addressing limitations to this study, such as the small number of cases, lack of youth perspective, and the lack of direct observation of educational programming. We recommend larger-scale studies to investigate the generalizability of our findings, longitudinal research to track pathways of program participants, and ethnographic studies to further understand the educational practices employed in these programs. Our findings have profound implications for practice in agricultural education. Insights can be used to inform design of programs to reach African American youth and, most importantly, serve as an entry point for non-African American agricultural educators and education researchers to develop a deeper understanding of the work that is occurring within these communities.

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The Historical Symbolism of the National FFA Organization Emblem

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Abstract

The history and evolution of the National FFA Organization emblem has a unique story. As the FFA approaches its centennial in 2028, it is important that the history of the emblem be documented for future educators, students, and the public. This historical research study investigated the evolution and symbolism of the FFA emblem. Findings showed that the founding fathers of the Future Farmers of America took great care in designing an emblem that would be easily recognized and cherished by many. Each individual symbol within the emblem represents something related to agriculture, community, and the Nation. The emblem has been amended four times since its original adoption. The first change was mostly for cosmetic reasons. The second change helped re-define the scope of the organization. The third change refreshed the emblem's fading color. The fourth change helped make the emblem easier to replicate. Members and alumni can take great pride in displaying an emblem that tells a unique and powerful story.

Introduction and Theoretical Framework

A person's first impression of an organization, based on its symbols, is important. An organization's identity and image outlines and fuels interpretations (Hatch & Schultz, 2002). We know that a person's attitude about an organization is not only learned from symbolic patterns, it is learned from achieving a fuller understanding of the culture of the organization (Ostroff, Kinicki, & Muhammad, 2013). Therefore, it is important for an organization to acknowledge how people interact with the symbolism of the organization (Rafaeli & Worline, 1999).

Exposure is not the only identity-challenging issue faced by organizations today. How an organization archives its culture through symbolism determines how people will view and speak about the organization (Rafaeli and Pratt, 2013). "Legacy, a sense of an organization's historical heritage, has long been considered a part of an organization's identity" (Walsh & Glynn, 2008). When an organization constructs its identity, the objective is to create a form of cultural and collective memory about who the organization *was* and who the organization *is* (Walsh & Glynn, 2008).

Symbolism has been important to agricultural organizations for centuries. Shortly after the United States Department of Agriculture (USDA) was established, there was efforts made to create a seal that would represent this important agency in the federal government. The seal is a green and gold seal with the date the agency was founded (1862) and the date it became a cabinet level agency (1889). It also includes 44 stars for the states in the Union in 1889. The main part of the seal is a shield with a shock of corn and a mold-board plow, similar to a John Deere plow that broke the plains. The first unofficial version of the seal depicted a shock of wheat, however, it was replaced by corn in the final version (USDA: Official Seal of the USDA).

In addition to the official USDA Seal, the agency also uses an official USDA Symbol or logo. This was created in 1996 and represents the foundation of all agriculture, soil. The colors are dark purple for the initials USDA and dark green for the soil. Both the USDA Seal and Symbol are widely recognized across the country as the symbol of the department of agriculture and its importance to the country (USDA: The USDA Symbol).

Another organization long associated with agriculture in the United States is the National Grange of the Order of Patrons of Husbandry, or Grange for short. The Grange was founded in 1867 with the aim to empower and improve the opportunities of agricultural people. In the document *The Evolution of the Grange* (n.d.) it was written that, "The Grange employs fraternal rituals based upon symbols relevant to the art of farming." Table 1 lists the agricultural symbols used during Grange meetings.

Table 1

Grange symbols and their meaning (Stanton, 2006)

Grange Symbol	Meaning
Grange	Dates back to Medieval England, when large farms were called granges, after the French word for barn.
Ceremonial Offices: Pomona, Ceres, Flora	Taken from Greek mythology, and represent fruit, grain, and flowers respectively. These are tied to the agricultural roots of the Grange.
Ceremonial Rug and Emblem	Sheath of Wheat with letters "P" and "H" standing for Patrons of Husbandry.
Ax	Symbol of perseverance.
Plow	Teaches to drive the plowshare of thought diligently through the heavy soil of ignorance and prepare the mind for the growth of knowledge.
Harrow	Used to pulverize the soil and cover the seed; emblematic of the course of study and observation needed to fully understand.
Spade	Used to dig deeper than the plow, symbolizes thoroughness.
Hoe	Symbolic of the cultivation of the mind that destroys errors, and keeps the mind ready to receive and apply new facts.
Pruning Knife	Reminds Grangers to prune idle thoughts and sinful suggestions, and keep passions within due bounds.
Sickle	Symbolizes peace, prosperity, joy, and reaping rewards.

Cornucopia	Teaches sharing abundant gifts and blessings.

Two youth organizations that utilized symbolism to convey meaning include the 4-H clubs and the New Farmers of America. The 4-H clubs grew out of the boys and girls agricultural clubs across the United States. Jessie Field, Superintendent of Schools in Page County, Iowa is often credited with creating the 3-leaf clover emblem which first appeared on pins and pennants around 1909. On each of the three leaves was an "H" which stood for head, heart, and hand.

A letter titled *Story of the Demonstration Emblem* published by the United States Department of Agriculture in 1912 describes pins used by a number of youth groups. The Demonstrator Emblem was used by the Boys' and Girls' Demonstration Work including the Boys' Corn and Cotton Clubs, and the Girls' Canning & Poultry Clubs. The four "Hs" were described as representing head, heart, hand, and health. The All Star Corn Club emblem was a five-point star instead of the four-leaf clover. The five "Hs" on the stars represented head, heart, hand, health, and home (Reck, 1951).

The New Farmers of America (NFA), an organization for African-American boys studying agricultural education was established in 1935. The emblem of the NFA closely resembled the emblem of the Future Farmers of America. The symbols of the eagle, owl, plow, and rising sun were identical. However, instead of a cross-section of an ear of corn, the symbols are on a boll of cotton. The cotton boll being used because it more closely resembled agriculture in the southeastern U.S. where the NFA chapters operated (Strickland, 1994).

Many of the rituals and symbols associated with the FFA organization were adapted from the Freemasons organization. In discussing the similarities between the two organizations, Boettjer (1995) wrote,

> Of greatest interest, however, are the original degrees and rituals of the Future Farmers of America. They reveal a close similarity to like elements in Freemasonry and clearly suggest that the founders of the FFA modeled the new organization along Masonic lines (p. 7).

Similar aspects of the organizations include using opening and closing ceremonies for meetings, initiation ceremonies, degrees of membership, officers and their symbols. Boettjer concluded by stating, "Clearly, Freemasonry had a key influence on forming the Virginia agricultural boys' organization that by 1928 became the Future Farmers of America" (p. 10).

One could argue the National FFA Organization's identity and emblem are one and the same. The individual symbols within the emblem hold significant meaning to the organization's members and affiliates. But what would happen if an uninformed person wrongly interprets the emblem? Therefore, we need to know more about what each of the symbols represents and how the emblem has evolved through the years so we can better educate the public about our identity. This study aligns with research priority five of the AAAE National Research Agenda (Thoron, Myers, & Barrick, 2016).

Purpose and Objectives

The purpose of this historical research study was to document the evolution and symbolism related to the National FFA Organization's emblem. Specific objectives which directed this study included:

1. Describe the evolution of the FFA emblem from its creation to present.
2. Describe the symbolism associated with the different components of the FFA emblem.

Methods and Procedures

Historical research methods were used to gather information for this study. The intended result of historical research is an "increased understanding of the present and a more rational basis for making choices" (Ary, Jacobs, Razavieh, and Sorensen, 2006). "To understand historical documents, one must have an interpretive point of view. This point of view shapes how one gathers, reads, and analyzes historical materials" (Denzin & Lincoln, 2011).

Few primary sources were available; therefore, mostly secondary sources were used including history books, reviews of research, journal articles, magazines, and convention proceedings. Data were collected from *The Agricultural Education Magazine*, *Journal of Agricultural Education*, *New Horizons Magazine* (formerly the *National Future Farmer Magazine*), artifacts from the National FFA Archives at Indiana University – Purdue University Indianapolis, and FFA.org. Each document was thoroughly examined to determine if it provided a true representation of the historical event. External criticism and internal criticism were used to determine if the documents were authentic and of value. Whenever possible, triangulation of the data was attempted.

Findings

One of the first acts of the new Future Farmers of America was the creation of an emblem to represent the organization. An emblem is defined as "a device, symbol, or figure adopted and used as an identifying mark" (Merriam-Webster's collegiate dictionary, 1999). The emblem of the Future Farmers of Virginia (FFV) organization strongly influenced the development of the FFA emblem (Yeatts, 1954, Hillison, 1993; Bryant, 2001; Moore, 2018). Henry Groseclose was instrumental in developing the symbols for both organizations.

The ideas for the FFV emblem came from an agricultural organization in Denmark (Hillison, 1993). The emblem included an owl perched on a wooden spade in front of a rising sun. The emblem also included corn, wheat, pumpkins, and a cornucopia. Buildings depicted on the emblem included a small town and a church with the words Knowledge and Labor at the bottom. The FFV emblem included an owl now perched on a hand plow in front of a rising sun and a tree with the same words, Knowledge and Labor.

These items all hold symbolic meaning for the members of these agricultural organizations. Symbolism is the art or practice of using symbols especially by investing things with a symbolic meaning (Fontana, 2018). Their value is evidenced by the fact that many of them have retained their meaning across centuries and cultures. One of their features is that their meaning is often grasped intuitively, without the need for much explanation.

Symbolism of the FFA Emblem

The first published description stated the FFA emblem was comprised of four symbols: the plow, owl, rising sun, and cross section of an ear of corn (Future Farmers of America, 1929).

- The plow represented labor.
- The owl represented wisdom and knowledge.
- The rising sun represented the new day that would dawn when all farmers were the product of vocational agriculture schools and learned to cooperate.
- The cross section of an ear of corn represented the scope of the organization as did the American eagle (Future Farmers of America, 1929, p.4).

Three symbols that are common across these three organizations are the spade or plow, owl, and rising sun. The Roman god Saturn is sometimes depicted with the spade, alluding to his origins as an ancient Italian god of agriculture. Throughout history when human societies turned to settled agrarian living, the plow became a natural symbol of a fruitful, pacific lifestyle (Fontana, 2018). It was easy to expand this meaning to include labor and tillage of the soil.

Among many peoples the owl is a bird of wisdom and prophecy. The owl was famously sacred to Athena, Greek goddess of wisdom. Thus, the owl easily became the symbol of wisdom and knowledge required to succeed in agriculture. The Sun is an almost universal symbol of life, light, creative renewal, and of supreme sovereignty. The Sun would clearly represent the creation of new life, planting new crops each spring, and the future of agriculture.

Corn depicted on both the Danish and FFA organization emblems is the staple crop of many civilizations and acquired the symbolism of benevolence and prosperity. The eagle which was added to the new FFA emblem closely represents the eagle on the official crest of the United States of America.

An article titled *A New Emblem* published in the National Farm Journal shows the new emblem with oversized corn kernels, and an undersized eagle on top of the ear of corn (A New Emblem, n.d.). For the first decade of the new organization, the eagle was attached to the emblem for anything representing the “national” scope or level of the organization. Thus, the official emblem and American Farmer degree keys included the eagle. However, the first bronze Greenhand and gold Future Farmer degree pins did not include the eagle because they were awarded by the local FFA chapter. The original State Farmer charm also lacked the eagle on top of the emblem because this was awarded by the state association.

The new *Agricultural Education* magazine included news from local FFA chapters and state FFA associations. The header was titled Future Farmers News and included the FFA emblem minus the eagle on both sides of the title (Future Farmers News, 1929). The complete emblem including the eagle would first appear in the pages of the Agricultural Education magazine in April 1930 attached to an article titled "F.F.A. Has Wonderful First Year Record (Groseclose, 1930). From that point forward, the FFA emblem would always include the eagle. Obviously, this was a confusing situation. Sometimes the FFA emblem included the eagle and other times it did not include the eagle. Most observers didn't know that the eagle was supposed to represent the national scope of the organization and was only included at the national level. As a result of this confusion, the delegates at the 1934 National FFA Convention voted that "the organization go on record at this time to the effect that the official emblem of the F.F.A. organization was the complete emblem including the American eagle surmounting the cross section of the ear of corn (Future Farmers of America, 1934).

Evolution of the FFA Emblem

The FFA emblem has been amended four times since its original adoption. The first major change was implemented in 1931; the letters "F.F.A" were adjusted to lay on a diagonal angle behind the owl which notably exposed the rising sun. Additionally, the new emblems were to have a red sun (Future Farmers of America, 1931).

The next, and perhaps most significant change, was implemented in 1988 when the delegates at the 61st National FFA Convention voted to change the words "Vocational Agriculture" to "Agricultural Education." This was a result of recommendations included in the Understanding Agriculture: New Directions for Education book published in 1988 (National Research Council, 1988). The committee recommended that "The organization name, symbols, contests, awards, and requirements for advancement in the FFA are still largely geared toward production agriculture" (p. 32). In addition, the committee suggested that "New efforts are needed to reform secondary school agriculture programs to better prepare students for agricultural-sector industries. An essential step toward achieving this goal it to fully accept the broader definition of agricultural education recommended by the committee" (p. 32). National FFA Advisor, Larry D. Case (1988), commented on the change when he stated, "the constitutional amendments are an attempt to shift the FFA from a production to an agricultural program, to broaden our spectrum to include more students" (p. 31).

Over the course of 15 years, the color and detail of the embroidered emblems modified to the point where they appeared more orange than old gold. It was assumed that the quality of the emblem changed due to the increase of material and labor costs over the years. In 2003 the National FFA Organization developed a three-year plan to restore the emblem to its original glory. Manufacturing of the restored emblems were finalized for retail in the fall of 2005 (Official FFA emblem, 2003).

The most recent renovation of the emblem began in 2013. The National FFA Organization Official Blog stated the renovation was necessary because “the digital FFA emblem was created in an out-of-date process that caused problems with today’s various production processes for digital, print and apparel use” (National FFA Organization, 2015). Each of the individual symbols within the emblem were digitally enhanced, proportioned equally, and designed to look more reminiscent of the font used on the original 1929 emblem. Additionally, the registered trademark symbol was positioned within the border of the ear of corn. Figure 1 shows the evolution of the emblem from 1928 to present.

Future Farmers of America emblem (1928-1930)		The first FFA emblem used for national purposes. It varied from the FFV emblem with the addition of the letters “F.F.A,” an American eagle with shield, arrows, olive branch, and a cross-section ear of corn in place of the web-like outline.
Future Farmers of America emblem (1931-1988)		The first revised FFA emblem. The letters “F.F.A.” were adjusted to lay on a diagonal line. The rising sun was changed to red (Future Farmers of America, 1931).
National FFA Organization emblem (1989-2005)		The second revised FFA emblem. The delegates at the 61st National FFA Convention in 1988 voted to replace the words “Vocational Agriculture” with “Agricultural Education” (Bryant, 2001, p. 327).
National FFA Organization emblem (2005-2013)		The third revised FFA emblem was restored to its original colors: old gold and national blue (Only Blue Will Do, 2003).
National FFA Organization emblem (2013-present day)		The fourth revised FFA emblem. The emblem was digitally enhanced to make the symbols symmetrical and easier to replicate (National FFA Organization, 2015).

Figure 1. Evolution of the FFA emblem from 1928-present day.

Conclusions/Recommendations

For centuries agricultural organizations have designed emblems and symbols to represent their group to members, potential members, and the general public. Symbols were designed to reflect things the organization valued. Government agencies, farmers' organizations, and youth groups all designed emblems for their organization. These included common agricultural items like soil/land, plows, sheaths of wheat, corn, or bolls of cotton. Animal symbols like the eagle often represented strength or the national scope of the organization while the owl represented knowledge and wisdom. The symbol of the sun was used to represent the dawning of a new day, a new era of agriculture, or the future in general.

Based on the results of this historical study, it can be concluded that the Future Farmers of America organization created a rich culture through symbolism. The founders of the FFA took great care in designing an emblem that held significant meaning to its members. The emblem that evolved includes important symbols that exemplify the strong agricultural tradition of the organization.

Throughout the history of the Future Farmers of America there have been calls to change the name, jacket, creed, and other parts of the organization. Yet, while the members have embraced many changes like the inclusion of women, the merger with the New Farmers of American, new degrees, and new competitive events, they have resisted drastic changes to the FFA emblem, jacket, or creed. Agricultural education professionals and FFA members should have a good understanding of the importance of the symbolism of the FFA emblem and how it still represents the organization 92 years after it was designed.

Based on the conclusions, it is recommended that youth and adults be taught the rich history of agricultural organizations and the symbols they utilize. Youth in both 4-H and FFA should be taught about the history of their organization and how their symbols were designed and evolved over time. Agriculture teachers have a responsibility to teach about the importance of agricultural organizations in their communities, their state, and the country. Students should be informed about agricultural organizations such as the Grange, Farm Bureau, as well as commodity, livestock, and breed associations. Local, state, and federal agencies such as the Department of Agriculture, Forest Service, Natural Resource Conservation Service, and Bureau of Land Management should be discussed. Each of these agencies have a rich history and are symbolic of the relationship between agriculture, forestry, soils, and range land.

Based on these conclusions a larger study should be conducted about the symbolism within the Future Farmers of Virginia, New Farmers of America, and Future Farmers of America organizations. Further research should explore the symbolism of the official dress, ceremonies, officer stations, degrees of membership, and use of the gavel.

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What college students know about food security: Implications for agricultural education

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Abstract: As student populations diversify and enrollment numbers increase, food security among college students is becoming an issue. Dwindling financial aid causes students to decide where their financial resources should be allocated. Maslow's Hierarchy of Needs is the conceptual framework for this study. The participants were the undergraduate student population at [university]. Data was collected via QR codes through Qualtrics and analyzed with SPSS. Nearly half of the respondents were found to be food insecure according the USDA's Adult Food Security Survey Module. Accepting a gift card to buy food and attending a campus event that offered free food were found to be the most popular strategies to fight food insecurity. While nearly 75% of respondents indicated they thought applying for SNAP and accepting food from a food pantry would be effective in combating food insecurity, only about one-half said they would utilize these resources if they were food insecure.

Introduction

In his 2019 Heisman Trophy award acceptance speech, Louisiana State University quarterback Joe Burrow focused not of his football achievements, but the social need to address hunger in the Appalachian community where he grew up. Three days later, over $350,000 had been raised to fund efforts by the Athens County (Ohio) Food Pantry where it is estimated 20% of the residents are food insecure. Burrow's use of his award platform to draw attention to the issue of food insecurity "went viral" and drew the attention of the sports community to the growing problem of food insecurity—if only for a little while (Wamsley, 2019).

The United States Department of Agriculture (USDA) Economic Research Service (ERS) (2019, para. 1) defines food security as "access by all people at all times to enough food for an active, healthy life." When studying food security, the USDA classifies food security as being high, marginal, low, and very low (ERS 2019). When an individual or household is classified as having very low food security, or food insecurity, they have "reports of multiple indications of disrupted eating patterns and reduced food intake" (Economic Research Service, 2019, para. 3). Very low food security can be experienced by an individual "with or without hunger" (Borre, Ertle, & Graff, 2010, p. 444). When someone experiences very low food security without hunger, it means food is available, but the available food lacks nutritional value necessary for a healthy body and life (Borre et al., 2010). Food insecurity does not always last for long periods in time, but the effects on an individual's diet can be long lasting due to repeated lack of financial resources (Seligman, Laraia, & Kushel, 2010).

In the past 50 years the traditional college students has changed (Goyette, 2008). The traditional college student started college immediately following high school graduation, was middle to upper class, single, and financially dependent on their parents (Choy, 2002). Today that traditional college student is a minority among student populations at many colleges and universities (United States GAO, 2018). A more diverse group of students are now pursuing higher education with an increasing number who are from low socioeconomic status homes, who are financially independent of their parents and represent a wider range of ethnicities. With the

increase of individuals applying for college, higher education has been turned into a commodity to be consumed by all with rising tuition and associated costs (Dubick, Mathews, & Cady, 2016; GAO, 2018; Institute of Education Services, 2018). Diversifying student populations, increases in tuition and associated fees, and decreasing financial aid has led to an increase of concern over food insecurity on college campuses (Bruenig, Argo, Payne-Sturges, & Laska, 2017; El Zein, Mathews, House, & Shelnutt, 2018; Gaines, Robb, Knol, & Sickler, 2014; Knol, Robb, McKinley, & Wood, 2017; United States GAO, 2018). Despite the increasing cost of higher education, there has been a steady increase of students who come from low income homes or are part of an underserved population in the last decade (United States GAO, 2018; Payne-Sturges, Tjaden, Caldeira, Vincent, & Arria, 2018), and these same students are at a higher risk for experiencing food insecurity (Cady, 2014).

According to the Government Accountability Office, the U.S. Federal Government spent over $122 billion in fiscal year 2017 on student aid in the forms of grants, loans and work study, an enormous investment in higher education. Aid comes in the form of grants and loans from the federal government, but many students still struggle to make ends meet, especially when it comes to buying food, causing some students to choose between eating and paying the bills. Federal aid helps; however, aid does not cover all the costs associated with attending college especially for low-income students (United States GAO, 2018).

In a review of food literature focusing on food insecurity among college students, factors related to food insecurity, and discuss solutions for universities and colleges to handle food insecurity was conducted A total of 59 articles were examined in this review of literature. The majority of these studies were conducted at public, 4-year institutions in urban settings, mainly in the United States. Researchers found the average rate of food insecurity to be 42%. The studies exclusive to the United States have an average food security rate of 32.9% among postsecondary students. No studies have examined ongoing interventions, so it is not clear if these various strategies are effective (Bruening, Argo, Payne-Sturges, & Laska, 2017).

The Supplemental Nutrition Assistance Program or SNAP is a federally funded, but state administered program that provides needy families with benefits so they can purchase food. SNAP replaced the familiar Food Stamp program in an effort to reduce fraud and fight the stigma associated with using food stamps. Instead of buying “stamps” at a discounted rate, SNAP recipients are issued an electronic benefits card that can used to purchase food. To be eligible for SNAP benefits, college students must work at least 20 hours per week, participate in a college work-study program, have a disability, be a parent of a young child, or be a single parent with a child younger than 12. In addition to SNAP, the Special Supplement Nutrition Program for Women, Infants, and Children (WIC) is available to eligible college students who are pregnant or post-partum with children up to the age of five. Recipients’ must be determined to be a nutritional risk and have a gross income below 185% of the U.S. Poverty Income Guideline. While SNAP recipients can purchase most any item from a store that sells groceries, WIC recipients receive vouchers or benefit cards for specific foods each month such as infant cereal, juice, eggs, milk, cheese, and peanut butter. In 2016 it was estimated that 2 million college students who were eligible, did not receive SNAP benefits (United States GAO, 2018).

Colleges and universities are responding to food insecurity among college students in a variety of ways that can be placed under one of the following categories: educating faculty, staff, and students, providing students with free food and emergency assistance, and creating a

centralized student services office that includes applying for federal and state benefits, such as SNAP (United States GAO, 2018). Educational campaigns are being used to help members of the campus community know what is available to them on and off campus. There has been an influx of campus food pantries being established in the last five to seven years, all varying in size and location (Bruening, Arto, Payne-Sturges, & Laska, 2017; United States GAO, 2018). As of January 2020, there were at nearly 800 food pantries established at colleges and universities across the nation according to the College and University Food Bank Alliance, but this number does not include food pantries at schools that are not members of the Alliance (College & University Food Bank Alliance, n.d.). However, there are major barriers to getting individuals to use resources such as a food pantry or applying for SNAP benefits. To streamline service and help faculty and staff know where to send students in need, colleges and universities have strategically located financial aid, academic counseling, food pantry, veterans' services, and more in or near the student union or center. Another way colleges and universities are helping students is by providing emergency cash through gift cards, loans, or grants (United States GAO, 2018).

Conceptual Framework

There are many types of individual needs, but Maslow suggests there are a set of basic needs that need to be met before other needs can be addressed. Maslow classified those needs as physiological, safety, esteem, and self-actualization (Maslow, 1943). Of those needs, physiological needs are the ones that must be met before any other needs and having adequate access to food is a physiological need (Maslow, 1943). Not having adequate access to food, also known as food insecurity, can lead to hunger, which can cause a person to seek food above all other needs (Maslow, 1943). The only thing a person lacking food can focus on is satisfying that need (Maslow, 1943; Wahba & Bridwell, 1976). Once this physiological need is met the next need becomes the new focus of the individual, which starts the cycle of the hierarchy of needs (Wahba & Bridwell, 1976).

When students are food insecure, they can no longer properly focus on their academic responsibilities. Colleges are also beginning to realize retention, completion, and other aspects of academic success among students cannot be addressed until the most basic needs of the student is met (United States GAO, 2018). The idea that students cannot focus until basic needs are met is realized and students receive free and reduced-price meals while they are in elementary through high school through, but this is not carried out once students start pursuing higher education (Broton & Goldrick-Rab, 2017). When a student experiences food insecurity their academic career, health, and behavior are affected creating a need for a holistic approach to meet the needs of students (Cady, 2014).

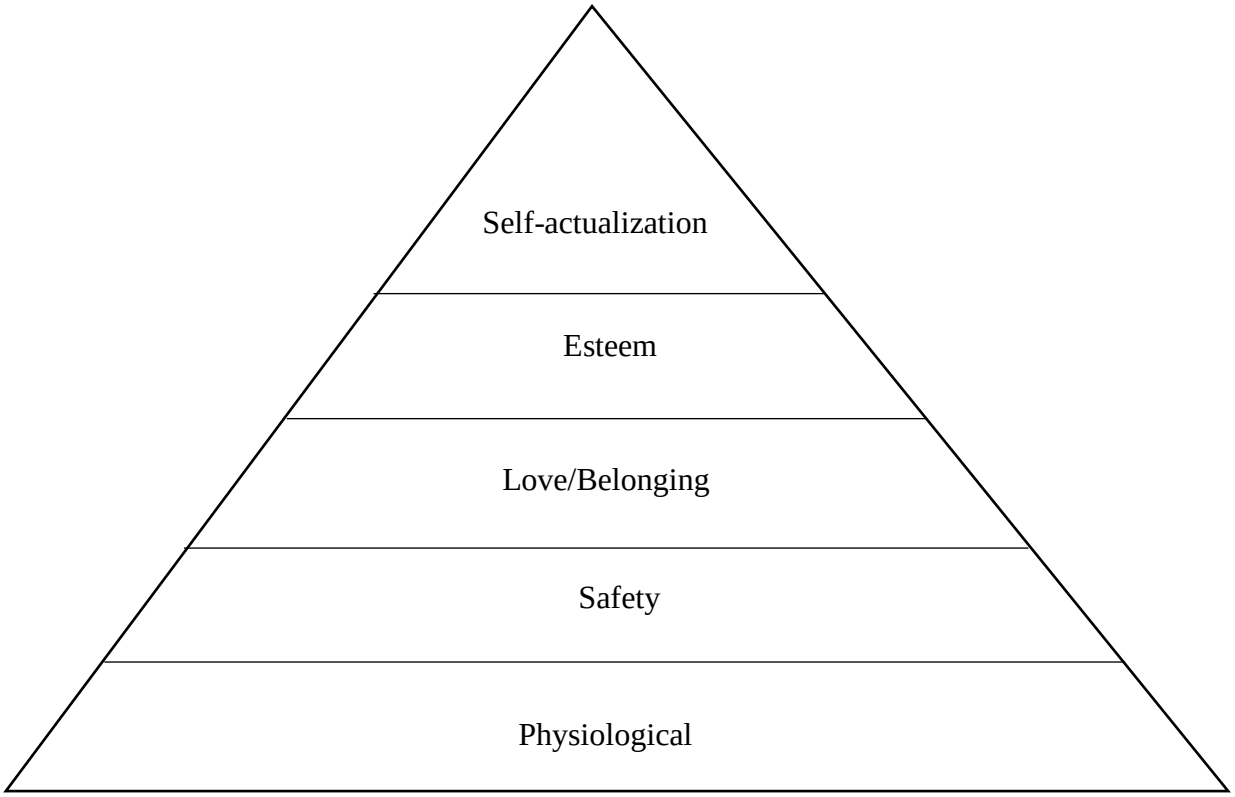

Figure 1. Pyramid of Maslow's hierarchy of needs.

Although the federal government spent almost as much on nutrition assistance programs ($98 billion) as federal college student aid ($122 billion), little food assistance aid is reaching college students. A large portion of this investment in higher education is at risk because the basic needs of college students are not being met (GAO, 2018).

Purpose and Research Objectives

The purpose of this study was to describe the food security status of the undergraduate student population of Oklahoma State University, their likely behaviors if experiencing food insecurity, and perceived effectiveness of strategies to combat food security. Research Priority 7 of the 2016-2020 National Research Agenda for the American Association for Agricultural Education (Andenoro, Baker, Stedman, & Weeks, 2016) calls for the profession to address complex problems in agriculture. No matter the age group, food insecurity is complex and addressing the issue is not simple (Bruening, Argo, Payne-Sturges, & Laska, 2017).

Research objectives for this study are the following:

- Objective 1: Describe the food security status of undergraduate students at Oklahoma State University
- Objective 2: Describe students' knowledge of Supplemental Nutrition Assistance Program and local food pantry
- Objective 3: Describe students' likely behaviors if they were experiencing food insecurity.
- Objective 4: Describe students' perceived effectiveness of strategies to combat food insecurity.

Methods

The instrument used in this study was adapted from one used by King (2017) in her study of food insecurity among college students. To better understand the food security of the population, we added the United States Department of Agriculture's (USDA) *Adult Food Security Survey Modules* six-item, short form on food security. Questions about students' likely behaviors if they were experiencing food insecurity and their perceived effectiveness of strategies to combat food insecurity were added to address the variety of ways food security is being addressed on college campuses (United States GAO, 2018).

The instrument was reviewed by a panel of three experts which included the director of Leadership and Campus Life, a professor in nutrition who also specializes in community nutrition education, and a professor of agricultural economics who specializes in food insecurity issues. The panel was asked to provide feedback on the instrument for content and on ways to improve the readability and clarity. The instrument was piloted with a group of 30 sociology and nutrition students from a nearby two-year college and a group of agricultural leadership students who were studying food security. Student panel members were asked whether the format and utility of the questionnaire was easy to answer, meaningful, and understandable. The pilot group who viewed the instrument found the instrument to be acceptable. Average time to complete the questionnaire in the pilot study was six minutes. In the pilot study, items were presented online using Qualtrics Survey Software. None of the questions included in the questionnaire would reveal the identity of the respondent. Prior to data collection the instrument, recruitment material, and study procedures were submitted to and approved by the Oklahoma State University Institutional Review Board. The application number is AG – 19 – 48.

The population of the study was the undergraduate student body of Oklahoma State University. According to the Fall 2019 enrollment data there were 18,513 undergraduates enrolled, split nearly evenly between male (50.58%) and female (49.42%) students. When looking at the student body by ethnicity, 68.3% of undergraduate students were White, 4.0%, Black or African American, 8.2%, Hispanic, 1.8% Asian, 4.3%, American Indian or Native American, 0.09%, Native Hawaiian, and 9.5% were multiracial. Freshmen makeup the largest (28%) class, followed by seniors (27.3%). Sophomores make up 21.9% of undergraduate students, and juniors make up 21.3% of the student body. The largest college on campus was Arts and Sciences (24.4%). The business school was the next largest (19.3%), which is followed by engineering, architecture and technology (17.9%). Representing 14.2% of the student body was the College of Agriculture. The College of Education, Health, and Aviation follows with 8.8% of the student body. Human Sciences was the smallest college with 5.7% of students.

To obtain a representative sample, at least 377 responses were needed. This sample number was calculated by Qualtrics Sample Size Calculator, which is based on the Krejcie and Morgan formula (Johnson & Shoulders, 2019). The population was oversampled to ensure adequate responses were collected.

Data were collected using an online questionnaire developed in Qualtrics Survey Software. A table was set up in the university library, outside a general education classroom, and inside the campus Student Union on three afternoons in October 2019. Respondents were recruited with the slogan "$5 for 5 minutes." Dillman, Smyth, and Christian (2014) suggest that offering an incentive, especially cash, is an important way to get individuals to respond to a

questionnaire. Once a student indicated they were interested in taking the questionnaire, they were asked to scan a Quick Response (QR) code with their smartphone. If an individual did not have a smart phone, iPads were available for their use. The QR code, which was generated by Qualtrics, linked the student to the questionnaire, which began with a consent form and allowed respondents to complete the questionnaire anonymously. Once a respondent had completed the questionnaire, they signed a receipt form and were given $5.

Over three days, 416 students responded to the questionnaire. Twelve responses were deleted because their responses were incomplete, and another nine responses were deleted because of unusable data. The Oklahoma State University Institutional Review Board approved the study for students who were the age of 18 years or older, and two students who participated indicated they were under the age of 18 so their responses were deleted, narrowing the total to 393 responses. The advertised time to complete the survey was five minutes. After the cleaning measures listed above were completed, I looked at the time it took participants to complete the survey and deleted any responses that had completion time of less than half of estimated five minutes to complete the questionnaire. This decision led to two more responses being deleted and the total response number was 391 respondents. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Statistical analysis included descriptive statistics analysis.

Levels of food security were determined using the coding provided by the USDA Economic Research Service (ERS) (2019). Reponses that were coded as affirmative for the questions in Table 1 were “often”, “sometimes”, “yes, almost every month”, and “some months but not every month” (Economic Research Service, 2019).

Table 1
Adult Food Security Survey Questions and Responses

Questions	Answers
“The food that I bought just didn’t last, and I didn’t have enough money to get more.” Was that often, sometimes, or never true for you in the last 12 months?	Often true Sometimes true Never true Not sure
“I couldn’t afford to eat balanced meals.” Was that often sometimes, or never true for you in the last 12 months?	Often true Sometimes true Never true Not sure
In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn’t enough money for food?	Yes No Don’t know
How often did you cut your meals – almost every month, some months but not every month, or in only 1 or 2 months?	Almost every month Some months, not every month Only 1 or 2 months Not sure

In the last 12 months did you ever eat less than you felt you should because there wasn't enough money for food?	Yes No Not sure
In the last 12 months, were you ever hungry didn't eat because there wasn't enough money for food?	Yes No Not sure

To determine food insecurity levels the number of affirmative responses were tallied and scored from zero to six as seen in Table 2 (ERS, 2019). For practical purposes, affirmation scores of zero and one described an individual who was food secure, affirmation of two, three or four of the statements describe an individual with low food security, and if an individual answered "yes" to five or six of the statements they were deemed to be experiencing very low food security.

Table 2
Coding of Adult Food Security Survey Questions

Number of Affirmatives	Food Security Level
Zero	High food security
One	Marginal food security
Two	Low food security
Three	Low food security
Four	Low food security
Five	Very low food security
Six	Very low food security

Results

The purpose of this descriptive study was to describe the following: the food security status of undergraduate students at Oklahoma State University, students' knowledge of Supplemental Nutrition Assistance Program and local food pantry, students' likely behaviors if they were experiencing food insecurity, and students' perceived effectiveness of strategies to combat food insecurity.

Table 3
Demographics of Sample Population (n=391)

	f	%
Ethnicity		
White Non-Hispanic	288	73.7
American Indian or Alaska Native	33	8.4
Hispanic	29	7.4
African American or Black	15	3.8
Multi-racial	11	2.8
Asian	9	2.3

Gender		
Female	211	54.0
Male	174	44.5
Student Classification		
Freshman	115	29.4
Sophomore	67	17.1
Junior	108	27.6
Senior	93	23.8
Other	8	2.0
Oklahoma State University College		
Agriculture	132	33.8
Business	60	25.3
Arts & Sciences	84	21.5
Engineering, Architecture, & Technology	60	15.3
Education, Heath, & Aviation	22	5.6
Human Sciences	22	5.6
Housing		
On Campus – Dormitory or Greek housing	160	
Off Campus – Alone, family, or roommates	222	
No stable housing	3	
Employment		
Not working	156	
< 20 hours/week	132	
>20 hours/week	96	

Over 95% of the respondents were full-time students, enrolled in at least 12 credit hours in the Fall 2019 semester, and nearly 95% were between the traditional college student ages of 18 - 23. College of Agriculture students were overrepresented, representing about 24% in the student body, but 38% in this study. It is not clear why a higher level of College of Agriculture students sought participation in the study. When compared to the rest of the population by age and classification, the College of Agriculture students were similar.

Findings related to Objective 1

Table 4
Food Security Status According to USDA Food Security Survey (n=391)

Food security Status	*f*	%
High/marginal food security	200	51.2
Low food security	105	26.9
Very low food security	86	21.9

When “low food security” and “very low food security” were combined, nearly half of the respondents are considered food insecure. Determining the level of food security was calculated by tallying the number affirmatives to each question. The number of affirmatives corresponds with a certain level of food security, as seen in Table 2.

Findings related to Objective 2

Table 5
Student Knowledge of the Supplemental Nutrition Assistance Program (n=391)

Question	*f*	%
To the best of your knowledge, can college students receive SNAP benefits?		
Yes	168	43.0
No	32	8.2
Not Sure	187	47.8

Over half of the respondents are unaware that there is a community food pantry. Of the 182 students who were aware of the community food pantry, 28 had visited the pantry at least one time.

Findings Related to Objective 3

Table 6 displays the frequency of positive responses to a listing of possible strategies universities might use to address food security on campus. Students were asked, “If you had trouble acquiring adequate amounts of healthy food, rate your likelihood of utilizing the following services”. A four-point Likert scale was offered with the choices of “very likely, somewhat likely, somewhat unlikely, and very unlikely. Accepting a gift card to buy food and attending a campus event that offered free food were the highest rated solutions. Less than 10% of the respondents thought they would look for food in a dumpster if they were hungry.

Table 6
Likely Behaviors if Experiencing Food Insecurity (n=391)

Strategy	Very Likely or Somewhat Likely	
	f	%
Accept a $50 gift card for groceries	376	96.1
Attend a campus event w/ free food	368	94.2
Accept donated campus dining dollars	330	84.4
Ask for money from family or friends	324	82.8
Seek out a free community meal	296	75.7
Apply for SNAP benefits	203	51.9
Get food from a pantry	198	50.6
Grow food in a campus garden	194	49.6
Dumpster dive	30	7.7

Table 7 presented most of the same strategies, but students were now asked to rate the effectiveness of those strategies. The strategy, “accept food from a campus-based pantry” was added because there could be a possibility of a campus pantry being established at Oklahoma State University. Students were asked, “how effective to you think the following strategies would be to combat food insecurity?”. The strategies were a community food pantry, weekly free community meal, a $50 gift card for groceries, dumpster diving, ask parents, family, or friends for money for food, use donated dining dollars, a campus event serving free food, apply for SNAP, grow food in a campus garden, and a campus-based food pantry. A four-point Likert scale was available with the choices of “extremely likely, moderately effective, moderately ineffective, and extremely ineffective.” Accepting a $50 gift card and attending a campus event with free food were rated as the most effective strategies. Seeking out a free community meal, using donated dining dollars, and accepting food from a campus-based pantry followed extremely closely behind.

Findings related to Objective 4

Table 7
Perceived Effectiveness of Strategies to Combat Food Insecurity (n=391)

Strategy	Extremely or Moderately Effective	
	f	%
Accept a $50 gift card	372	95.2
Attend a campus event w/ free food	370	94.6
Seek out a free community meal	368	94.1
Use donated campus dining dollars	365	93.4
Accept food from a campus-based pantry	354	90.5
Community food pantry	345	88.3
Ask for money from family or friends	301	77.0
Apply for SNAP	297	75.9
Grow food in a campus garden	237	60.6
Dumpster dive	29	7.4

Conclusions and Discussion

Based on the findings, the sample was very similar of the Oklahoma State University’s undergraduate student body based on the student demographics provided by Institutional Research. The population was predominantly white and of traditional college age. Nearly all of the respondents were full-time students and all [university] colleges were represented. Genders in this study generally matched those reported by Institutional Research. A quarter of the population reported they were employed at least 20 hours a week.

Conclusions related to Objective 1

Experiencing low food security, also known as food insecurity without hunger, indicates little or reduced food intake, but the quality and variety of food an individual consumes is reduced (ERS, 2019). Very low food security indicates that an individual is reducing food intake and abnormal eating patterns (ERS, 2019). With nearly half of the respondents in this study

experiencing low to very low food security, food insecurity appears to be a major problem on Oklahoma State University's campus. This supports what other researchers have found, that food insecurity is a major problem across the nation (Bruening, Argo, Payne-Sturges, & Laska, 2017).

Conclusions related to Objective 2

When eligibility requirements are met, college students are eligible to receive SNAP benefits. However, less than half of the students in our study were aware that college students could receive SNAP benefits. At Oklahoma State University 2% of the population reported receiving SNAP benefits, but at least 25% (by virtue of employment alone) could qualify to receive SNAP benefits. The GAO reports that at least 2 million college students across the nation meet the eligibility requirements of SNAP but have not applied to receive benefits. At Oklahoma State University a community food pantry is open to college students, but students were generally unaware of that resource.

Conclusions related to Objective 3

Respondents overwhelmingly believed that accepting money to purchase food or accepting prepared meals would be top choices if they had trouble finding food. Using government and community resources such as a food pantry and SNAP were not nearly as popular. Growing food in a campus garden was only slightly less popular than accepting food from a food pantry or applying for SNAP.

Conclusions related to Objective 4

From the findings, we can conclude that students believe accepting money to buy food, attending an event where free food is served, and accepting dining dollars to be used on campus are effective ways to deal with food insecurity. Applying for SNAP benefits and accepting food from a food pantry were seen as effective means to deal with food security but deemed less popular than other strategies.

Discussion

To take a more holistic approach to combatting food insecurity among college students, the 2018 GAO reports some universities are have success in forming a centralized group of services that assist students with applications for housing, financial aid, food assistance programs, and more. These offices usually titled, *coordinated benefits access programs* and are typically located in or near a building such as a student union, a central hub of activity for students. Creating such programs could help de-stigmatize food assistance programs like SNAP, WIC and campus or community food pantries. Universities may need to promote programs such as SNAP as just another form of higher education government assistance, like Pell Grants, loans, and work-studies. If applying for SNAP benefits could become more normalized, university staff could be enlisted in helping students navigate eligibility much as they do for other forms of financial aid. (United States GAO, 2018).

A coordinated benefits access program would have the added benefit of giving faculty and staff a place to refer students who are experiencing need. Faculty are often first to identify the problem of food insecurity (United States GAO, 2018). Educational campaigns to promote services and resources, for staff and students, could help increase retention rates on campus.

Beyond making free food available in campus food pantries, colleges and universities can help students in unique ways. For campuses with meal plans, at the end of a term, students could be allowed to donate unspent meal plans. Through coordinated efforts of administration, students identified as food insecure, or at risk of experiencing food insecurity, could be given those dollars or meals to use at on-campus markets or restaurants. Providing gift cards at local grocery stores is another option college and universities could use to help students with food emergencies. Establishing, staffing, and funding on-campus food pantries has become the flashiest and most popular way to address food insecurity on 800 campuses. It just may not be the most efficient or most effective approach (Bruening, Argo, Payne-Sturges, & Laska, 2017; United States GAO, 2018).

The Supplemental Nutrition Assistance Program is a federal program that is funded by the United States Department of Agriculture. The Farm Bill is the source of funding for SNAP and many other similar programs. Colleges of Agriculture and commodity groups should consider more vocal support for programs such as SNAP and WIC, as these programs allow individuals to purchase food. When people receive federal food assistance benefits, they purchase food, and that is helping all agricultural producers. (Wilde, 2018).

With the diversifying student population and increasing enrollment in higher education, educators must not forget the billions of dollars of federal financial aid that is put at risk when students are food insecure. Students who are experiencing food insecurity are struggling to decide where their financial resources should be allocated, and more often than not buying food falls to the bottom of the list. When food insecurity turns to hunger, peoples' ability to focus decreases and the worry of where their next meal will come from can drive some students to withdraw from classes. If action is not taken to support students who are experiencing food insecurity, then the money that has been invested in their education will be lost.

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A Phenomenological Examination of Early Female Agricultural Educators

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Women were not universally allowed entry into secondary agricultural education until 1969. Until the mid-1970s, there were very few women teaching agriculture at the secondary level. The literature at the time of women entering the profession revealed beliefs from many that women would have a difficult time finding teaching jobs no matter their skill level or experiences. In 2009, men still dominated the industry 2:1. This phenomenological study allowed us to examine the shared experiences of some of the first female agricultural educators, allowing them to share their thoughts on gender norms, mentorship, and camaraderie in the profession. We identified n = 9 women who were among the first five women to teach secondary agricultural education in their respective states. We conducted semi-structured interviews to address the research question "what were the experiences of female agricultural educators who entered the profession as one of the first in their state or region?" The phenomenological analysis revealed themes related to gender norms, mentorship, personal sacrifices, qualifications, and evolution in the profession.

Introduction/Review of Literature

In a climate where men once dominated the workforce, agricultural education has made great strides in the last two decades to provide equal opportunities for women to become agricultural educators or teacher educators in agriculture education (Baxter, Stephen, & Thayer-Bacon, 2011). This field traditionally followed stereotypical gender roles, with men holding most of the agricultural educator positions up to the late 1990's (Foster, 2001). Early women who entered the profession broke ground to allow easier career entry for the women agricultural teachers and teacher educators. One of the defining events related to the path opening for female agricultural educators was the National FFA Organization (FFA) changes in 1969 which provided for female membership (National FFA Organization, 2018).

Although there is evidence that women played a role in agricultural education prior to women joining the FFA (Moore, 2019), on a formal level, women were not included in the leadership, education, and skill development that the agricultural education classroom provided (Foster, 2003). Now fast forward to fifty years later of female membership in the National FFA organization, the entry experiences of women who paved the roads in agricultural education is one that is needed to be highlighted. These women helped facilitate groundbreaking experiences without the knowledge of doing so and breaking the norms of the profession.

In the early part of the 21st century, gender roles were set by marital status (Kulik, 1999). Example, if a married woman entered the workforce she would leave to care for her children and return when her family obligations lessened (Foster, 2001). In 1947, only 31% of women had an occupation outside of the home, while, 87% of their male counter parts were employed (Blau & Kahn, 2007). Over time a drastic shift took place in the number of women choosing to enter a career. In 2000 roughly 60% of women and 74% of men had full-time occupations (Blau &

Kahn, 2007). Historically, when women make first entry into a male-dominated career they face tangible barriers to entry (Baxter, Stephen, & Thayer-Bacon, 2011).

Though teaching has long been a female-dominated role at the elementary and secondary level; teaching agriculture was largely male-dominated until after the turn of the century (Enns & Martin, 2015; Foster, 2003). In 2003, 15.7% of nationwide agriculture educators at the secondary level were female (Foster, 2003) and in 2009 males still out-weighed women two to one (33%) (Enns & Martin, 2015).

As early as 1971, there were perceptions that the entry to agricultural education would be difficult for women (Bradley, 1971). Bradley (1971) stated "the women's liberation movement has not moved in the direction of vocational agriculture teachers (p. 33). Bradley (1971) continued noting that women would have a difficult time finding a job teaching agriculture no matter their grades or experience. He continued to explain school administrators and community were not ready to welcome a female agriculture educator. While the barriers were steep, women continued to enter the profession and become both agriculture educators and teacher educators in agriculture. In the 1980s, a study was completed that showed the relationships of perceived sex bias and the decision of women to teach production agriculture. This early study led researchers to conclude that agricultural education was a profession in agriculture that offered a place for women (Ries, 1980), and helped showcase both fields creating a welcoming industry for females pursuing the career of agricultural education.

A significant change in the gender representation in agricultural education (Foster, 2003) exists from the time women were allowed FFA membership and today (Foster 2001; National FFA Organization, 2018). In 1969, the vote to strike male from the National FFA membership part of the constitution and lead to universally accepted female membership into the organization. In 2019, the fifty year celebration of women in the FFA, is what inspired this study. Since the start of women in agricultural education, little has been studied to gather the experiences of the women who first broke gender norms and how they became agricultural educators. Gathering this information could be helpful in examining the entry into the profession today, the large-scale shift in agricultural educators gender (Kantrovich, 2010, NAAE, 2016) and the inclusivity policies in place within agricultural education and surrounding organizations (US Department of Labor, 1965).

This study was guided by the theoretical underpinnings of the Feminist theory presented by Grant and Osanloo (2014). Grant and Onsanloo (2014) described an approach to gender roles in society through an analysis of factors related to gathering the experiences of those who broke traditional gender roles. Foundational patriarchy lead to the historical development of gender norms and gender roles. The establishment of gender norms lead to women's position in society through social factors, political factors and institutional factors. Gender roles lead to gender discrimination, which can devolve into oppression and result in male dominance within the industry and marginalization of women's experiences in the industry (Grant & Osanloo, 2014). Grant and Osanloo (2014) posit that the sharing of womens' experiences when departing from stereotypical gender roles leads to empowerment of women who would otherwise be bound by gender discrimination and prevent them from meet the desired tasks at hand for the careers they are pursuing.

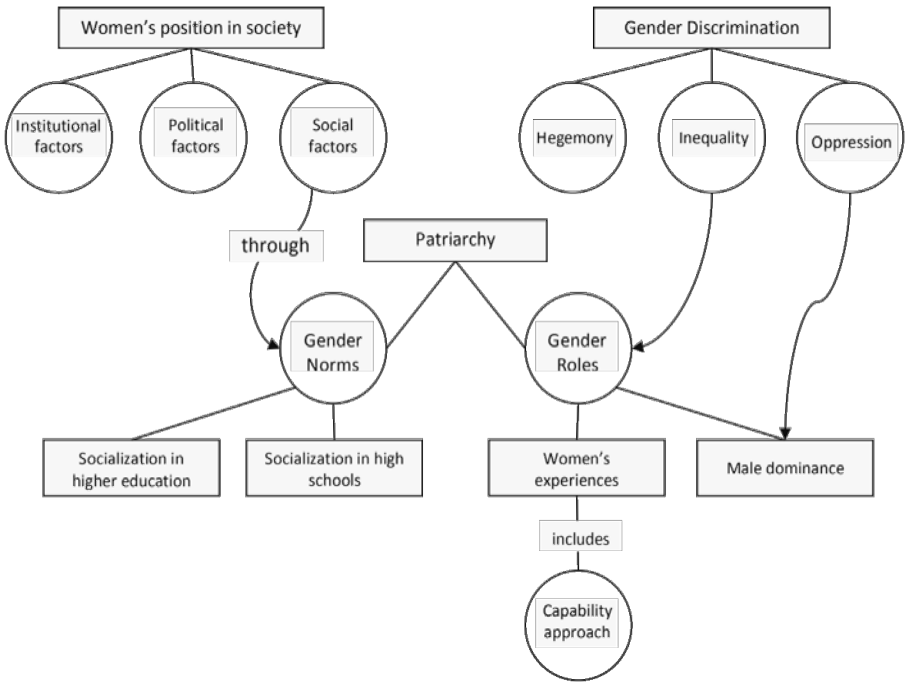

Figure 1. Grant and Onsaloo's feminist theory (2014)

Research Question

Our goal in undertaking this project was to examine the entry for women to the agricultural education profession. To guide this study, we worked to answer the following research question:

R1: What were the experiences of female agricultural educators who entered the profession as one of the first in their state or region?

Methods

This study was conducted using qualitative phenomenological methods. Creswell (2007) suggested using a phenomenology when the purpose of the research is to gather the lived experiences of individuals who experienced a common situation or phenomenon. The phenomenon of interest was entering agricultural education as a woman in areas where women had no previously held positions. This shared experience was filtered through many variables, including personal background, regional perceptions of agricultural education, and culture. By examining shared experiences, we sought to describe commonalities and differences experienced by study participants. The University of Idaho provided Institutional Review Board approval for this study. The project was funded through a grant from the Office of Undergraduate Research at University of Idaho.

Prior to recruiting subjects, we developed an interview protocol derived from the literature and historical documentation of females entering the agricultural education profession.

The completed semi-structured interview protocol included nine questions designed to give respondents opportunities to share components of their agricultural education entry. Questions included prompts to guide conversation related to agricultural background, choice to become an agricultural educator, teacher preparation experience, mentors, collaboration with other teachers, support and relationships as a teacher, and observations of changes in agricultural education since their entry. The semi-structured nature of the protocol allowed us to prompt for more information based on any responses collected. Creswell, suggests the use of a semi-structured interview in cases where the entirety of the topic is not well-defined (Creswell, 2007). As the respondents were the only people who could truly provide a holistic view of being the first women in agricultural education for an area, we deemed this structure appropriate.

We began participant recruitment by contacting state staff in agricultural education in nine western states to locate historical records of agricultural educators. Most states were able to provide access to records, either online or via email to the list of agricultural educators and/or agricultural education graduates in their state. We examined directory information to identify early women for each state. Our investigation yielded $n = 33$ names who were one of the first five women to teach in their respective state. From the list of eligible participants, we selected respondents to gather a wide variety of regions, length of time teaching, and current role/involvement in agricultural education. Contact information was obtained for selected respondents ($n = 20$), and contact was made via email or through social media messenger. From the final list of potential respondents $n = 9$ were available within the study window to complete the interview process. Creswell (1998) recommended interviewing between five and 25 individuals to gain an accurate view for a given phenomenon, and Morse (1994) noted that data analysis is appropriate with as few as six interviews.

Data collection occurred via telephone or video interviews ranging in length from 10:00 to 45:55 minutes. While video interviews were preferred, we allowed respondents to choose the format interview that they were most comfortable with, per the recommendation of Conrad and Schobar (2008). Interviews were audio and/or video recorded depending on the platform for the interview and then transcribed verbatim using an online transcription service. A member of our research team reviewed the transcribed data along with the audio file for accuracy. Transcribed interviews were separated into unique data points for analysis. From the nine completed interviews, we gathered $n = 593$ unique data points.

Data were analyzed using methods set forth by Creswell (2008). Creswell (2008) suggested phenomenological analysis should take place in five steps: describing personal experiences of the researchers with the phenomenon, developing a list of significant statements, condensing significant statements into “meaning units” or themes, writing descriptions of what and how the phenomenon was experienced, and finally developing a composite description of the phenomenon. We followed Creswell’s recommendation with the exception of describing our personal experiences with the phenomenon. Although each member of the research team developed a formal reflexivity statement as a portion of our trustworthiness criteria, none of the researchers on the team had experience with the phenomenon in question. As such, we could not describe our own experiences and eliminated the first step from the data analysis process.

Three members of the research team read through the unique data points and transcripts to develop a list of significant statements, in a process similar to open coding procedures more common in qualitative data analysis (Creswell, 2008). After creating the lists of significant statements independently, our research team met to debrief and condense the significant statements into meaning units/themes. This process allowed us to identify five themes rising from the interviews. We triangulated significant statements within themes to arrive at the final three components of phenomenological analysis. Our descriptions of what and how the phenomenon was experienced, along with the composite description of the phenomenon is included in the findings section of this manuscript.

We took numerous steps to establish trustworthiness in this study, per the recommendations of both Creswell (2008) and Lincoln and Guba (1984). First, each member of the research team developed a formal reflexivity statement to identify prior biases which may have existed in regard to this topic. There were four researchers directly involved with the project, all female. One member of our team was an undergraduate student, two were graduate students, and one served as a faculty member, all within the agricultural education arena. Common amongst reflexivity statements were positive views of female agricultural educators and positive interactions with both male and female agricultural educators.

In addition to reflexivity statements, we employed the concepts of reflexive journaling throughout the data collection and analysis process, in order to observe and mitigate personal bias in the data collection process. Following completion of data analysis, member checking occurred and each of the $n = 9$ participants had the opportunity to review their own transcripted interview, significant statements, and contributions to the overall analysis. We employed peer debriefing in the examination of significance statements, development of themes, and writing of results and composite statements. All data were recorded from primary sources through audit trails, and data were triangulated at each stage of the data analysis process (Creswell, 2007; Lincoln & Guba, 2014).

Subject Characteristics

Subjects were selected to have a range of years entering the profession and backgrounds. While the age of most respondents was unknown, all began teaching agriculture between 1978 and 1990. Subject characteristics are shown in Table 1.

Table 1

Subject Characteristics

Participant Number	Year entering profession	Current Profession	Original Academic Degree
1	1982	Teacher Prep	Animal Science and Agriculture
2	1982	Teacher Prep	Agricultural Education

3	1987	Agricultural Educator	Agricultural Education
4	1978	Retired Agricultural Education	Agricultural Education
5	1998	Agricultural Educator	Agricultural Education
6	1982	Agricultural Educator	Agricultural Education
7	1990	Agriculture Lawyer	Agricultural Education
8	1982	Agricultural Educator	Agricultural Education and Biology Education
9	1978	Retired Agricultural Education	Accounting - B.S. Agricultural Education- M.S.

Findings

Through the data analysis process, we identified five major themes related to the phenomenon of investigation. The themes included: *trailblazing*, *being qualified*, *personal sacrifice*, *male mentorship*, and *evolution in the profession.*

Theme 1: Trailblazing

The nine women who participated in this study all noted they never expected to be treated differently when entering into the profession. There were no overwhelming comments related to an unawareness of changing societal norms, only an acknowledgement of a desire to have freedom to pursue their own career path. Many of the respondents did not even notice that they were among one of the firsts in their respective state or region. Participant 7 commented while reflecting back on her hiring process

> It was very early on I was one of the first couple of women hired to teach agricultural education here in [State]. So, it played a significant role in someone trying to take a leap to hire me.

The significant statements related to this theme painted a picture of the gender-neutral mindset for women who were entering a male dominated profession. Participant 2 said, “I never knew that women weren't supposed to be doing what we were doing.” She also commented,

> I had agriculture teachers [in high school] who were open to accepting and encouraging of girls being there in the agriculture classroom. They never told us we couldn't they never made us sit in the classroom and work on the FFA record books while everybody else went to weld and I hear stories about all the time that although women had to be in the male teachers didn't include them mine were not like that.

Several participants commented about advisors recommending her into pursuing a career in agriculture education and pushed her into pursuing the education. All respondents shared that

they jumped right in and found their own way to being successful in the profession. Making strong professional networks also emerged as a concept for many participants, who sought opportunities to ask questions and continue to grow.

While all found their way into the profession, each found their own method of entry, for some it was a switch of major while at their University, others it was a combination of the passion of agriculture and education, and for some it was a career change. Participant 9 stated,

> I went into bookkeeping and accounting … and I was making a living doing that and I hated it and finally I said to my husband shouldn't I [teach agriculture] if I have all these years left to work shouldn't I do something that I enjoy?

This push from a career she did not enjoy is what motivated and persuaded her to become an agricultural educator.

Theme 2: Being Qualified

Participants had dissimilar views of gender bias from administrators or community members in the hiring process. Some participants noted there were some biases which caused issues when interviewing. Participant 1 stated,

> They showed me the shop and acted like I didn't know what to do in the shop, I showed up for the interview, but they obviously had no intention of hiring me. They were just very dismissive of me as an individual and didn't even bothered to follow up.

Community members were also concerned about some of the participants joining the school as an agricultural educator. Participant 2 stated,

> When I was hired it was to reopen a program that had been closed and the community was all up in arms because our principal had hired a woman and they were not expecting a woman to be hired. I really kind of didn't know all of that until much later as stories were shared. I thought I was supposed to be a great Ag teacher doing great stuff.

Participant number 5 had a different experience and noted that being female may have been a benefit, stating, "the superintendent said to me we've had four men in the last four years and they can't get the job done, so we might as well try something different."

Several participants noted bias in the hiring process, but felt any bias toward them was not because of their gender, but because they were new to the profession and that the bias would have been in place for all new agricultural educators regardless of gender. Participant 2 commented, "I knew I needed to just be absolutely the best teacher I knew how to be so my students and parents and our track record of achievements would speak for itself." She continued to note her belief that being a great educator is more important than the gender roles and felt hiring decisions were made based on overall qualifications rather than gender norms.

Once hired, respondents universally agreed that they were not treated differently by their peers based on gender, and felt as though they were brought into the profession with open arms. All identified as an agricultural educator, while none of the respondents self-identified as a female agricultural educator. Participant 4 commented that she felt like "one of the guys" in her agricultural education interactions. Significant statements in this theme included gender neutral

comments about being qualified as an agricultural educator and shared no evidence to indicate others in the profession felt they were not capable because of gender. Participant 8 said,

> I think if you show the effort, and you work hard, it will show through, male or female, if you're going to sit there and be like 'oh, I can't do this' it really has an impact on how people think about you and treat you. For me, I worked hard and never felt like other teachers didn't see my efforts or abilities.

Respondents also expressed universally that they knew working hard was always going to be a part of the job and not something that would be excused or expected because of gender. The expectations they set for themselves extended to a gender-neutral evaluation of other agricultural educators. Participant 6 commented,

> In my role now I see both men and women and I think there are strong ag teachers of both genders, and I think there are some that are average in both arenas [genders]. I think there are some [of each gender] that have work to do.

Theme 3: Personal Sacrifice

Being an agricultural educator was not without challenge for the first female agricultural educators. Each of the respondents noted a struggle to meet the demands of the profession. Many noted the tension between the commitment level required to be good at the job and the requirements of family life. Participant 1 noted,

> So that work-life balance is hard initially and I think that's why maybe a lot of women drop out in Idaho because they never get to that point where they're you know, profiting from their previous work.

Many significant statements in this theme related to the need to find balance within a demanding career. Three of the respondents chose to focus their time and energy on the career rather than have children of their own. Participant 1 characterized the sentiments of these respondents when she said,

> To [the topic of] having children, you know, it's extremely demanding and I never had children. I chose not to have children because I wanted a career and I just couldn't figure out how to do both.

Several respondents commented on the career benefits they experienced by having a supportive spouse who was willing to step outside of traditional male gender roles to assist in household responsibilities. All participants agreed with the importance of having a partner who was aware of the time commitment and schedule of being an agricultural educator. One participant commented that her spouse was aware of the duties in an agricultural education program because of his involvement in agricultural education and noted that their marriage was not impacted by her career because of his knowledge that she would be required to spend late nights and non-school hours performing the duties required to be an agricultural educator.

The women in this study all felt more comfortable finding balance in their careers and home life as they increase in experience. commented that the work-life balance came with time when they became comfortable in their job and could grow with in the profession in and out of

the classroom. Participant 1 commented, “it becomes more pleasurable because you're older you're wiser. You have your lessons developed. You have everything down.”

Theme 4: Male Mentorship

Contrary to worries published prior to women entering the profession, the respondents in this study were not met with overwhelming opposition from male agricultural educators as the first females to join the profession. In fact, respondents universally noted the strong impact of male mentors and supporters who pushed them into the profession and then took a vested interest in their success. For some it was their father, for others it was their high school agricultural educators or university faculty.

Male mentors defended them and helped them out while entering the profession. They were the ones who helped them with curriculum, navigating the components of a total agricultural education program, and provided the friendship, camaraderie, and love needed to make these women feel part of the profession.

Participant 2 recalled that years after her hire, she was made aware that male mentors in a neighboring school stood up for her when she was first hired, and the community had questions about her qualifications. She shared the following story,

> I didn't know until much later the number of times the parents were calling them [male teachers at a neighboring school] complaining about me and how I was doing something that a man wouldn't have done... I never knew any of that because they were very supportive of me and didn't undermine me and didn't listen based on those phone calls. They were very supportive of me and defended me. It was much later when they shared with me... they were absolutely incredibly supportive of me in trying to defuse any of that and defend what I was doing. They told the community basically to give me time and let me make mistakes and learn and do my job. That really mattered to me.

All respondents noted the importance of relying on male mentors, as there were no older females in agricultural education for them to look up to. This reliance on mentorship was a common thread when respondents discussed the importance of feeling part of the profession.

Theme 5: Evolution in the profession

All respondents commented on the changes in the profession, citing that there are more demands placed on agricultural educators today than at their time of entry. Respondents cited numerous new regulations and requirements for collaboration, curriculum integration, and paperwork, along with noting how teaching as a profession has evolved to meet the evolution of technology and the students at hand in a variety of communities. Many mentioned how the dynamics between teacher and student has changed since their time in the classroom began.

The gender shift was also seen as a huge evolution in agricultural education, with most respondents commenting their pride at seeing the growth in female agricultural educators in a once male dominated profession. All noted some level of personal satisfaction in knowing that there was a place for women in agricultural education through the entire process. Participant 4

noted that her first real visual of the evolution of the profession was at a state agriculture teacher conference when, “I had to wait in the bathroom for the first time.”

The other evolution observed by respondents was the changes to entry experience in the field. One participant commented, “I got the preparation that was prevalent at that time.” She continued to comment about the pre-service teacher programming has evolved into something incredible. The evolution of teacher preparation is one that is ever evolving to meet the needs of the students, the women in this study commented on the change favorably and noted their desire to be a part of the future of agricultural education.

Composite Statement

The shared experience of some of the first women to enter the agricultural education profession was not what many expected it to be. For most, the journey began with a passion for education and agriculture, spurred on by the confidence of their male role models both in and out of the profession. These women entered a profession largely without an awareness that they would be seen as pioneers. Respondents worked hard to meet the demands of the job, making personal sacrifices in order to fulfill career requirements. Individually, the women in this study did not call attention to differences between genders, preferring to let their skills and abilities stand without attachment to a gender norm. They were met by a profession of men who were welcoming and warm, men who provided mentorship, friendship, and guidance early on and throughout their careers.

Conclusions/ Discussion/ Implications

The experiences of those who were among the first women in agricultural education allow us to draw several conclusions of interest for the profession. First, while there is evidence in the literature to suggest difficulties for women entering the profession in the early 1970s (Bradley, 1971; Enns & Martin, 2015), most of the women in this study did not recall overwhelming biases against them. This was one example of the school district “trying something new” for the agricultural education program. In the 1980s, it was suggested that agricultural education was a career that women who wanted to pursue careers in agriculture would enjoy and be the perfect combination of agriculture and a female dominated career of teaching (Ries, 1980).

Another conclusion we drew from the data was that all respondents had a strong commitment to the profession. All respondents noted work-life balance issues, even though none of the interview protocol questions specifically asked for respondents to comment on work-life balance. This finding allows us to suggest that perhaps work-life balance has always been a concern for female agricultural educators. Many respondents noted the influence of traditional child-rearing roles in their planning for agricultural educator responsibilities, which aligns with the gender role implications of Grant and Osanloo’s (2014) views of persistent barriers for women who break societal roles in their occupation. More work is to be done in this area as we examine whether differences exist in workload for male and female agricultural educators. Understanding this topic more completely could provide insight to help teacher educators and

leadership in agricultural education develop programming related work-life balance professional development.

The first women to enter the profession were a unique group of individuals. They sought an opportunity and career of their own and brought forth generations of female agricultural educators after them. The ability of these individuals to ignore gender norms and move forward with confidence certainly does not fit with their generational culture. However, without their persistence, the ground would have been broken much later for women whom wanted to pursue careers in agricultural education. These individuals sought mentorship on their own, found a place in an occupation which was male dominated for over fifty years, they created a network of other educators, and became mentors themselves to new agriculture educators. These individuals made sacrifices in their life to be successful in the profession.

When discussing the next step in research and what recommendations by the research team. This research topics of entry experiences can be modified into looking into seeing the evolutionary changes in entry experiences through the generations of agricultural educators. Seeing the entry experiences between first year educators and those close to retirement is one that would be recommended to look into. Seeing the barriers of what an agricultural educator goes through could possibly help the profession gain more agricultural educators. As well, seeing these barriers can help adapt the preparation experiences provided for all agricultural educators. With these experiences being documented, the next step is seeing their barriers of entering the profession. With seeing the profession you can see the different ways of helping the new generations of agricultural educators. Other items that could be looked into is the seeing of the entry experiences of those who may have barriers entering the agricultural education profession that is not based off of the gender roles.

In 2017, the data provided by the National Association of Agriculture Educators indicated those entering the profession through a traditional teacher preparation program 506 (69%) were female and 234 (31%) were male (Smith, et. al, 2018). Then in 2018, the data showed a growth continuing in females entering the profession to 6236 (71%) were female and 250 (29%) were male (Smith, et al., 2019). This shows a major shift from women entering a career in agricultural education to today. The numbers for women entering the profession are even more profound. As of 2018, there were 6,099 female and 7,250 male current agricultural educators nationwide (Smith, et al., 2019).

As the landscape of agricultural education changes, and the gender roles rapidly shift to a place where there is the potential to have more women in the profession than men, we can learn from the lessons of those who were first women to walk this path. These individuals blazed trails for the current and future women in the profession, and while there may be many lessons left to be learned about gender roles and inclusion in agricultural education, these women may hold the knowledge we need to take steps in the right direction.

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Personas of Agricultural Education Supporters: A Q-Method Study

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Educational partnerships are an essential part of agricultural education programs whereby external supporters give their time, talent, and resources to assist teachers and students. An agricultural teachers' ability to recruit and retain quality supporters relies in part on their understanding of the characteristics and preferences of those individuals. In this study, we utilized a Q-method research design to examine the perspectives that existed related to school-based agricultural education (SBAE) supporter personas in Idaho. Deci and Ryan's (1985) Self Determination theory served as the framework for our study. Our participants included a diverse set of 49 individuals who give their time, talent, or resources to support Idaho SBAE programs. Participants completed a questionnaire, q-sort procedure, and interview to examine components of each respondent's viewpoint related to serving as an agricultural education supporter. Three common viewpoints, or personas, resulted from the data which were classified as: Developers, Amplifiers, and Visionaries. SBAE teachers should recognize that different personas of supporters exist and be intentional with selecting, training, and managing supporters in a manner that benefits the supporters' experience with the SBAE program. Researchers should further explore the experiences and preferences of SBAE program supporters from the supporters' perspective.

Introduction

The critical role educational partnerships play in preparing students for success is a shared vision of practitioners in psychology, general educators, and educators in agricultural extension and school-based agricultural education (SBAE) (Albrecht & Hinckley, 2012; Culp, 2012; Dodd & Boleman, 2007; Epstein, 2011; Foster, Masser, & Sankey, 2012; Masser, Foster, & Falk, 2013; Tillinghast, Ramsey, & Terry, 2014). Researchers, policymakers, and educational leaders support these partnerships as components helpful to improve school function, expand educational experiences, increase student interest in post-secondary training, and prepare students for careers (Alleman & Neal, 2013; Epstein, 2011; Ferguson & Lamback, 2014; Sanders, 2003). The renewed significance of partnerships is evident in recent discussions surrounding education reform, community development, and workforce readiness (USDOE, 2012; Executive Office of the President, 2009; Fuller & Raman, 2017). Researchers have found that educational partnerships are linked to improved grades and attendance, increased civic involvement, reduced behavioral problems, greater classroom cooperation, and increased capacity for self-direction. (Blank, Melaville, & Shah, 2003; Epstein, 2011).

Because SBAE programs are rooted in Career and Technical Education (CTE), technical skill development and career readiness are integral elements of SBAE programs (Newcomb, McCracken, Warmbrod, and Whittington, 2004). Researchers have found that close collaboration between schools, employers, and communities can result in a more effective skill development in students, help schools and teachers facilitate more meaningful and relevant education, provide more resources for school programs and classes, and assist staff and teachers in guiding students

in career decisions (Ferguson & Lamback, 2014; Ferguson, Schwartz, & Symonds, 2011; Gross, Haines, Francis, Blue-Banning & Turnbull, 2015). Collaboration with parents, industry, and community members is a foundational and required component of SBAE programs in order to receive funding from the Carl D. Perkins Career and Technical Education Act of 2018 (Albrecht & Hinckley, 2012; H.R. 2353, 2018; Tillinghast, Ramsey, & Terry, 2014). In SBAE programs, educational partnerships exist when supporters such as community, industry, or government-affiliated entities or individuals give their time, talent, and resources to assist teachers and students (Masser, 2014).

Agricultural teachers value the contributions they receive from supporters (Masser, 2014; Solomonson & Retallick, 2018). Non-affiliated supporters, FFA alumni chapters, and advisory councils provide support as chaperones, guest speakers, event judges, and coaches (Albrecht & Hinckley, 2012; Gossen, 2011; Masser, Foster & Falk, 2013; Phipps et al., 2008). Supporters also play a role in classroom instruction, provide job placement, supervise SAE programs, and assist with program planning (Baker & Futrell, 2017; Masser, 2014). SBAE program supporters are critical to an agricultural teachers' ability to foster community partnerships, increasing students' career awareness, and develop students potential for personal and professional success (Newcomb et al., 2004; Talbert, Vaughn & Croom, 2005).

Both new and experienced teachers indicated that recruiting and managing supporters is challenging (Boone & Boone, 2007; DiBenedetto, Willis, & Barrick, 2018; Solomonson & Retallick, 2018; Sorensen, Tarpley, & Warnick, 2010). Complex factors such as education program requirements, supporter needs and motivations, and administrative backing all effect the success of educational partnerships (Clary & Snyder, 1999; Dodd & Boleman, 2007; Epstein, 2011). The individual characteristics of supporters can have an impact on their willingness and interest to engage in educational partnerships (Baggetta, Han, & Andrews, 2013; Rochester, 2010; Studer, 2016). Understanding the needs and preferences of SBAE supporters could provide insight to equip teachers with the skills and tools to implement and maintain strong educational partnerships (Bussell & Forbes, 2002; Phillips & Little, 2002; Rochester et al., 2010). Few studies have explored the perspectives and characteristics of SBAE program supporters. Further investigation is needed to help agricultural educators and administrators effectively recruit and retain SBAE program supporters (Masser, 2014).

Common elements crucial to recruiting and retaining volunteers include satisfied motivations, collective program goals, strategic supporter selection and preparation, consistent management and communication, thorough evaluation, and purposeful recognition (Clary & Snyder, 1999; Culp, 2012; Decker & Decker, 2003; Dodd & Boleman, 2007; Epstein et al., 2009; Sanders, 2003). We used the subjectivity of our participants to test the importance of these concepts when applied to SBAE supporters' perceptions and experiences. Exploring the characteristics of supporters who collaborate with agricultural educators and contribute to SBAE program success aligns with Research Priority 5 of the American Association for Agricultural Education National Research Agenda, Efficient and Effective Agricultural Education Programs (Thoron, Myers, Barrick, 2016).

Researchers have explored SBAE partnerships largely from the perspective of agricultural teachers, although supporters play a crucial role in the creation and sustainability of

educational partnerships (Clary & Synder, 1999; Decker & Decker, 2003; Rochester et al., 2010; Studer, 2016). In this study we sought to better understand supporters who are actively involved with SBAE programs. Due to a lack of published studies related to this topic in SBAE disciplines, researchers in general education partnerships, volunteer management, and agricultural extension provided additional foundational literature related to supporters' preferences and experiences (Culp, 2012; Epstein, Simon, Salinas, & Jansorn, 2009; Penrod, 1991; Rochester et al., 2010; Sanders, 2001, 2003; Studer, 2016).

The framework for our study was Deci and Ryan's (1985) self-determination theory (SDT). Deci and Ryan (1985) posited that intrinsic factors, such as interests and care, and extrinsic factors, such as rewards and evaluations, facilitate a person's motivation. They examined how biological, social, and cultural conditions facilitate or undermine human capacity for growth and engagement (Deci & Ryan, 1985). The authors suggested that humans have three basic psychological needs including a desire for some control over their lives and behavior, a desire to have knowledge and competence, and lastly a desire to have connection and relationships (Deci & Ryan, 2017). In this study, we examined SDT factors with individuals' subjectivity in reference to conditions that support or undermine their attainment of these needs when interacting with SBAE programs.

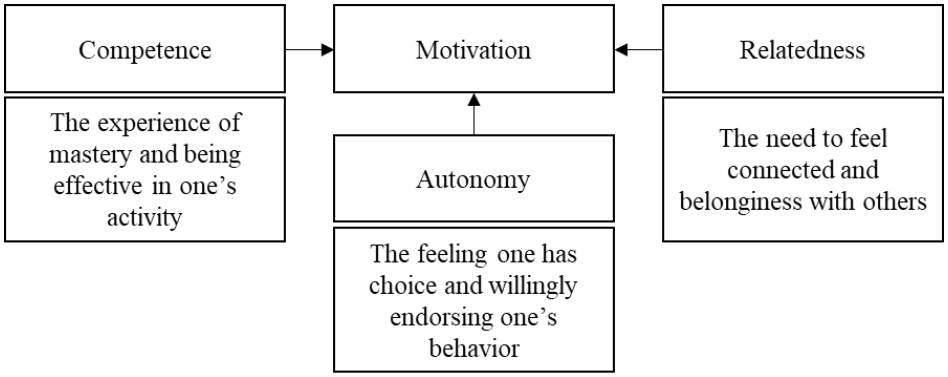

Figure 1

Self Determination Theory

Purpose/Objectives

The purpose of this research study was to examine the perspectives that existed related to SBAE supporter personas. Specifically, this study aimed to meet the following objectives:

1. Describe the personas of selected SBAE supporters in Idaho.
2. Identify the training and communication preferences of selected SBAE supporters in Idaho related to personas.
3. Identify the motivations of selected SBAE supporters in Idaho related to personas.

Methods

We used a Q-method research design along with survey methods to meet the objectives of this study. Q-method is a way to identify personal beliefs, opinions, or subjective meaning in an attempt to define general types or patterns of perspectives held by a particular group (Watts &

Stenner, 2012). The process allows researchers to flip traditional *spearman r* correlations (Leggette & Redwine, 2016). According to Leggette and Redwine (2016), instead of using instruments to test the performance of an individual and make comparisons to the population, Q-methodology uses each individual, complete with all the subjectivity and holistic diversity, as tests for the performance of items (p. 51).

Q-methodology was chosen in this study as the primary objective was to define types of patterns or perspectives held by the supporters of SBAE programs. Q-method includes three main components: Concourse (population of ideas on a given topic), Q-set (sample of ideas that will be analyzed), P-Set (participants who will sort statements in the Q-set). The Q-method allows the three components of concourse, Q-set, and P-set to be analyzed and interpreted through statistics rooted in factor analysis (Watts & Stenner, 2012; Van Exel & de Graaf, 2005).

Concourse and Q-Set Development

Q-method allows respondents to use personal preferences to sort a set of statements into a forced quasi-normal curve (Stephenson, 1935). Watts and Stenner (2012) note that 40-60 statements is adequate to cover a topic in which respondents exhibit strong feelings or knowledge. We selected a 40 statement Q-set, following the recommendation to use a more flattened curve in situations when respondents have large amounts of subject knowledge (Watts & Stenner, 2012).

To generate the Q-set, Watts and Stenner (2012) recommend conducting an exhaustive literature review of the concourse of ideas surrounding the issue to be examined. For this study, we developed a concourse to include concepts relevant to supporter experiences, perceptions, and preferences while supporting SBAE programs (Watts & Stenner, 2012). We explored literature in agricultural education, agricultural extension, school-business partnerships, and volunteer management, and generated 96 issues, theories, findings, and recommendations related to the concourse. Concourse items were organized by theme and examined to develop concise statements, each with both a point of view and connection to a concourse item. This process allowed us to generate 51 statements, called the Q-set, related to information including management, communication, evaluation, and recognition (Watts & Stenner, 2012).

The 51 Q-set statements were validated by a group of agricultural education faculty members, all with experience managing SBAE supporters. In addition, we conducted a semantic review of statements using undergraduate research students at the University of Idaho. The review process helped to identify and refine 40 statements balanced across the concourse and providing coverage of all applicable content areas, per the recommendation of Watts & Stenner (2012).

P-Set

Participants (P-set) identification began by examining the Q-set and estimating the number of expected viewpoints related to concourse items including; motivation, industry-ties, FFA membership affiliation, former volunteer efforts, and life cycle of support (Watts &

Stenner, 2012). Based on this examination, 11 diverse supporter viewpoints emerged. To recruit participants for the study, we contacted Idaho agricultural educators for recommendations and a description of each supporter. Van Exel and de Graaf (2005) recommend obtaining four to five participants for each defining viewpoint. Our initial recommendations from agricultural educators included no fewer than four participants for each of the 11 identified viewpoints.

We contacted potential participants via email and/or phone call to request participation. No participants declined to participate for reasons outside of scheduling conflicts. Our final P-set consisted of 55 participants with varying degrees of relevance, experience, and perspective related to the study concourse (Watts & Stenner, 2012). Of the 55 participants, (n = 49) was our final sample, as a result of unsuspected cancellations. During the data collection process, we verified participants' defining viewpoints to ensure we were obtaining the intended, necessary number of diverse participants. Once agreeing to participate, P-set members identified a time and location to join the research team and complete the components of the study.

Data Collection

Data were collected in five locations across southern Idaho, in December 2018. Data collection for each participant occurred in four phases: initial questionnaire, presorting process, Q-sort, and follow up interviews with each participant. The pre-sorting questionnaire for this study included the Volunteer Function Inventory (VFI) instrument (Clary et al., 1998) and an adapted survey from Masser's (2014) study. We used the VFI to measure motivation (Burns et al., 2006; Burns et al., 2008; Clary, Snyder & Ridge, 1992; Clary et al., 1998, Papadakis et al., 2004). The instrument measures six motivation functions including: values, understanding, social, career, protective, and enhance.

Participants self-reported the important and accuracy of 30 statements related to their motivation using a 7-point Likert-type scale. Post hoc analysis of the VFI instrument resulted in a sufficient Cronbach's alpha coefficient score (α = .79). We used the adapted survey from Masser's (2014) study to measure the participants' preferences for training and communication methods on a Likert-type scale. Participants used a 5-point Likert-type scale to rank their preference for face-to-face, email, mailed letters, phone call, social media, and text message communication methods. In the next block of questions, participants used the same 5-point Likert-type scale to rank their preference for various training methods including formal training, informal discussion, self-guided online training, and written document.

Participants were asked to begin the Q-sort by presorting the 40 statements into piles they agreed with, disagreed with, or were indifferent to. Watts and Stenner (2012) recommend a presorting process as a means to measure general agreeability of a participant related to the Q-set. During the Q-sort procedure, participants ranked the Q-set statements based on their psychological significance (Watts & Stenner, 2012). The stem, or common set of words "As a supporter, I…", preceded each statement, and was used to ensure participants approached each statement with a specific frame of mind (Watts & Stenner, 2012). They placed statements that were most meaningful or important to them on the positive side of the curve and statements that were least meaningful on the negative side. A member of the research team observed each

participant as they placed the statements on the Q-sort table, journaled observations of their sorting, and recorded the Q-sort ranking after the participants were finished (Stephenson, 1935).

After the sorting was completed, we conducted a semi-structured interview to explore each participant's wider perspective and capture the meaning and significance participants held behind certain items and themes (Watts & Stenner, 2012). Questions asked during the post-sorting interview included an explanation of the items placed at extremes, personal meaning for certain statements, items the participant felt were omitted, and any additional questions unique to the participant (Watts & Stenner, 2012).

Data Analysis

Questionnaire data were entered into excel by hand and analyzed using SPSS. The mean and standard deviation was reported for communication and training preferences and the mean, range, and standard deviation were reported for the VFI functions. The data was used to confirm and corroborate the tone of certain interpretations reported from the Q-sorts (Watts & Stenner, 2012). To analyze the Q-sorts, we used PQMethod software that examined the location of ranked statements in relation to other items to identify similar types of participants (Schmolck, 2014).

To begin, we calculated a correlation matrix to show the level of agreement and disagreement between all completed (n = 49) sorts (Watts & Stenner, 2012). We then identified the number of groupings that are similar and dissimilar. These groupings of shared meaning and viewpoints were extracted to serve as our factors (Van Exel & de Graaf, 2005). We made an *a priori* decision to only extract factors with an eigenvalue of 1.00 or higher to indicate a factor's statistical strength (Guttman 1954; Kaiser, 1960). Based on PQMethod factor loading results, we used alternative factor extraction solutions to that took a holistic view of analysis and were responsive to the data (Watts & Stenner, 2012). We used Brown's (1980) calculation to manually extract factors based on a 0.408 level of significance of two or more Q-sorts in each factor.

We interpreted each factor through a careful and holistic inspection of distinguishing Q-set statements, the items in the exemplary sorts, and post-sorting interview data (Watts & Stenner, 2012). Significant differences between the three factors were interpreted by referencing z-scores at a $p < 0.01$ level. The z-scores were converted into a factor array to further aid in the interpretation process. A factor array is a single Q-sort configured to represent the viewpoint of a specific factor that forms the basis of persona development (Watts & Stenner, 2012).

We worked through each factor array, and placed statements into categories to identify perspectives about which each factor was polarized relative to other factors. The categories were compiled into a crib sheet that delivered a more complete view of viewpoints within each factor. It is critical to understand and report the distinctive characteristics that are unique to each factor (Watts & Stenner, 2012). To develop a complete persona description, pre-sorting questionnaire data and post-sorting interview data were connected to the data derived from the factor arrays.

Results/Findings

A total of 49 Q-sorts were intercorrelated and factor-analyzed with 26 sorts loading significantly to one of three factors. We interpreted each factor through a careful and holistic inspection of distinguishing Q-set statements, the items in the exemplary sorts, and post-sorting interview data (Watts & Stenner, 2012).

Objective 1: Describe the personas of selected SBAE supporters in Idaho.

A total number of 49 Q-sorts were intercorrelated and factor-analyzed. Of the 49 Q-sorts, 26 loaded significantly to one of three factors. Factor loadings with ± .408 or above were significant at $p \leq 0.01$ level. Factor 1 accounted for 22% of the variance. Factor 2 accounted for 20%, and Factor 3 accounted for 17% of the variance. This led to 69% of the study variance being accounted for in three factors. The exemplary sorts in each factor were combined to create a typical Q-sort for each factor called a factor array. We interpreted the factor arrays through a careful and holistic inspection of the items in each array (Watts & Stenner, 2012). We also used findings from post-sorting interviews to fully explain the viewpoint captured by each factor. Factor 1 had 11 defining sorts. Factor 2 had eight defining sorts, and Factor 3 had seven defining sorts. The factor characteristics related to defining sorts, reliability and standard error of z-scores are exhibited in Table 1. The reliability scores show that the factor extraction solution was reliable.

Table 1

Factor Characteristics

Characteristic	Factor 1	Factor 2	Factor 3
No. of defining sorts	11	8	7
Average reliability coefficient	0.80	0.80	0.80
Composite reliability	0.98	0.97	0.97
Standard Error of factor z-scores	0.15	0.17	0.19

The three factors that met the criteria of the calculation were extracted from the data for further analysis. This led to 69% of the study variance being accounted for in three factors (Watts & Stenner, 2012). We then manually reviewed each factor to flag defining sorts, that were above the .408 significance level and therefore have more than half of their common variance in one factor (Schmolck, 2014; Watts & Stenner, 2012). Sorts with confounding scores were not included as defining sorts. There were 26 defining sorts and 23 confounding sorts. We calculated the correlation between factors to determine that the extracted factors were dissimilar enough to be distinctive viewpoints (Watts & Stenner, 2012).

We named Persona 1 supporters *Developers* after reviewing the defining statements. These individuals value working with supporters with diverse viewpoints and did not seem to believe the teacher and supporters need to share the same vision for the program. We interpreted that these supporters viewed the community and SBAE program as an integrated system focused on students and therefore saw their support as critical to the success of the program. They did not expect the teacher to be everywhere the supporters are and expect the teacher to use supporters to free up time for their own family. They also reported being likely to seek opportunities to recruit and mentor new supporters.

Developers reported being willing to learn new skills and did not believe they should be able to choose the task they assist with. They began supporting the program to contribute to the good things that were already happening. These supporters reported that they would not stop volunteering if they received negative feedback. They also reported not valuing public appreciation and instead requested small personal gestures from the teachers or students to show that their contribution is valued and impactful.

Persona 2 supporters became known as *Amplifiers* after reviewing the defining statements. These supporters placed high importance on helping students reach career success and gain knowledge in agriculture. Amplifiers desired to support SBAE programs because they saw good things happening and specific program areas and outcomes they could enhance. We interpreted that these supporters view their contribution in a specific way and are more likely than other supporters to choose tasks that align with their current skillset. They reported wanting to enable the teacher to do otherwise unattainable work, such as network with community members or obtain sponsorships for events and projects.

Amplifiers believe there is room for multiple supporter viewpoints in the program and do not expect the teacher and supporters to share the same viewpoints. They reported desiring to choose the tasks with which they assist. They were more likely than other supporters to desire public recognition if they represent a company but prefer small forms of appreciation such as conversations with students about their projects. These supporters reportedly welcomed evaluation of their contribution to the program and saw it to optimize their support.

Persona 3 supporters became known as *Visionaries* after reviewing the defining statements. These supporters were most likely to believe that supporters should be chosen, interviewed, or invited to support the SBAE program. Visionaries expected a sense of shared vision and teamwork between the supporters and agricultural teacher, yet they also believed that anyone who wants to support the program should be able to. They are willing to be assigned tasks that do not align with their current skills, and do not believe they should choose projects.

Visionaries were more likely to begin supporting programs because they saw changes that could be made and were willing to contribute whether there were in a comfortable environment. They reported being capable of evaluating their own contribution. These supporters were least likely to expect recognition for their support from students or other supporters. They also did not desire public appreciation for their support and instead wanted to feel a sense of connection to the teacher, students, and program.

Analyzing consensus statements enabled us to see which Q-set statements did not distinguish between any pair of factors. We found that all supporters felt positively about helping students find careers in agriculture and achieve personal success. They all reported expecting some amount of teamwork between the teacher and supporters and felt positively about communication among supporters. All participants reported working hard when they are part of a team that works hard, but they did not expect everyone to get along. They also welcomed opportunities to support independently of their family and friends and reported feeling negatively about only supporting SBAE programs that serve their kids.

The supporters in this study felt negatively about public recognition from the teacher, students, or other supporters. They spoke positively about personalized appreciation. All participants felt positively about their ability to provide unique insight to the program. They did not expect to receive feedback of the effectiveness of their support.

Objective 2: Identify the training and communication preferences of selected SBAE supporters in Idaho related to personas.

As reported on their questionnaires, Developers preferred to use face-to-face (*M* = 4.82), text message (*M* = 4.18), and email communication (*M* = 4.09) methods. Amplifiers preferred to use text message (*M* = 4.25) and email (*M* = 4.13). Visionaries preferred to use text message (*M* = 4.43), email (*M* = 4.14), and face-to-face (*M* = 4.00) communication methods.

Table 2

Frequencies and percentages of participants' communication preferences (*n = 49)*

Method	*Min*	*Max*	*M*	*SD*
Text Message	1.00	5.00	4.22	1.05
Face-to-face	2.00	5.00	4.16	1.11
Email	1.00	5.00	4.14	1.08
Phone Call	1.00	5.00	3.92	1.10
Mailed Letters	1.00	5.00	2.90	1.25
Social Media	1.00	5.00	2.41	1.41

Regarding training methods, Developers most preferred a written document (*M* = 4.36), followed by an informal discussion (*M* = 4.18). Amplifiers preferred to be trained with informal discussion (M = 4.50) followed by a written document (*M* = 3.63). Visionaries preferred an informal discussion (*M* = 4.29) and formal training program (*M* = 3.86). Of the supporters who served as exemplary sorts for persona interpretation, (*n* = 18) 69% preferred to be prepared for their role by an agricultural teacher.

Table 3

Frequencies and percentages of participants' training preferences (*n = 49)*

Training methods	*Min*	*Max*	*M*	*SD*
Informal discussion	2.00	5.00	4.37	0.81
Written document	1.00	5.00	3.53	1.31
Formal training program	1.00	5.00	3.30	1.31
Self-guided online training	1.00	5.00	2.76	1.18

Objective 3: Identify the motivations of selected SBAE supporters in Idaho related to personas.

Based on their VFI scores, supporters in all three personas expressed altruistic motives to act on their beliefs and concerns through volunteering (Developers, *M* = 6.17, Amplifiers, *M* = 5.88, Visionaries, *M* = 5.77). Developers were also motivated, more than the other personas, by learning and sharing knowledge (*M* = 5.25). They were least motivated by advancing their career (*M* = 3.16). While Amplifiers were least motivated by reducing guilt (*M* = 1.70), Visionaries were least motivated by social factors (*M* = 1.71).

Table 4

Participants' Volunteer Functions Inventory scores (*n = 49)*

Construct	*Min*	*Max*	*M*	*SD*
Values	3.60	7.00	5.91	1.34
Understand	2.40	7.00	4.84	1.77
Social	1.00	6.20	3.94	1.92
Enhance	1.00	6.60	3.57	1.75
Career	1.00	6.20	2.53	1.87
Protective	1.00	6.00	2.52	1.83

Conclusions/Recommendations/Implications

A selected group of Idaho supporters placed meaning on their interaction with SDT factors while supporting SBAE programs by completing a questionnaire, Q-sort procedure, and interview (Deci & Ryan, 1985). Three distinct supporter personas were discovered through this examination. Teachers should recognize the three unique viewpoints of supporters regarding their preferences and values, learn the personas represented in their SBAE supporters and or build a group of supporters with a combination of personas that fits their program needs. Researchers should also recognize the three supporter personas and conduct further studies to better understand SBAE program supporters. The collective viewpoints shared by the entire P-set of participants should also be acknowledge to better understand supporters collectively.

Regarding Developers, we recommend that recruitment efforts towards this persona should focus on their potential to influence students, the community, and agriculture. Messaging toward these supporters should showcase the impact of the SBAE program on the greater surrounding community. Because they care about students' personal and career success, these supporters should spend time with students learning about their projects or helping them prepare for a CDE. They are likely to enjoy seeing how their support benefits students, and the agricultural program. They should be given projects that require skill development and problem solving with other supporters.

Being open minded will be important when managing these supporters. They welcome new ideas and do not mind conflict if it leads to a better outcome for students. They will welcome diverse viewpoints and have the potential to be a great recruiter and advocate for the program. They will likely appreciate feedback as an informal discussion, focused on their task or project rather than on them as a supporter. The teacher and students should show appreciate to them through small meaningful gestures such as thank-you cards from students, a verbal "thank

you” from the teacher, or an acknowledgment from students when they see the supporter outside the agricultural program.

When recruiting Amplifiers, practitioners should showcase program success and outline future goals that supporters can contribute to. They may desire to choose a specific task that aligns with their skillset and the needs of the program. Teachers should utilize text messaging and email to communicate with these supporters, as they are unlikely to prefer face to face communication. Amplifiers are less likely to have background knowledge about SBAE programs and will appreciate information to help them decide how to help and options of what they can assist with. Tasks for these supporters should be well-defined, such as serving on the advisory council or coaching a CDE team or sponsoring and attending an advocacy event or serving as the secretary at an auction.

We recommend that Amplifiers be involved in the evaluation process of projects in which they are involved. These supporters may stop supporting if they receive negative feedback, so practitioners should focus on the positive impact of potential changes to their contributions. These supporters may want public recognition, if they represent a company, but they will likely also desire small gestures to feel personally appreciated. Additional methods to show appreciate may include letters that showcase student success stories, or students’ post-secondary and career goals.

Visionaries may need to be asked to engage with SBAE programs and would likely appreciate a teacher or alumni member to get to know them personally. Teachers should consider interviewing these individuals to understand their specific skill set and harness their intentional involvement. These supporters would respond well to an informal discussion to prepare them as supporters. They may also be interested in attending a formal training program. They are likely to begin supporting an SBAE program because they see a need or project that they can improve with their skillset.

These supporters are likely to appreciate efficient meetings and focused discussions related to their supporter role. They will want to be part of a close-knit team that communicates with one another regarding their work and shares the same vision for the future of the SBAE program. These supporters do not expect feedback relating to their contributions. They hold great pride in helping the students and program, so when engaging them in evaluation measures related to their work, ask them to generate ideas of how their contributions can improve. In leu of public recognition, provide these supporters with small gestures of individualized appreciation.

The intrinsic, values-driven motivation of our study participants is supported by literature as a common volunteer trait (Clary & Snyder, 1999; Rochester, et al. 2010). However, in analyzing consensus statements, we found that additional motivators of promoting career success, agricultural knowledge, and personal growth for students in SBAE programs were very important to supporters. These motivators seem to be built not just by their values, but also their lifestyle, career, and perception of the importance of agriculture. SBAE supporters may have more unique motivation than the literature suggests. We recommend that practitioners need to openly promote, communicate, and advocate for the vision and goals of SBAE programs so supporters can see where their skillsets, experiences, and interests align with the program.

Across all personas, the supporters did not expect everyone to get along, preferred informal training methods, and felt unsure that all meetings need to be efficient. Researchers argue that a pleasant environment and well-planned management are among factors that increase volunteer commitment (Culp, 2012; Fritz, Barbuto, Marx, Etling, & Burrow, 2000; Penrod, 1991; Rochester, et al., 2010). SBAE supporters may require less structure and comfort than initially conceptualized, however, they all felt positive about the importance of teamwork, and favor communication between the teacher and other supporters. We recommend that practitioners maintain structure within their supporter group, but also provide foundation for teams to form and communicate regularly with the group.

Supporters felt unsure about expecting feedback and evaluation regarding their support. Evaluation is an important component of general education and agricultural extension partnerships (Culp, 2012; Dodd & Boleman, 2007; Epstein, 2009). These supporters may feel negative or unfamiliar with the word "evaluation" in relation to their role and therefore require more open dialogue and positive reinforcement surrounding the effectiveness of their support. Supporters felt negatively about receiving public recognition. Recognizing those who volunteer their time to an organization is important (Culp, 2012; Dodd & Boleman, 2007; Phillips & Little, 2002), however, private forms of recognition to show genuine appreciation were favored by this group. We recommend additional forms of recognition such as conversations about the impact of their support, sincere respect, stories of student success, timely communication, thank you cards, and small gestures. (Dodd & Boleman, 2007; Penrod, 1991; Tillinghast et al., 2014).

Based on the results of this study, our first recommendation for research is to refine the concourse and Q-set and replicate this study to better enable study participants to organize statements. Of the total number of sorts utilized in data analysis, 23 sorts were confounded and therefore could not be used to explain a singular viewpoint. Content clarity of Q-set statements relating to appreciation and recognition, and evaluation and feedback may better enable study participants to organize statements based on their personal experience and perceptions relating to their support. Several published studies of SBAE program supporters survey agricultural teachers, leaving the experiences and preferences of supporters up to interpretation. Our second recommendation is to further explore SBAE program supporters from the supporters' perspective to uncover important findings related to commitment, motivation, and supporter life cycle.

Our third recommendation is to continue exploring motivations of SBAE program supporters to understand the distinguishing characteristics that influence their motivations. The differences in motivation between supporters was evident with relatively high standard deviations and relatively large ranges of VFI scores reported by participants. There were also sizable differences between the motivations of participants in and between factors in this study.

Our fourth recommendation is to explore the relationship between the duration of support and supporter demographics, years lived in their community, preferences, or experiences. Researchers in volunteer management disciplines have studied the life cycle of a volunteer and its influence on their commitment (Rochester, 2010; Rotolo, 2000). Given the findings of this study, SBAE program supporters may have a different life cycle and duration of commitment than researchers currently indicate.

We found that a variety of supporters are needed to achieve program and student success goals in Idaho SBAE programs. Our results can assist teachers in recruiting and retaining supporters. These findings also provide researchers with a broad understanding of supporters in SBAE programs in Idaho. The results of this study can serve as a basis for effective partnership implementation and further exploration into the distinguishing characteristics of SBAE supporters.

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Investigating the Effects of Cognitive Diversity on the Hypothesis Generation and Troubleshooting Ability of Undergraduate Students Enrolled in an Introductory Agricultural Mechanics Course at Louisiana State University

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Abstract

Problem solving has been regarded as one of the most important cognitive skills in everyday life. The complexity of problem solving in technical areas is a critical component to developing the problem solving abilities of agricultural education students. This study grounded in Kirton's Adaptation-Innovation Theory (A-I Theory), sought to identify the effects of cognitive diversity on the time to solution and hypothesis generation ability of undergraduate students enrolled in an agricultural mechanics course at Louisiana State University during the spring semester of 2018 (n = 17) and spring semester of 2019 (n = 15). Students were divided into three groups based their Kirton's Adaptation-Innovation Inventory (KAI) scores into three cognitive diversity groups including (a) homogenous innovative, (b) homogenous adaptive, and (c) heterogenous. Overall, the more heterogeneous cognitive diversity group was able to solve the problem more quickly as well as being the most successful group to hypothesize correctly, with the homogeneous innovator group being the slowest to reach conclusion. From the results of this study, it is recommended that educators consider cognitive styles when grouping students in undergraduate courses that are heavily laboratory based.

Introduction

Problem solving is defined as "any goal-directed sequence of cognitive operation" (Anderson 1980, p. 257) and has been regarded as one of the most important cognitive activities in everyday life (Jonassen, 2000). We encounter and solve problems daily as part of a routine that is integrated into our personal and professional lives. This ability has been recurrently identified as a critical skill for employment in the agricultural industry, specifically within technical areas (Alston, Cromartie, Wakefield, & English, 2009; Graham, 2001; Robinson & Garton, 2008; Robinson, Garton, & Terry, Jr., 2007). Despite the importance of problem solving, students today often do not solve meaningful problems as a part of their curricula (Jonassen, 2000). For problem solving to successfully develop, there must be social, cultural, and intellectual value placed upon the task (Jonassen, 2000).

One of the most commonly experienced and applicable types of problem solving we encounter, especially within the realm of technical education, is troubleshooting (Jonassen, 2003). Troubleshooting can be broadly defined as determining what causes a malfunction in a machine or process (Herren, 2015; Morris & Rouse, 1985). Troubleshooting includes a subset of problems where the problem is situated into a real-world situation. In order for a troubleshooter to be

successful, he/she must use a multitude of domain knowledge and be able to utilize cognitive skills to find faults in a system (Custer, 1995; Jonassen, 2000; Jonassen & Hung, 2006; Schaafstal, Schraagen, & Van Berl, 2000). Specifically, troubleshooting requires the individual to employ prior knowledge and experiences to effectively interact with the complex system (Johnson & Flesher, 1993).

However, problem solving and troubleshooting is not as straight forward as whether an individual can or cannot solve complex issues. Cognitive styles, technical knowledge, and problem solving methods can impact an individuals ability to successfully solve problems (Jonassen, 2000). Dyer and Osborne (1996) researched the use of teaching methods on ability of students with varying learning styles to solve problems. This study indicated students who were taught using the problem solving approach had significantly higher problem solving ability than those taught just through subject matter (Dyer & Osborne, 1996). While no statistically significant differences were present within this study between students with similar learning styles; all benefited from the problem solving approach. Similarly, Torres and Cano (1994) found learning style had an effect on students being successful in specific situations and environments.

Within agricultural education, an area that is heavily focused on hands-on learning and problem solving in a multitude of learning environments, researchers have investigated students' problem solving in a variety of contexts. Pate, Wardlow and Johnson (2004) and Pate & Miller, (2011) investigated agriculture students' ability to solve small gasoline engines related problems when implementing Think-Aloud Paired Problem Solving (TAPPS) and reported no statistically significant differences in ability. Similarly, Blackburn and Robinson (2016) found the greatest difference in time to solution among high school students troubleshooting small gasoline engines was their ability to hypothesize correctly. They further analyzed differences in problem solving ability and reported no differences based on students' cognitive style (Blackburn & Robinson, 2016). Blackburn, Robinson, and Lamm (2014) reported differences in problem solving ability of students based on the cognitive style and problem complexity. Additionally, Lamm et al. (2012) conducted a qualitative analysis of undergraduate agriculture students who had completed an international experience in Costa Rica. Upon returning to the U.S., the students were grouped purposely by cognitive style and tasked with solving a complex, ill-structured problem. Overall, it was reported that the students' ability to solve the problem differed depending on the cognitive diversity of the groups.

Theoretical/Conceptual Framework

The theoretical framework for this study was grounded in Kirton's (1976, 2003) Adaptation-Innovation Theory (A-I Theory). This theory is founded on the belief that every individual is creative and can solve problems (Kirton, 2003); however, it is important to note that the A-I theory is only concerned with the *how* an individual solves problems. This theory allows an individual to understand their cognitive style and how they go about solving everyday problems (Kirton, 2003). According to Kirton (2003) cognitive style is "the preferred way to which people respond to and seek to bring about change" (p. 43), therefore resulting in problem solving and cognitive style differences between individuals. Foundationally, the A-I theory presumes

individual cognitive style is predetermined from the early stages of life and remains stable, regardless of a person's previous experiences or age.

According to this theory, individual cognitive styles fall between adaptation and innovation on a continuum from 32–160 (Kirton, 2003). This type of scale does not allow any individual to be purely an adaptor or purely an innovator. Kirton (2003) identified key distinctions in preferred problem solving style between the more adaptive and more innovative individuals. Specifically, individuals whose tendencies were more adaptive preferred a more structured environment when solving problems. However, more innovative individuals preferred an environment that allowed them to think more fluidly.

Conceptually, this study was underpinned by Bransford's (1993) IDEAL problem solving model. At the foundational level, this model draws focus on the importance of how an individual utilizes information to build new tools that will help the individual solve problems (Bransford, 1993). More specifically, this model can be utilized to address individual awareness on the problem solving process and therefore, allowing the individual to reflect and analyze. The model, developed by Bransford (1993), has five essential steps (a) Identify, (b) Define or Develop goals, (c) Explore, (d) Anticipate or Act, and (f) Look and Learn and is utilized to understand how individuals move through the problem solving process (see Figure 1).

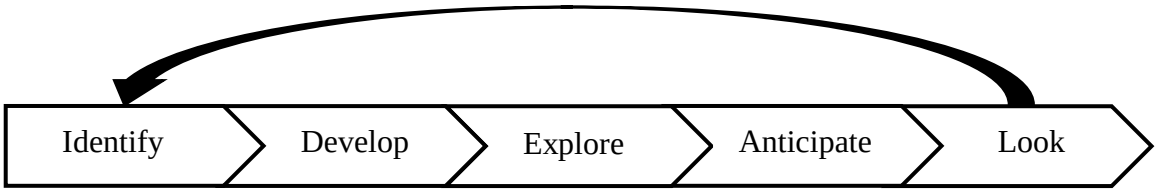

Figure 1. Bransford's (1993) IDEAL problem solving model. Adapted from "The Influence of Cognitive Diversity on Group Problem Solving Strategy" by AJ Lamm, C Shoulders, GT Roberts, TA Irani, LJ Snyder, & J Brendemuhl, 2012, *Journal of Agricultural Education*, *53*(1), p.19. Copyright 2012 by Journal of Agricultural Education. Reprinted with Permission.

Problem solving and troubleshooting have been researched in agricultural education for some time. Researchers have utilized the TAPPS method (Pate et al., 2004; Pate & Miller, 2011) and cognitive styles (Blackburn & Robinson, 2016) to explain differences in problem solving ability, with no differences reported. However, Lamm et al. (2012) reported differences, qualitatively, in problem solving based on cognitive style and Blackburn and Robinson (2016) reported that hypothesis generation had an effect on time to solution. Therefore, the principle question that arose after the review of the literature was: What effect does cognitive diversity have on undergraduate students' ability to hypothesize and solve small gasoline engines problem?

Purpose and Objectives

The primary purpose of this study was to investigate the effects of cognitive diversity on hypothesis generation and troubleshooting ability of undergraduate students enrolled in an agricultural mechanics course at Louisiana State University. This research supports the American Association of Agricultural Education's National Research Agenda Priority 4: Meaningful, Engaged Learning in All Environments. Specifically, this research addresses question three,

"How can delivery of educational programs in agriculture continually evolve to meet the needs and interests of students?" (Edgar, Retallick, & Jones (2016), p. 39). The following objectives guided this study:

1. What effect does team cognitive diversity have on the hypothesis generation ability of undergraduate students enrolled in an introduction to agricultural mechanics course when solving small gas engine problems?

2. What effect does team cognitive diversity have on the troubleshooting ability, measured by time to solution, of undergraduate students enrolled in an introduction to agricultural mechanics course to solve a small gasoline engine problem correctly?

Methods

This research study was completed as part of a larger research project that investigated the effect of cognitive diversity on students' abilities to solve problems related to small gasoline engines. This portion of the research project is focused specifically on the effect of cognitive diversity on the hypothesis generation and troubleshooting ability of students to solve a small engines problem correctly. Because of the nature of this study, a preexperimental one-group pretest-posttest was utilized to collect data (Campbell & Stanley, 1963; Salkind, 2010). Preexperimental research methodology is commonly used in educational research when random sampling is not possible (Campbell & Stanley, 1963). In this approach, all individuals are assigned to the experimental group and are observed at two time points (Campbell & Stanley, 1963; Salkind, 2010) and the changes from the pretest to the posttest determine the results from the intervention.

Population/Sample

The population of this study was all students enrolled in an introductory agricultural mechanics course at Louisiana State University during the spring semester of 2018 (n = 17) and spring semester of 2019 (n = 15). Overall, one student in the spring semester of 2018 did not complete enough course material to be included in the study, therefore, the accessible population totaled n = 31. In compliance with the Institutional Review Board (IRB), students were notified of this research on the first day of class and were given the opportunity to not participate. All students, in this research study, were over the age of 18 and provided signed consent to participate in this research. Demographically, the majority of the participants were 19–21 years of age (n = 25, f = 80.6%) and female (n = 54.8, f = 17). Also, the majority of them were classified as sophomores (n = 13, f = 41.9) and majored in Agricultural and Extension Education (n = 13, f = 41.9).

To test for homogeneity, independent samples T-tests were employed to determine if statistically significant differences existed between the students enrolled in introductory agricultural mechanics in the spring of 2018 and 2019 semesters based on age (t = 2.197, df = 29, p = 0.596) and cognitive style (t = 0.006, df = 29, p = 0.109). Also, a Chi-Square test was utilized to determine if differences existed between the two semesters based on gender (X^2 = .313, df = 1, p = .576). The analysis revealed that our population from both semesters was homologous and subsequently the data were merged for further analysis.

Course Structure

On the first day of the small gasoline engines unit, the KAI and 30-item pretest were administered to the students. Due to the flipped nature of this course with the incorporation of Team-Based Learning (TBL) the students were grouped purposively by cognitive style into teams of four for the duration of the unit. The TBL layout described by Michelsen and Sweet (2008) was employed for the course. The course readings, videos, worksheets, Individual Readiness Assurance Tests (IRATs), Team Readiness Assurance Tests (TRATs), and peer reviews were all developed by the researcher.

Within the small gasoline foci, five individual modules were constructed including (a) small engine tool and part ID, (b) 4-cycle theory and fuel, (c) ignitions and governor system, (d) cooling/lubrication system, and (f) troubleshooting. After every module, students completed an IRAT to determine their content knowledge retained. After completing the IRAT, the students would then join their assigned team and complete the TRAT. Each team of four would come together during class time to complete the TRATs, where the students were allowed to collaborate with other team members to come to agreements on items they may have gotten incorrect. The goal of completing the IRAT before the TRAT is to ensure that all group members of the team contribute equally. After the TRAT, the remain class time was dedicated to completing laboratory-based activities and assignments. For the purpose of laboratory activities, each team of four was further split into dyads (i.e., Team 1A, Team 1B) to complete the hands-on learning activities.

Instrumentation

Kirton's Adaptation-Innovation Inventory (KAI) was used to determine the students' cognitive style (Kirton, 2003) and that information was used to group students into teams. The students were grouped, based on their KAI scores into three cognitive diversity groups including (a) homogenous innovative, (b) homogenous adaptive, and (c) heterogenous. The KAI consists of 32 items that ask specific questions about the individuals preferred way to learn. Per the theory, individuals who score 95 or below are considered more adaptive, while individuals who score is 96 or above are considered more innovative. The internal reliability of this instrument has been measured and collected through multiple studies with individuals from varying backgrounds and demographics. From the wide use of the instrument, internal reliability coefficients have ranged from .83 – .91 (Kirton, 2003).

In order to collect data on hypothesis generation ability, Johnson's (1989) technical troubleshooting model was utilized as a guide to create the small gasoline engines troubleshooting packet. The packet consisted of three sections that included (a) hypothesis, (b) engine symptoms, and (c) troubleshooting process. Inside each packet were three sets of hypothesis sheets to ensure that if the group hypothesized incorrectly the first time they could use a different sheet to start over. This protocol was developed to follow the technical troubleshooting's model process of hypothesis generation (see Figure 2). One of the researchers kept a master time on a smartphone stopwatch application and recorded time to solution for each team. Time was not stopped and recorded until the students had successfully identified and corrected the fault. Specifically, the fault was an overtightened exhaust valve.

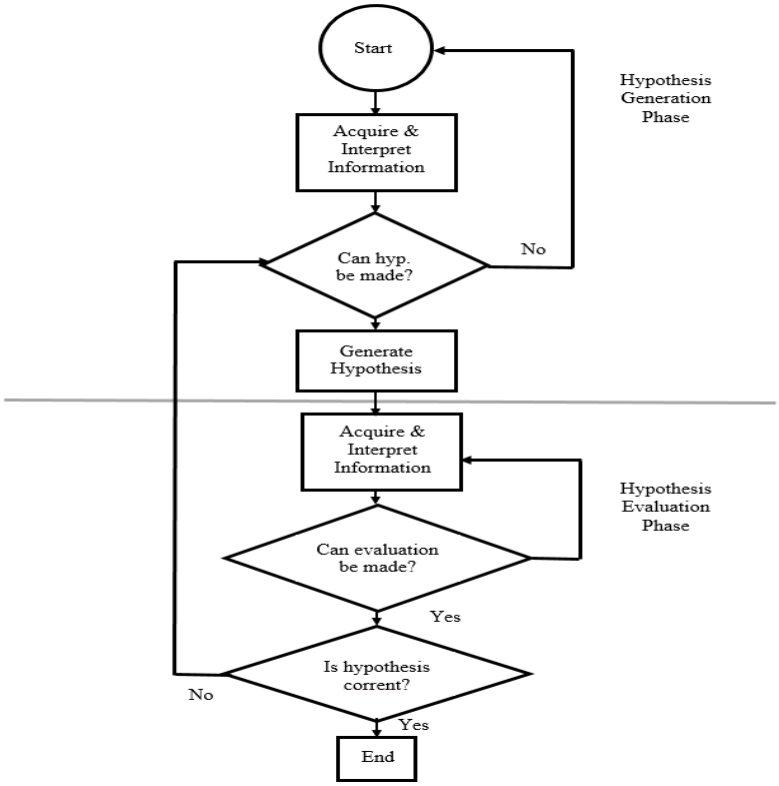

Figure 2. *Technical Trouble Shooting Model (Johnson, 1998)*

Data Analysis

During the initial data screening it was discovered that data related to the dependent variables were not normally distributed. Due to this violation of statistical assumptions, a Kruskal-Wallis test was employed to compare the effect between cognitive diversity and time to solution. The Kruskal-Wallis test is a nonparametric test equivalent to a parametric one-way ANOVA. Further, Mann-Whitney U tests were analyzed *post hoc* to determine if differences existed between the cognitive diversity groups. An *a priori* significance level of .05 was utilized to interpret the statistical significance of the analysis because this study is comparing two independent groups with no control; therefore, no adjustments to the critical value needed to be made (Lewis-Beck, Bryman, & Liao, 2004). Pearson's correlation coefficient *r* was analyzed after the Mann-Whitney U tests to calculate the effect size and standardize the measure of the size of effect observed (Field, 2009). Per Field (2009), an *r* value of .10 represents a small effect, which explains only 1% of the total variance, an *r* value of .30 represents a medium effect and explains 9% of total variance, and finally, an *r* value of .50 represents a large effect and accounts for 25% of the variance (Field, 2009).

To answer research question one, descriptive statistics, specifically, the frequency and percentage were utilized. Hypothesis generation ability was operationalized as whether or not they correctly hypothesized on the first attempt. Three independent Pearson's Chi-square tests were utilized to determine the relationship between hypothesis generation ability and problem solving ability have on cognitive diversity. Research questions two also utilized descriptive

statistics, including mean, frequency, and standard deviation were utilized to describe the individual small gasoline engine teams and their time to completion.

Findings

Each of the small gasoline engines groups were given one laboratory period (e.g., 110 minutes) to generate a hypothesis and perform the troubleshooting activity. The teams were asked to hypothesize the possible problem and solution (see Table 1). Hypothesis generation ability was operationalized as correct or not correct on their first hypothesis. The homogeneous innovative cognitive diversity group consisted of all teams who were more innovative, which included team one. Based on hypothesis generation one, all four individuals hypothesized incorrectly. The homogeneous adaptive cognitive diversity group consisted of teams who more adaptive, which include team two, team four, team six, and team seven. Within this cognitive diversity group, seven (41.18%) of the 17 individuals correctly hypothesized and 10 (58.82%) hypothesized incorrectly on hypothesis one. Finally, the heterogeneous cognitive diversity group consisted of teams who were made up of a more innovative and more adaptive individual, which included team three and team five. Of the members in this cognitive diversity group, six (60%) hypothesized correctly the first time, while four (40%) hypothesized incorrectly.

Table 1

Hypothesis Generation Ability based on Cognitive Diversity Groups for Students in Introduction to Agricultural Mechanics

Cognitive Diversity	*Hypothesis Generation 1*			
	Correct		*Not Correct*	
	f	*%*	*f*	*%*
Homogeneous Innovative	0	0	4	100
Homogeneous Adaptive	7	41.18	10	58.82
Heterogeneous	6	60	4	40
Overall Total	13	41.94	18	58.06

In order to test for relationships between the cognitive diversity groups, three independent Pearson Chi-Square tests were employed to determine the effect that cognitive diversity has on hypothesis generation ability in order to successfully problem solve. The analysis from these tests revealed no statistically significant difference between the homogeneous adaptive cognitive diversity group and the heterogeneous χ^2 (.894) = 1, p = .345. Also, no statistically significant difference were found between the homogeneous adaptive group and the homogeneous innovative group χ^2 (2.471) = 1, p = .116. However, a statistically significant difference was found between the homogeneous innovative group and the heterogeneous group χ^2 (4.200) = 1, p = .040 based on hypothesis generation ability (see Table 2).

Table 2

Pearson Chi-Square Test between Cognitive Diversity Groups for Students Enrolled in Introduction to Agricultural Mechanics (n=31)

Groups	Value	*df*	*p*
Homogeneous Adaptive vs. Heterogeneous	.894	1	.345
Homogeneous Adaptive vs. Homogeneous Innovative	2.471	1	.116
Homogeneous Innovative vs. Heterogeneous	4.200	1	.040

Table 3, below, describes the teams and small gasoline sub-groups and their respective times to solution. Overall, the mean time to solution, across all groups, was 39 minutes. When looking at individual team times, Team 1A successfully completed the troubleshooting task in 90 minutes. While their counterpart, 1B, completed their engine in 60 minutes. Team 2A and 2B took 58 and 42 minutes, respectively, to complete the task. Team 3A successfully completed the task in 17 minutes; whereas, team 3B completed in 13 minutes. Teams 4A and 4B successfully completed their task in 52 and 60 minutes. Team 5A, 5B, and 5C successfully completed their troubleshooting task in 14 minutes, 21 minutes, and 1 hour and 12 minutes, respectively. Team 6A completed their task in 56 minutes, whereas team 6B completed their troubleshooting task in 33 minutes. Finally, team 7A and 7B completed their troubleshooting fault in nine minutes and 12 minutes.

Table 3

Introduction to Agricultural Mechanics Small Engine Sub-Grouping Time to Successful Completion of the Troubleshooting Problem

Teams	*Group A*	*Group B*	*Group C*
	Time to completion		
Team 1-Homogeneous Innovative	1 hour 30 minutes	1 hour	-
Team 2-Homogeneous Adaptive	58 minutes	42 minutes	-
Team 3-Heterogenous	17 minutes	13 minutes	-
Team 4-Homogeneous Adaptive	52 minutes	1 hour	-
Team 5-Heterogenous	14 minutes	21 minutes	1 hour 12 minutes
Team 6-Homogeneous Adaptive	56 minutes	33 minutes	-
Team 7-Homogeneous Adaptive	9 minutes	12 minutes	-
Mean Time Solution	39 minutes		

A non-parametric one-way ANOVA (e.g., Kruskal-Wallis) was utilized to determine the statistical significance of the effect cognitive diversity had on time to solution (see Table 4). The Kruskal-Wallis test determined that there was a statistically significant difference in time to solution by cognitive diversity, H (8.206) = 2, p = .017. Effect size was calculated to standardize the measure of the effect observed. The analysis of the effect size revealed an r value of .70, which is interpreted as a large effect (r > .50).

Table 4

Overall Kruskal-Wallis Test for Differences in Time to Solution by Cognitive Style Group for Students Enrolled in Introduction to Agricultural Mechanics

H	*df*	*p*
8.206	2	.017

In order to compare groups, Mann-Whitney U tests were employed *post hoc* to determine if a difference existed between two independent groups. Three independent Mann-Whitney U tests were conducted between homogeneous adaptive and homogeneous innovative, homogeneous adaptive and heterogeneous, and homogeneous innovative and heterogeneous. The Mann-Whitney U test between homogeneous adaptive and heterogeneous groups determined there was no statistically significant difference between the two groups based on time to solution and cognitive diversity (p = .580), however, a statistically significant difference was found between the homogeneous adaptive and homogeneous innovative group (p = .023) and homogeneous innovative and heterogeneous group (p = .004) (see Table 5). Effect size was also reported to standardize the measure of the effects observed between all statistically significant cognitive diversity groups. An r value of .61 was revealed between the homogeneous adaptive and homogeneous innovative, which is a large effect (p > .50). Also, between the homogeneous innovative and heterogeneous group revealed an r value of .63, which is also interpreted as a large effect (p > .50).

Table 5

Mann-Whitney U Tests of Differences in Time to Solution by Cognitive Diversity Groups for Students Enrolled in Introduction to Agricultural Mechanics (n=31)

Groups	U	*Z*	*p*
Homogeneous Adaptive vs. Heterogeneous	74	-.554	.580
Homogeneous Adaptive vs. Homogeneous Innovative	2	-2.886	.004
Homogeneous Innovative vs. Heterogeneous	4	-2.280	.023

Conclusions/Discussion

During the troubleshooting exercise, students were asked to create a written hypothesis based on the information they collected when trying to start their respective engines. Regardless of cognitive diversity, the teams who generated the correct hypothesis on the first attempt were more likely to solve the problem quicker; whereas, the more times the team hypothesized, the

more time it took to complete the troubleshooting task. This conclusion is consistent with previous research by Blackburn and Robinson (2016), which indicated that regardless of cognitive style and problem complexity, students who generated a correct hypothesis were more efficient problem solvers. Similarly, Blackburn and Robinson (2017) indicated the majority of students were able to identify and hypothesize regardless of cognitive style, however, more adaptive students were more likely to hypothesize correctly on the simple problem; whereas, the more innovate students were more likely to solve a complex problem. Previous research by Johnson (1989) also concluded that students who generated a correct hypothesis are more likely to be able to correctly solve problems.

Overall, 31 students completed and solved the troubleshooting problem successfully regardless of cognitive style. In terms of group cognitive diversity, the heterogeneous group solved the problem on average 13 minutes faster than the homogeneous adaptive group and 48 minutes faster than the homogeneous innovative group. The homogeneous adaptive group, however, solved the problem on average 34 minutes and 45 seconds faster than the homogeneous innovative group. Therefore, the heterogeneous cognitive diversity group was a more efficient type problem solver. Also, a difference amongst cognitive diversity groups and time to solution was identified between the homogeneous adaptive and homogeneous innovative and the homogeneous innovative and heterogeneous. Further analysis revealed that the homogeneous adaptive and heterogeneous cognitive diversity group had no differences between cognitive diversity and time to solution. This conclusion also supports the adaptation-innovation theory that indicates each cognitive style has its own distinct characteristics when problem solving, which can affect how efficiently they are able to solve problems (Kirton, 2003). This finding also supports the findings of Lamm et al. (2012) who reported, qualitatively, that homogeneous innovator groups struggle to solve complex problems, perhaps due to their ability to proliferate ideas.

The most efficient group of problems solvers where the heterogeneous teams who not only solved the problem the quickest but more accurately hypothesized. The homogeneous adaptive group was the second most efficient at solving the problem but were least likely to hypothesize the problem correctly. The homogeneous innovative teams were the least efficient at problem solving and did not hypothesis correctly on hypothesis one. This is consistent with previous research conducted in troubleshooting, which ascertain that those who generate a correct hypothesis the first time are more likely to solve the problem faster than those who require more than one hypothesis (Blackburn & Robinson, 2016, 2017; Johnson, 1989). Further, this supports the adaptation-innovation theory that no matter the individual's cognitive style, anyone can solve problems (Kirton, 2003).

Implications

The more heterogeneous cognitive diversity group was able to solve the problem on average 24 minutes quicker than any of the other groups. However, the homogeneous adaptive group was able to solve the problem almost 35 minutes faster than the homogeneous innovator group. These substantial time differences between cognitive diversity groups led to further questions about why those differences exist. It is possible that the differences in how each of the cognitive style groups go about solving problems was the primary factor in time to completion. Kirton (2003) stated that groups of homogeneous adaptors tend to excel in problem solving when the problem

is structured and has boundaries. Whereas, the more innovative individuals tend problem solve more efficiently with less structure and challenge those set boundaries (Kirton, 2003). However, Kirton (2003) also stated the most successful types of problem solvers are heterogeneous groups who are able to manage their wide variety of cognitive diversity because they are able to utilize both cognitive styles (Kirton, 2003). Therefore, per the theory, it could be beneficial to purposefully group students based on cognitive style into heterogeneous groups.

The most successful cognitive diversity group at hypothesizing correctly on hypothesis one, was the heterogeneous group. The least successful group on a correct hypothesis one, was the homogeneous innovative group. Per the A-I theory, the more adaptive individuals tend to solve problems more effectively that are structured and have boundaries, while the more innovative excel at problems with no boundaries and little structure (Kirton, 2003). Perhaps, the heterogeneous groups were more successful at hypothesis generation because they were able to utilize and manage the wide cognitive diversity range; therefore, broadening their problem-solving ability scope (Kirton, 2003).

In Johnson's (1989) technical troubleshooting model, the students are required to hypothesize once and if they indicate their initial hypothesis to be incorrect, they are to go back to phase one and hypothesize again. This process is continual until the troubleshooter correctly hypothesizes the fault. It is possible that the homogeneous innovative cognitive diversity group, were least successful at hypothesizing correctly the first time because they proliferated too many ideas and were unable to identify and recognize the problems; therefore, they struggled to make a hypothesis (Bransford, 1993; Johnson, 1989; Kirton, 2003) or they generated multiple hypotheses from symptom problems and were then unable to make a decision on the correct one. Pate and Miller (2011) found that students who utilized groups to problem solve, took an average of four minutes longer to solve problems. This could indicate that conflict within groups may can actually hinder the problem solving process when compared to allowing individuals to problem solve independently.

Overall however, the teams who hypothesized correctly on hypothesis one were more likely to have a quicker time to solution. It is possible that the heterogeneous groups were better at problem solving because they solved problems more linearly and were able to utilize all the steps in Bransford's (1993) IDEAL model, allowing them to be efficient problem solvers. Perhaps one of the reasons the homogeneous adaptive and innovative groups were less successful at solving the problem on hypothesis one and had slower times to solution was because they got lost in the details and had a harder time moving through all the steps in the IDEAL model, which created gaps in their problem solving process and led to errors (Bransford, 1993).

Recommendations for Practice

From the results of this study, it is recommended that educators assess students' cognitive styles and then purposefully group students into heterogeneous cognitive diversity groups in undergraduate agricultural courses that are heavily laboratory based. Kirton (2003) concluded that heterogeneous groups can be more effective and efficient problem solvers if they are able to manage their wide range of cognitive diversity. Based on this research, educators should consider adopting active learning environments, like TBL, to help promote the development of problem-solving skills. It has become increasingly important for educators to adapt to new pedagogies in order to meet the demands of the 21st century (Blackburn et al., 2014) because the

agricultural industry today desires employees who are able to effectively and efficiently problem solve (Robinson & Garton, 2008). Based off the results of this study, the ability for students to hypothesize correctly has increased their problem solving effectiveness and efficiency.

It is also recommended that educators create more questions or application activities that are specifically designed to help develop an individual's procedural knowledge. Much of the literature on troubleshooting reiterates the importance of developing an individual's conceptual and procedural knowledge (Anderson, 1980; Johnson & Flesher, 1993; Johnson, 1989; Jonassen, 2003; Hegarty, 1991, McCormick, 1997). Therefore, it is important for educators to be developing the students *how* knowledge when dealing with problem solving tasks.

Recommendations for Research

Additional research is warranted to further investigate the effects of cognitive diversity on hypothesis generation and time to solution on the problem-solving ability of undergraduate students. Specifically, it is recommended that this study be replicated to increase the sample size increase statistical power and, perhaps, normalize the data. Further replication of this study is also warranted to study the effects of cognitive diversity on hypothesis generation and time to solution. To fully be able to account for extraneous variables, full randomization of treatment and control groups are needed in order to make the findings generalizable to a larger demographic.

Further research is warranted to investigate the effects metacognitive activities have on the troubleshooting ability and hypothesis generation of undergraduate students. Zimmerman and Risemberg (1997) and Davidson and Sternberg (1998) state that metacognitive skills are an essential prerequisite to effectively problem solve. Similarly, Davidson and Sternberg (1998) explain that metacognitive activities are a driving force that allows students to encode the problem type by forming mental schemas of the problem, which allows them to select the most appropriate plan.

Research is also recommended to investigate the short and long-term effects of TBL; specifically, on critical thinking, problem solving ability, content knowledge retention, and self-efficacy. Previous literature states that active learning classrooms provide students with the opportunity to engage in real-world problems, which increase critical thinking and problem solving skills (Michealsen & Sweet, 2008; Sibley & Ostafichuk, 2015), while also providing students with opportunities to learn conceptual and procedural knowledge and provides a framework for cognitive development, critical thinking skills development, and building problem solving skills (Michaelsen & Sweet, 2012).

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Navigating the Social Landscape of School-Based Agricultural Education: A Hermeneutic Phenomenology

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Abstract

Despite decades of research about the agriculture teacher shortage problem, we still know little about the ways in which secondary agriculture teachers assume their roles and responsibilities as members of social and cultural communities. Expanding how we have historically researched this problem is crucial, especially if we hope to mitigate the teacher shortage problem. Therefore, the purpose of this study was to use a hermeneutic phenomenology to explore the experiences of secondary agriculture teachers as they navigate, manage, and attend to the landscape of practice in which they live and work. Our specific research questions included, 1) how do agriculture teachers conceptualize the social landscape of SBAE? and 2) how does the landscape influence the way they go about their work? When interpreting the findings through the theoretical lens of Landscapes of Practice, five themes emerged: 1) multiple accountability partners, 2) different people, different expectations, 3) no room for error, 4) arms race, and 5) validation. Our findings illuminate the struggles agriculture teachers encounter as they manage the different people and practices of their work. As a result, we offer implications and recommendations to help propel the profession forward and pose critical questions to further critique current systems in SBAE.

Introduction and Literature Review

As someone who is leaving the profession at the end of this school year, I feel quite strongly that our leadership needs to think long and hard about this profession and expectations. There are so many things that I have loved about my career as an Ag Educator. However, it isn't sustainable. The data supports this; there will only be 1 teacher left from my fairly large cohort after this year. When I talk to other teachers I hear the same thing: I don't know how much longer I will last. When I look at many of the educators who have been around for a while I either see people constantly pushed to their limit, broken families, or families where only one parent works. I know that you all know and recognize this, yet, nothing is changing systemically. In fact, it seems like the "to-dos" have only increased over the past 5 years. I don't know the answer, I just know that until the workload of this career changes, retention will continue to be a problem. I care passionately about the power of Ag Ed and the impact it makes on student's lives. I'm genuinely worried that we have created a monster that will result in no Ag teachers left when my kids are in high school. I truly hope that a group of people smarter and wiser than myself will be able to come up with a solution. -Respectfully, Carrie

In the above email excerpt, a secondary agriculture teacher explains her reasons for exiting the profession after only a few short years. She implores her former professor, the one to whom the letter is addressed, to critically examine the expectations and demands of secondary agriculture teachers and identifies the increasing workload as unsustainable. She charges leaders in the profession to make systematic changes so the benefits of School-Based Agricultural Education

(SBAE) may continue to impact students across the country. It is with this email, this voice from a young woman whose convictions are both compelling and palpable, that we situate this study.

SBAE in the U.S. is currently facing a crisis as there exists a severe shortage in the number of qualified agriculture teachers to fill open positions (Foster, Lawver, & Smith, 2015; Kantrovich, 2010; Smith, Lawver, & Foster, 2016, 2017, 2019). This decade-old problem has continued to beleaguer the profession for over forty years, with consistent shortages in both the amount of agriculture teachers entering the profession as well as the number of those leaving the profession before retirement age (Kantrovich, 2010). In 2018 alone, only 66.9% of the license-eligible completers of teacher preparation programs chose to enter the profession by accepting an agriculture teaching position, and of the 900 teachers who left the profession, only 24.8% did so due to retirement (Smith et al., 2019). While we acknowledge there may be many factors attributed to teacher attrition, sadly, these numbers have fluctuated little in recent years (Foster, et al., 2015; Smith, et al., 2016). Carrie, our passionate yet discouraged emailer, is fully aware of this problem, recognizing that only one agriculture teacher from her student teaching cohort has remained in the profession.

Unlike core subjects and possibly other CTE programs typically taught in schools, SBAE seeks to "prepare students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems" (Ortiz, 2019, p. 1). With this SBAE mission comes a three-component model that emphasizes leadership development through the National FFA Organization (FFA), experiential learning in both the courses taken and through Supervised Agricultural Experience (SAE) projects, and college and career readiness. Carrie believes in this model, stating it makes an impact on the lives of students. Recent research supports her claim, showing the positive benefits of participation in both SBAE and FFA (McKim, Velez, & Sorensen, 2018; Velez, Clement, & McKim, 2018).

In an effort to curtail the shortage, and continue to offer the benefits of SBAE to students, scholars have devoted significant energy to better understanding the work of agriculture teachers and why they leave before retirement. In sum, agriculture teachers encounter significant challenges as they engage with the demands of the profession including long work hours, demanding expectations, time spent away from family, and difficulty managing the multiple responsibilities of the job (Baxter, Stephens, & Thayer-Bacon, 2011; Boone & Boone, 2007, 2009; Fritz & Miller, 2003; Mundt & Connors, 1999; Myers, Dyer, & Washburn, 2005; Paulsen, Anderson, & Tweeten, 2015; Rocca & Washburn, 2008; Stair, Warner, & Moore, 2012). Agriculture teachers also experience stress as they engage in the profession, particularly when struggling to meet deadlines (Torres, Lawver, & Lambert, 2009), fulfilling FFA and SAE obligations (King, Rucker, & Duncan, 2013), and incorporating experiential learning into their programs (Smith & Smalley, 2018). These stressors may or may not lead to burnout (Chenevey, Ewing, & Whittington, 2008; Croom, 2003; Kitchel et al., 2012; Newcomb, Betts, & Cano, 1987) and the ability to manage work and non-work responsibilities (Murray, Flowers, Croom, & Wilson, 2011; Solomonson & Retallick, 2018; Sorensen & McKim, 2014; Sorensen, McKim, & Velez, 2016).

While there is inconsistent evidence that shows agriculture teachers are burned-out and unable to achieve work-life balance, the literature is consistent regarding reasons why agriculture teachers leave the profession before retirement. Not surprisingly, these reasons parallel the literature

exploring challenges or problems agriculture teachers face. Overall, agriculture teachers leave the profession due to the long hours (Dillon, 1978; Lemons, Brashears, Burris, Meyers, & Price, 2015; Solomonson, Korte, Thieman, Rettalick, & Keating, 2018), demanding expectations and multiple responsibilities (Dillon, 1978; Lemons et al., 2015; McIntosh, Morrish, & Wakefield, 2018; Solomonson et al., 2018), the struggle to manage the career along with a family (Lemons et al., 2015; Sorensen et al., 2016; Sorensen, McKim, & Velez, 2017; Tippens, Ricketts, Morgan, Navarro, & Flanders, 2013), and unsupportive administrators (Dillon, 1978; Kelsey, 2006; McIntosh et al., 2018). Conversely, agriculture teachers stay in the profession because they feel they were adequately prepared (Cole, 1984; Edwards & Briers, 2001), are committed to attaining work-life balance, and have supportive administrators, communities, and parents (Clark, Kelsey, & Brown, 2014).

Existing research on the agriculture teacher shortage problem reveals several insights about the challenges of the profession, particularly those associated with managing the multiple responsibilities of the job. This research has taken a largely quantitative approach with the purpose of enhancing preservice and in-service professional development. Unfortunately, despite several decades of research, the agriculture teacher shortage problem persists. Given our understanding of the problem, and the research that has investigated it, a logical next step would be to engage in additional research that assumes an alternative perspective. We argue that more must be known about the ways in which agriculture teachers assume their responsibilities as members of social and cultural communities, a perspective that only one study to date has adopted (Traini, Claflin, Stewart, & Velez, 2019). Therefore, our current study explored the problem of teacher shortage from an alternative perspective, one which situates agriculture teachers as members of social communities whose identities, decisions, and ways of being are influenced by the people, practices, and communities in which they live and work. Alternative theoretical perspectives, in particular, Wenger-Trayner and Wenger-Trayner's (2015) *Landscapes of Practice*, allowed us to conceptualize how professionals learn, make meaning, engage with others, build identity, and position themselves in the world.

Theoretical Framework

We employed concepts from Wenger-Trayner and Wenger-Trayner's (2015) Landscapes of Practice to explore the experiences of secondary agriculture teachers as they engage in the practices of the profession. Wenger-Trayner and Wenger-Trayner postulated learning is a social endeavor through which participants construct identities as they participate in a *landscape of practice*. Landscapes are dynamic and complex compositions of various communities of practices, or groups of people that are formed via mutual engagement in a shared enterprise (Wenger, 1998). As professionals, we engage in and belong to multiple communities of practice that make up a social landscape, each with their own histories, norms, and *regimes of competence*, or socially negotiated criterion which defines legitimacy in a particular community (Wenger, 1998). For example, a high school agriculture teacher might belong to a community of practice associated with their individual school (e.g., a professional development committee comprised of other teachers), a community of other agriculture teachers (e.g., the state's agriculture teachers association), and a community comprised of local agricultural industry leaders (e.g., an advisory board) to name a few. These three communities are unique in that they are comprised of different people and have different goals, practices, and expectations for what is considered competence. Wenger-Trayner and Wenger-Trayner describe participation and

engagement in multiple communities of practices in a landscape as *multimembership*. This is often viewed as difficult identity work as landscapes are political, flat, and diverse (Wenger-Trayner & Wenger-Trayner, 2015). Landscapes are political and imbued with power, as they are comprised of "competing voices and competing claims of knowledge" (Wenger-Trayner & Wenger-Trayner, 2015, p. 16). Landscapes are flat in that no individual practice can represent the whole landscape, "practices in a landscape inform and influence each other...relations among practices are at once epistemologically flat, politically unequal, and potentially contestable" (Wenger-Trayner & Wenger-Trayner, 2015, p. 17). Landscapes are diverse in that meaning is produced in each practice and boundaries between practices are never unproblematic; they always involve a negotiation of how the competence of one community becomes relevant or irrelevant to another community.

For this study, we conceptualized SBAE as a complex and dynamic landscape of practice, consisting of multiple communities of practice and the boundaries between them. Each community has its own participants, histories, norms, and practices; just think of how different the context and practices of a state-wide FFA competition may be from a county fair or a school board meeting. While each community differs from each other, the boundaries between them are not clearly separated but instead murky lines that overlap, intersect, and possibly inform each other. As we think about agriculture teachers traversing this dynamic landscape, they may encounter tensions as they strive to claim competence in each individual community and fulfill the expectations of their job (e.g., striving to attend to the expectations of parents, school administration, peer agriculture teachers, and local agriculture industry simultaneously). Given the dearth of research that explores the ways in which agriculture teachers assume their professional roles and fulfil the demands of the profession, and Wenger-Trayner and Wenger-Trayner's (2015) social learning perspective, the purpose of this study was to explore the experiences of secondary agriculture teachers as they navigate, manage, and attend to the landscape of practice in which they live and work. Our specific research questions included, 1) *how do agriculture teachers conceptualize the social landscape of SBAE*? And 2) *how does the landscape influence the way they go about their work?*

Methods

This study employed a hermeneutic phenomenological approach to investigate the experiences of secondary agriculture teachers as they navigate *multimembership* in the social landscape of SBAE. Epistemologically, phenomenology is based on personal knowledge and subjectivity and emphasizes the personal perspectives and interpretations of a particular experience (Creswell, 2013). The focus on experience is based on the assumption that human behavior is determined by the experiences in which individuals engage in everyday life rather than a physical objective reality that is removed from the individual (Sloan & Bowe, 2014). Unlike descriptive or transcendental phenomenology, hermeneutic phenomenology rejects the idea that one could transcend his/her own presuppositions and biases when examining the lived experiences of individuals; one cannot bracket off the way one identifies with the phenomenon (Sloan & Bowe, 2014). Therefore, given my (the lead author and the person whom engaged in the primary activities of data collection and analysis) own personal experience with the phenomenon of multimembership, of which I outline below, hermeneutic phenomenology is an appropriate choice.

Participant Selection and Recruitment

Participants for a phenomenological study must all have experienced the phenomena under investigation (van Manen, 1990). Given the expansive number of duties and responsibilities required of agriculture teachers, we operated under the assumption that all secondary agriculture teachers in the U.S. engage in *multimembership* across the SBAE landscape. Therefore, the population consisted of participants who held positions in secondary agricultural education programs across the country during the 2018-2019 academic year. We targeted three main groups of agriculture teachers in order to reach a wide audience of teachers by their location and level of recognized success as an agriculture teacher. The three groups were 1) agriculture teachers who have won the NAAE Early Career Agriculture Teacher award, 2) agriculture teachers who have won the NAAE Outstanding Agricultural Educator award and 3) agriculture teachers in five Western states (California, Oregon, Idaho, Washington, and Utah) who are in their first ten years of teaching and have won *neither* the NAAE Outstanding Early Career Agriculture Teacher nor the NAAE Outstanding Agricultural Education Teacher award. To recruit participants in the first two groups, their names were obtained from the National Association of Agricultural Educators (NAAE) website. To recruit participants in the third group, an email was sent to all agriculture teacher educators in each of the five states asking for a list of five names and emails of current agriculture teachers who met the criteria for the group.

Our study contained 12 participants, six male and six female who teach in seven states across the U.S. including Oklahoma, Oregon, North Carolina, Washington, Idaho, California, and Utah. All but three participants (Teresa, Allison, & Liberty) were married at the time of data collection. The number of years teaching ranged from two years (Madison & Allison) to twelve years (Teresa). Three participants were NAAE winners (Teresa, Connor, & Paige) and all 12 participants were engaged in SBAE as high school students. Four participants were the only agriculture teacher at their school (Teresa, Connor, Mark, & Natalie). The other participants had one, two, or three additional agriculture teachers at their school.

Data Collection and Analysis

Semi-structured, in-depth interviews via telephone were the primary form of data collection. When developing the protocol, questions were included that would afford participants the opportunity to share their experiences about navigating the multiple demands and expectations of their jobs. These questions were refined after piloting the protocol with four agriculture teachers who were not included in the study. Each interview lasted between 45 and 75 minutes and was audio recorded. Interviews were transcribed verbatim and imported into Dedoose software for analysis. Data for this study were collected in accordance with [University's] Institutional Review Board (IRB) guidelines and all participants voluntarily gave verbal consent.

In hermeneutic phenomenology, the researcher's goal is to interpret the meanings in relation to the phenomenon under investigation. The researcher must enter the hermeneutic circle in a "dialectic movement between understanding and explanation" (Lindseth & Norberg, 2004, p. 149). For this study, we drew from Lindseth and Norberg's (2004) method for interpreting hermeneutic interview text as the overarching analysis approach and Emerson, Fretz and Shaw's (2011) method for specific coding and memoing guidelines. van Manen's (1990) conceptualization of *theme* in phenomenological research was also considered. This process

began with naive reading, which involved reading the interview texts several times to grasp the overall meaning and allowing time to develop any thoughts, ideas, and conjectures that emerged (Lindseth & Norberg, 2004). This was followed by thematic analysis, through a series of open coding, theme selection, and focused coding (Emerson et al., 2011). As this process developed, the individual themes and sub-themes gave way to more comprehensive integrative memos, which sought to "integrate what were previously separate pieces of data and analytic points" (Emerson et al., 2011, p. 172). These memos built descriptions of certain codes and created linkages between different themes and subthemes. After thematic analysis, each interview was read through as a whole once again, juxtaposing themes and sub-themes with the naïve understandings, remaining cognizant of any pre-understanding of the phenomenon and how this influenced the interpretation. To ensure this did not limit the findings, we engaged in critical reflection, collaborative discourse among co-authors, and written reflexive memos. Then, the selected themes and subthemes were added to the integrative memos and we explored opportunities to describe these themes in a way that aligned with the research questions (Lindseth & Norberg, 2004; van Manen, 1990).

Building Quality into the Study

We drew from Lincoln and Guba's (1988) criteria of *transferability*, *credibility*, and *dependability* to ensure this study was conducted in a rigorous and scientific way. To ensure *transferability* of our findings, we employed thick description by describing the participants and findings in rich detail and grounding claims with ample illustrative quotes from the participants (Creswell & Creswell, 2017; Geertz, 2008). To ensure our findings are both *credible* and *dependable*, we engaged in collaborative data analysis, which, as van Manen (1990) argued, allows for "deeper insights and understandings" of the themes and thematic descriptions (p. 100). Additionally, we employed member checking as a tool to enhance the credibility of the findings (Creswell & Creswell, 2017; Maxwell, 2012) first by asking participants to review their transcripts and offer additional insights and second by asking participants to provide input on an initial draft of the findings (Birt, Scott, Cavers, Campbell, & Walter, 2016).

Further, Maxwell (2012) posited it is impossible to remove researcher theories, beliefs, and perceptual lenses during the research process. To address this, the researcher must be reflexive throughout the research process by recognizing their positionality in relationship to the phenomenon under investigation and that they themselves are merely inscribing *one* reality instead of *the* reality (Emerson et al., 2011). Therefore, I (Haley Traini) make explicit my positionality within the study by discussing my experience with the phenomenon and research topic as well as how these experiences have shaped my interpretation of the phenomenon. I come from a family of agriculture teachers, most notably my father who was an agriculture teacher for 37 years. During my tenure as an agriculture teacher, I spent significant time engaging in the practices of the profession and was highly influenced by the environments and systems in which I worked as well as the people around me. During this time, I encountered significant struggle as I strove to meet the demands of the profession while striving for some semblance of a life outside of work. Also, the ontological and epistemological orientations I brought to this study align with the major tenets of constructivism. I recognize and acknowledge there is a material reality, yet posit individuals have unique realities which are constructed by and from their individual experiences, histories, cultures, environments, etc. (Maxwell, 2012).

Findings

The following section chronicles the lived experiences of agriculture teachers as they manage, attend to, and experience the different aspects of their job. This evolved as participants shared stories of their work, described who they felt accountable to, and how these accountability partners (and their respective expectations) influenced their decision-making and identity. This is captured through five themes: 1) *multiple accountability partners*, 2) *different people, different expectations*, 3) *no room for error*, 4) *arms race,* and 5) *validation*.

Multiple accountability partners

Living in the SBAE landscape requires multiple accountability partners, significant coordination, and long hours. Agriculture teachers in this study felt accountable to many different individuals and parties including school administration, community members (including Ag Boosters clubs, Ag Advisory clubs, and FFA Alumni chapter members), Career and Technical Education (CTE) liaisons, university partners, other non-agriculture teachers at school, other agriculture teachers at their school, other agriculture teachers in the state, the state Agricultural specialists/liaisons, parents, students, and themselves. While the hierarchy of accountability partners differed among participants, the trend was to place administrators and community members at the top of their respective accountability partner lists. In fact, all twelve participants identified school administrators as individuals to whom they felt accountable, including school principals, assistance/vice principals, superintendents, and CTE liaisons who worked either at the school or at the district office. Likewise, all participants identified various community members as people or groups to whom they are accountable. These included Advisory Board members, Agriculture Boosters clubs (typically parents of students or alumni who fundraise for the chapter), Alumni chapter members, local businesses, and local organizations who either serve in an advising capacity to the program or who support the program through financial and/or material means.

As these agriculture teachers recounted their accountability partners, specifically in reference to community members, other teachers at school, and other agriculture teachers, they often talked about it from a perspective of fear or self-consciousness. Three participants—all of whom are in their first five years—reflected on these feelings of being watched or feeling pressured by different accountability partners. Natalie, particularly felt pressures from the community and other Ag teachers, “I would say my most, my first answer is my school administration. But I feel pressure from community members, and I would also say I feel pressure from other Ag teachers, as well”. Similarly, Joey felt pressure from other agriculture teachers, particularly those who are involved in the state-wide professional association. He shared, “I feel that I very much report to all Ag teachers because a lot of ag teachers are alphas, and I think there tends to be a lot of critiquing, And, just like their eyes are always on you”.

Attending to these different accountability partners is not without difficulty. So as to meet the demands of various individuals, fulfill the responsibilities of their jobs, and provide students with various opportunities to be engaged in the agriculture program, participants reported they work long hours, have congested schedules, and encounter significant stress as a result of engaging in their work. Connor noted, “there's only so many hours in the day. We have lots of conflicts with everything ourselves, just with time and everything. School events would be another example of where we meet challenges”. Below we see another example through Paige’s work as she strives

to navigate what she calls multiple “moving parts”, “I'm at school until 6:00 or 7:00 PM. But I know it's not sustainable to do that every day…I definitely haven't figured out how to manage it perfectly without being stressed about things”.

Different people, different expectations

Agriculture teachers in this study not only recognized multiple accountability partners within their work, they also identified that not all of these partners have the same expectations or metrics for success. As Connor put it, “some of them would look at results, an event, and outcome based on their perspectives and what they've seen happen…what resonates with them”. It became clear that, overall, different accountability partners all want program “success”. However, “success” meant different things for different people. Participants were highly aware of these competing expectations and, depending on their individual school, level of involvement with various partners, relationships with their administrators, and the program/community’s regard for tradition, attending to these different expectations was challenging.

Often, administrators have expectations that are in-conflict with expectations of other parties. Megan said, “admin want data and test scores, and our alumni and a lot of community members want awards and you know, student involvement in the community. And so I think what everybody expects and what everybody wants, there are differences”. Expectations from community members to win awards and gain recognition from CDE competitions was also echoed by Natalie who stated, “it can be really challenging, I feel there is a lot of pressure from community members and your Ag teacher colleagues, to make sure that we're doing all this FFA stuff, and staying up on that”. Connor felt his community reiterated these same thoughts stating, “they [the community] make a big deal of it. It gets a lot of attention, and that happens whether it's through social media or the banquet or whatever it is that gets commented on. I think that they mark as a success”. Mark identified the differences in expectations from accountability partners including his university partners, CTE liaisons, and Farm to School program. After he discussed the different expectations from various accountability partners he stated, “so it kind of depends on the day of the situation. So there's a little bit of frustration coming there because I don't know which direction I should be going, because every direction I go seems to be the wrong direction”.

No room for error

As participants discussed how they strive to attend to the different accountability partners and their respective expectations, they often spoke about the negative repercussions should they make a mistake or change traditions within their program. These negative repercussions surfaced through feelings of fear, social pressure, threats to remove programmatic funding, or verbal or nonverbal chastisement and it became evident that little forgiveness would be granted should agriculture teachers mess up in any way. As a newer agriculture teacher in the community, Liberty shared her fear of making changes in the program stating, “honestly, I'd be afraid to kind of walk away or change what I'm doing because I feel like I'm disappointing people”. Megan noted that should she displease parents, they would bypass communicating with her and go straight to the school district, “if parents and their friends are not pleased with things, it’s just such a small community that then it would go, anything negative would go straight to the superintendent right away”. Unspoken social pressure also existed for participants as they tried to

attend to community expectations. This was the case for Natalie who said, “I guess other things that we're kind of expected to go to with things like literacy night, and farmer's carnival. And it's not required, but it's pretty frowned upon if you don't show up for those things”.

Expectations are also tied to funding. For example, Stephen reflected how money is tied to both CTE expectations and administrative expectations, which are different. He noted matter-of-factly, “if I don't do what they want, then my money goes away”. Likewise, Connor indicated his various accountability partners directly influenced his decision making as he shared, an administrator expects their school to run well. When life is good, they're good, and when it's not, they're not. Like most bosses, when you don't cause them problems, they're happier”. Natalie shared how she would be chastised for failing to attend to each accountability partner fully and worried that there would be consequences of judgement or termination from her job based on the opinions of these different constituents,

> And I always feel like I'm in a fish bowl. As Ag teachers, we fall into this kind of role where the community wants us to be involved; but there is this expectation that we should be at everything...I've always just felt like there's a lot of eyes on what the Ag teacher is doing, and what they should or shouldn't be doing.

Arms race

Within the social landscape of SBAE, there exists a sort of arms race, an unspoken yet ever-present feeling of judgement, comparison, and competition among agriculture teachers to be the best or most successful. To be good or successful is determined by tangible metrics associated with the job (e.g., coaching winning CDE teams, winning teaching awards) as well as visibility, status, and power within the profession (e.g., hosting a workshop where you are seen as the expert, holding a leadership position within the professional association). This makes participants strive to win awards and gain recognition, thereby outperforming each other. This was shared by ten of the participants, both men and women as well as new and experienced teachers and was especially prominent in participants who work in California and Oregon. In the below excerpt, Connor described this arms race,

> We have this ‘cold war - arms race’ where everybody feels they are being measured with the expectation. Whether that expectation is that you're going to be just as good as you've always been or better, or that you're going to be just as good as the neighbor next door. So everybody keeps pushing. And even competitive people and people who aren't competitive, [they have] that feeling of comparison.

While Connor named this phenomenon, several other participants described the judgmental and competitive nature of agriculture teaching and how it personally affects how they think about themselves as professionals. Joey succinctly shared his perspective, “it's so competitive, Ag teachers can get so competitive with each other, that sometimes new teachers can get caught up in it and forget that they're human beings”. Similarly, Allison struggled with comparison stating, “I'll compare myself to what other Ag teachers in my area doing. That's another thing I haven't figured out yet 'cause I still compare myself all the time and don't feel like I'm doing enough”. Natalie shared a similar story stating, “there are some Ag teachers that put a lot of pressure on other Ag teachers, there's this kind of unspoken judgment, that if you don't go to every SAE or

CDE in your district, that you are doing something wrong". In the disheartening excerpt below, she pairs comparison and feelings of guilt with the possibility of leaving the profession,

> But I feel like I always get caught in this rock and a hard place, I'm doing the right thing by leaving work right now and going to the gym, and taking care of myself and my body; but I should be there until 7:00, because other Ag teachers do. And I kind of have this guilt. I look at other Ag teachers and see what they're doing sometimes. And here I am cooking dinner. And it makes me feel guilty that I should be out there doing the same thing...But like I want to be able to stay in this job, and I feel like if I don't take care of myself, then I won't.

Validation

Participants in this study thrive on the recognition and validation from others, which plays a pivotal role in how they feel about their competence, level of success, status in the profession, and agriculture teacher identity. Validation comes in many forms including increases in student growth and achievement, recognition from community members, silences from community members (pending they meet their expectations) or administration (indicating they have autonomy and are content with their decision-making), verbal recognition from various accountability partners, or evidence of "membership" in the profession (via invitation or recognition from more powerful members to various activities) (Wenger-Trayner & Weger-Trayer, 2015). Further, in alignment with Landscapes of Practice, participants do not claim competence in isolation, but instead rely on various individuals to deem them successful (Wenger-Trayner & Weger-Trayer, 2015).

This theme emerged largely as participants discussed their own conceptualizations of success, whether or not they identified themselves as successful, and whether or not they think others would see them as successful. Teresa, a veteran teacher, said she especially felt appreciated when her superintendent congratulated her on her recent award at the grocery store, "awards are wonderful and that's not the reason I do things, but it does make you feel like other people appreciate what they see you are doing". The other veteran teacher in this study, Connor, reflected on how this award served as a way to compare himself to other agriculture teachers. He stated, "It's wanting the scoreboard again... how do I, where do I measure? Where do I fall? How am I doing? Who's doing a better job and what are they doing?". Joey also admitted thriving on validation from others as a source of motivation to continue his work, specifically how meaningful it was to receive validation from a more experienced peer in the state, "I received one of the best comments I have ever gotten from one of my friends. He thinks that I'm one of the top five, if not top three Ag mechanics teachers in the state". Similar to Joey's desire to be seen as good by his fellow agriculture teachers was Eddie who measured his own success based on validation and membership from more senior peers. He spoke several times of wanting to impress agriculture mechanics teachers whom he admired and consequently, have won several awards with phrases such as, "I'm the young buck, these are old guys, and I gotta impress them". Other participants like Megan and Mark sought validation from parents and members in their community. Mark shared, "it's gratifying to hear comments from parents" in regards to how his students' outlooks have changed. Megan on the other hand, shared how important recognition from her community is, especially in regards to winning CDE competitions. She commented,

"we definitely feel that struggle of wanting, of the community and some particular individuals just really wanting us to have that recognition".

Conclusions, Recommendations, and Implications

The purpose of this study was to explore the experiences of secondary agriculture teachers as they navigate, manage, and attend to the landscape of practice in which they live and work. Our specific research questions included, *how do agriculture teachers conceptualize the social landscape of SBAE*? And *how does the landscape influence the way they go about their work?* As agriculture teachers in this study described their various roles and responsibilities, to whom they are accountable, and how these individuals influenced their work, five themes emerged 1) *multiple accountability partners*, 2) *different people, different expectations*, 3) *no room for error*, 4) *arms race*, and 5) *validation*.

In this study, it became evident secondary agriculture teachers live and work in a complex social landscape with *multiple accountability partners* who have *different expectations* of them. Living in this landscape is challenging and involves extensive work, long days, feelings of stress and tension, especially as their accountability partners allow *little room for error*. This is consistent with literature that outlines the roles and responsibilities of agriculture teachers (Baxter, Stephens, & Thayer-Bacon, 2011; Boone & Boone, 2007, 2009; Fritz & Miller, 2003; Mundt & Connors, 1999; Myers, Dyer, & Washburn, 2005; Paulsen, Anderson, & Tweeten, 2015; Rocca & Washburn, 2008; Stair, Warner, & Moore, 2012) and the trend that they work well beyond 40-hour work weeks (Delnero & Montgomery, 2001; Hainline et al., 2015), undergo stress (Smith & Smalley, 2018; Torres, et al., 2009), and struggle to manage the various responsibilities of the profession (Dillon, 1978; Lemons et al., 2015; McIntosh et al., 2018; Solomonson et al., 2018). However, until now, the literature did not specifically identify the expectations associated with various accountability partners. We assert this new knowledge not only adds to the literature about the work of agriculture teachers, but provides fodder for future research and dialogue about how these different expectations impact agriculture teacher decision-making, identity, and retention. For example, this study concluded participants feel pressure from their peers about winning, being present at FFA events, and engaging their students through a variety of activities. How are these pressures and expectations both administered and received by agriculture teachers? Does this occur during profession-related events, when they see posts on social media from their peers, or during in-service meetings? Future research could delve into not only this phenomenon, but also explore how agriculture teachers are becoming aware of the various expectations the different accountability partners have of them. Moreover, while we now have empirical evidence that illuminates the complexity of the SBAE landscape, we have yet to understand how exactly agriculture teachers reconcile the competing expectations and multiple accountability partners within the landscape. Future research should explore this phenomenon specifically as it may help us to understand the degree to which these factors contribute to their decision to leave the profession.

In this study, less-experienced agriculture teachers recounted their accountability partners from the perspective of fear, pressure, or self-consciousness while simultaneously recognizing how receiving *validation* from these individuals was pivotal in how they position themselves as agriculture teachers. This is fitting given Wenger-Trayner and Wenger-Trayner's (2015) claim

that regimes of competence are socially negotiated, pull new members into a given community, shape their participation, and contribute to their identity development until they are able to reflect the competency of the community. Unfortunately, participants in this study noted they could not reflect the regime of competence associated with various communities. Because of this, they often felt like failures. Although this is not studied specifically in previous literature, there is some indication these feelings are common for agriculture teachers. Prior literature has identified a lack of confidence and feelings of inadequacy as challenges agriculture teachers face, although these studies do not tie these feelings to anyone or anything in particular (Fritz & Miller, 2003; Paulsen et al., 2015; Stair et al., 2012). What is left to be known is *why* these agriculture teachers live in such fear? How are they experiencing said pressure, specifically from community members and other agriculture teachers? Are they being held to unrealistic expectations? Or are these expectations merely not communicated to new teachers? Future research could explore connections between the desire and pressure to fulfill the expectations of the profession and agriculture teacher identity development.

In addition to other findings, this study also found agriculture teachers live in a sort of *arms race*, an unspoken yet ever-present feeling of judgement, comparison, and competition among agriculture teachers to be the best or most successful. It is difficult to explain this finding, but it may be related to both the public yet insular nature of SBAE as well as the connectivity of agriculture teachers to each other. Perhaps the public nature of this profession (e.g., the frequency with which agriculture teachers interact with each other at FFA events, professional development conferences, on social media etc.) serves as a platform for this arms race and amplifies it. This may be what Kitchel et al. (2012) were alluding to when they posed the question, “does the professional culture in agricultural education create a situation where teachers wear their jobs as a badge of honor and scorn others whom they are not performing to the same level?” (p. 38). Perhaps they are hinting at the arms race that emerged in this study. While we would argue a modest sense of competition can be healthy at any workplace, we do wonder at what point competition becomes an invisible arms race where judgment, critique, and pressure cloud all sense of collaboration or community. Further, how do these findings and developing questions relate to the development of a shared repertoire of practices Wegner-Trayner and Wenger-Trayner (2015) described as an essential component of healthy communities of practice? Are agriculture teachers effectively working together to cultivate their communities of practice and develop shared knowledge (Wenger, McDermott, & Snyder, 2002) or are communities being fractured through competing interests? More research is needed on this phenomenon, particularly its origin and effects.

As a final observation, in addition to our own desire to understand, this line of inquiry has sparked emotion among participants. We have witnessed intense emotion as the questions raised caused the participants to wrestle with concepts around personal meaning, belonging, fear, and uncertainty. The passion and emotional investment of the participants encourage us as researchers to continue this line of inquiry and develop new knowledge pertaining to how agriculture teachers interact with their work. As we continue to explore the ways in which agriculture teachers navigate the social landscape of SBAE, how can we support and encourage them with the results of our research? What have we learned from our participants that can push our pragmatic understanding and address the systematic change Carrie called for in the email that began this paper? Does the entire system need to be changed, or can we identify and target key

components of the landscape that will result in increased teacher retention? While our challenge has persisted for decades, we believe a thoughtful and at times, critical, analysis of the system of agricultural education is overdue. We embrace the challenge and look forward to continuing to ask the questions that need to be asked to increase the longevity and vitality of our profession.

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Images from the Trenches: A Visual Narrative of the Concerns of Agricultural Education Majors

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Abstract

This study described how agricultural education majors (N =30) at Louisiana State University visually represented and narrated their concerns about teaching. To accomplish this, students captured photos during early field experiences (EFEs) and then critically reflected on such through focus group interviews during the Fall 2018 and Fall 2019 academic semesters. As a product of our analysis of data, we offered a visual narrative of students' concerns through three themes: (1) Blurred Expectations: Representations of Incompetence; (2) Framing Success: Depictions of Achievement; and (3) The Narrowest Lens: Views of Time. As a result, the first theme represented how students grappled with feelings of incompetence. In the second theme, they depicted success as a secondary agricultural education teacher as winning banners and awards, which emerged key tensions. As students assigned meaning to this concern through the co-construction of knowledge, however, their perspectives began to mature and evolve. The final theme spoke to how the EFEs opened students' eyes to the realities of teaching, especially regarding the time required to be effective. As a consequence, we offered recommendations and implications for teacher preparation programs to better respond to the concerns of agricultural education majors preparing for careers as secondary teachers.

Introduction and Literature Review

The discipline of agricultural education is experiencing a crisis regarding the recruitment and retention of highly qualified and effective teachers (Kantrovich, 2010; Talbert, Vaughn, Croom, & Lee, 2007; Smith, Lawver, & Foster, 2018). For example, in the 2017-2018 school year, it was reported that 868 teachers were not returning to the profession, with retirement only accounting for 18.2% of the reason why such individuals were leaving (Smith et al., 2018). To complicate this matter further, however, over one-fourth of graduates who were license-eligible, program completers of teacher preparation programs in agricultural education chose not to enter the profession (Smith et al., 2018). Unfortunately, such trends do not appear to be changing, as they have remained relatively consistent in recent reports commissioned by the *American Association for Agricultural Education* (Foster, Lawver, & Smith, 2014; Smith et al., 2018).

As a consequence, teacher preparation programs in agricultural education are tasked with not only recruiting high-quality candidates but also ensuring they are prepared to successfully enter the workforce (Torres, Kitchel, & Ball, 2010). However, preparing individuals for such responsibilities remains complicated, as the job duties of school-based, agricultural education (SBAE) teachers far exceed classroom instruction. For example, Roberts and Dyer (2004) reported that seven characteristics of effective agricultural education teachers gained 100% consensus among a panel of experts: (1) cares for students, (2) planning for instruction, (3) evaluate student success, (4) promotes moral and honesty, (5) effectively advises the program's

FFA chapter, (6) communicates with stakeholders, and (7) uses and maintains laboratory spaces. Despite this knowledge, however, one of the challenges of teacher preparation programs is equipping students with the knowledge and skills needed to thrive in their future careers and, thereby, reduce their desire to leave the profession (Stair, Warner, & Moore, 2012).

It is imperative, therefore, for teacher preparation programs to better understand the concerns of agricultural education majors so they can respond by providing tailored coursework, experiences, and programming designed to meet their needs (O'Conner & Taylor, 1992). In response to such needs, Fuller (1969) introduced the concerns based adoption model (CBAM). The model helped describe the evolution of teachers' concerns as they adopt research-based practices introduced through teacher preparation (Fuller, 1969). In particular, Fuller (1969) theorized that as education majors mature, they evolve through three specific developmental stages – self, task, and impact – of concern. In the first stage, *self*, university students begin to question their capability and how various forces will affect them as a teacher (Fuller, 1969). In the second phase, *task*, they become more concerned with process-based variables that may affect them in the classroom, such as organization and implementation. The final stage, *impact*, reflects the maturation of students' concerns as they begin to question how various factors will affect their future students and how they can make their teaching more impactful (Fuller, 1969).

Despite such insights, more work is needed to distill the initial teaching concerns of agricultural education majors. As a consequence, Stair et al. (2012) called for a deeper investigation into the phenomenon. To this point, the literature has illuminated a number of intersecting concerns for agricultural education majors and beginning SBAE instructors across several states (Claycomb & Petty, 1983; Edwards & Briers, 1999; Fritz & Miller, 2003; Garton & Chung, 1997; Hillison, 1977; Johnson, Lindhardt, & Stewart, 1989; Paulsen, Anderson, & Tweeten, 2015). In particular, evidence has demonstrated that students' concerns are grounded in a lack of confidence in their teaching abilities, perceived deficiencies in their content knowledge, and little self-efficacy to deliver agricultural education's comprehensive, three-circle model in a balanced way (Fritz & Miller, 2003; Paulsen et al., 2015; Stair et al., 2012).

To help agricultural education majors navigate such concerns, several researchers have advanced early field experiences (EFEs) as an essential component of teacher preparation (Baker, Culbertson, Robinson, & Ramsey, 2017; Retallick & Miller, 2007a, 2007b; Smalley & Retallick, 2012; Wells, Smalley, & Rank, 2018; Rank & Smalley, 2017). EFEs occur before students engage in student teaching and include an array of observations, microteachings, and other opportunities "to immerse themselves into the complex world of teaching and serve as a means for students to think as teachers" (Retallack & Miller, 2007b, p. 20). As a result, EFEs have been shown to help improve individuals' self-efficacy, desire to enter the profession, and ability to conceptualize the multifaceted characteristics of effective teaching and learning (Guyton & Byrd, 2000; Miller & Wilson, 2010). It is important to note, however, that Fritz and Miller (2003) argued that critical reflection on EFEs was essential to help agricultural education majors process their concerns so that they can better understand how to navigate the complexities of teaching in SBAE. One approach used to facilitate critical reflection on EFEs is through the formation of a community of practice (Cumming-Potvin, 2009; Paulsen et al., 2015).

A community of practice is a constructivist approach to teaching and learning that emphasizes

the role of social interaction, discussion, and reflection on topics and issues to socially construct knowledge and develop new solutions to problems (Wenger, 1998). One way that communities of practice have been used is by having education majors socially reflect on the concerns they encounter during EFEs (Paulsen et al., 2015). Then, through critical reflection, students co-construct meaning and develop a strategy to overcome these concerns moving forward. Communities of practice have been used in an array of educational settings; for example, they have appeared in classrooms, online forums, and social media groups to provide resources and support to education majors as they grapple with teaching concerns (Ferriter, 2010; Lock, 2006; Lieberman & Miller, 2011). However, more work is needed to explain how this approach could assist agricultural education majors in processing their concerns as they co-construct meaning of their EFEs. Such an understanding could illuminate the ways in which discourse, social processes, and conceptualizations of concerns merge to influence the professional identity development of postsecondary agricultural education students (Korthagen & Kessels, 1999). This deficit in knowledge motivated the current study.

Epistemological Lens and Theoretical Perspective

We approached this investigation from the epistemological lens of *constructionism*, which advances the notion that individuals construct reality internally (Crotty, 1998). However, such constructions are influenced by engagement with others and interpreted through a lens heavily influenced by society, culture, and historical influences. Ultimately, therefore, an individual's worldview is shaped by their upbringing, prior experiences, and exposure to divergent perspectives (Crotty, 1998). In designing this investigation, therefore, we maintained that agricultural education majors' concerns were internally constructed and foregrounded by a number of contextual forces. We also maintained that such contextual influences were the result of students' interactions with objects in their environment (Crotty, 1998). As a consequence, when investigating this phenomenon, we also drew on the theoretical perspective of *symbolic interactionism* (Crotty, 1998). Through the lens of symbolic interactionism, individuals engage through multiple, intersecting lines of action. And, objects that are positioned within this social environment hold distinct meanings for each individual; however, shared meanings emerge as individuals interact socially (Crotty, 1998). As a consequence, in the design of this study, we placed particular value on the *objects* and *symbols* that represented agricultural education majors' concerns about teaching in SBAE. For example, during students' EFEs, we were interested in understanding which items, relics, architectural features, and other objects they encountered elicited a visceral response of concern. As such, we were keenly attuned to their visual representations of concerns. However, our primary interest was in understanding how students' co-constructed meanings of such visual representations through narrative discourse as they critically reflected on their EFEs.

Purpose and Research Questions

The purpose of this study was to describe the ways in which agricultural education majors at Louisiana State University *visually represented* and *narrated* their concerns of teaching as they critically reflected on an EFE. Because identifying and addressing postsecondary students' concerns is critical to retention and teacher success, it addressed the American Association for Agricultural Education's Research Priority Area 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016). Two

research questions framed the investigation: (1) How did agricultural education majors visually represent their teaching concerns encountered during an EFE? and (2) How did students co-construct a narrative of their teaching concerns as they critically reflected on their EFEs?

Background of the Study

Foundations of Agricultural and Extension Education is the first in a series of courses for agricultural education majors at Louisiana State University. Traditionally, the course is completed during students' freshmen or sophomore year; however, exceptions exist due to scheduling and because some students transfer later in their academic careers. Per the syllabus, the course is designed to "provide an introduction to of the philosophical foundations for agricultural education" (Roberts, 2018, p. 1). Further, students also gain practical experience through EFEs by which they complete 10 required hours of observation at two different secondary agricultural education programs. Data for the current study were collected from students enrolled in the course in the Fall 2018 and Fall 2019 semesters. At the beginning of each semester, the course's lead instructor required students to capture two photographs at each EFE site, i.e., *in the trenches of SBAE*, that represented their teaching concerns. Then, at the end of the course, students reflected and expounded on their photos and captions through two-hour focus group interviews. Due to a larger number of students enrolled in the course in Fall 2019, students were divided into two different focus group sessions. As a consequence, our beliefs about teaching and learning and the value we placed on students reflecting on their teaching concerns encountered during EFEs influenced this investigation's conceptualization. As such, it was essential to address our positionality.

Reflexivity

Before offering our methodology and interpretation of the study's findings, it is critical to disclose our relevant backgrounds, experiences, and bias that may have influenced this investigation. To begin, it is important to acknowledge that we are former SBAE teachers. Further, the lead researcher also served as the primary instructor for the course under investigation. As such, our views on teaching and learning and relationships with students could have influenced the data collected and our interpretation of such. Further, because we held a position of power over the participants, they could have chosen not to provide honest responses because they perceived it might negatively affect them. To mitigate such power imbalances, we ensured students that what they shared would not affect their grade or their standing in our program. We also attempted to foster an open atmosphere during the focus group interviews so that the students felt comfortable sharing and providing ideas about how to navigate teaching concerns with their peers. Despite such attempts, however, we recognize that vulnerabilities persisted. Therefore, in the description of our methodology, we provide more detail in regard to how rigor and trustworthiness were emphasized throughout each phase of the investigation.

Methodology

In this study, we used a visual narrative approach (Pink, 2012). Visual narratives are premised on the idea that humans interact in the world using symbols and imagery that are assigned a socially constructed meaning (Rose, 2016). As an illustration, when engaging with others, individuals often refer to a range of objects and metaphors to add critical layers of meaning and evoke vivid imagery as they story critical events and experiences (Pink, 2012; Rose, 2016). Therefore, visual

narratives focus on how individuals use imagery to depict aspects of their beliefs, perceptions, and lived experiences (Pink, 2012; Rose, 2016). In particular, the approach allows researchers to examine how visual representations and the meaning individuals assign to such, influence the social world (Riessman, 2008). Although it shares similarities with the photovoice approach, visual narratives do not place emphasis on critiquing issues of power and injustice (Rose, 2016). Instead, researchers attempt to story the ways in which participants use imagery to co-construct knowledge and narrate shared meanings regarding issues, problems, and concerns (Pink, 2012). Therefore, a common procedure used to facilitate visual narratives is to invite individuals to capture and discuss photographs through focus group interviews (Pink, 2012). A description of our participants and how the visual narrative approach was used in this investigation follows.

Participants, Data Sources, and Procedures

Participants (N = 30) in this study consisted of students enrolled in the *Foundations of Agricultural and Extension Education* course at Louisiana State University in Fall 2018 (n = 9) and Fall 2019 (n = 21) academic semesters. Of the participants, 22 identified as female and eight as male. Regarding classification, there were 12 freshmen, 14 sophomores, and four juniors. It is also important to note that data for this investigation were furnished from three primary sources: (1) 120 participant submitted photographs and captions, (2) video recordings from three focus group interviews, each lasting two hours in length, regarding agricultural education majors' teaching concerns, and (3) observations and fieldnotes.

As a requirement for the course under investigation, students visited two secondary agricultural education programs. During this experience, students captured four photos that represented their concerns about teaching. Participants were informed at the beginning of the semester that their photos and captions would be shared with other students in the course to facilitate a voluntary focus group interview for the current investigation. After IRB approval, students were directed to take photographs of their concerns during EFEs at secondary agricultural education programs. The students then submitted the four photographs, accompanying captions, and other required artifacts through the course's online learning platform three weeks before the end of the course. After students submitted the assignment, the course's instructor compiled the 120 photographs and captions into a single document and removed all identifying information. Then, the students were given the option to earn bonus points in the course by engaging in a focus group interview; however, their attendance was not mandatory. It should be noted that only one focus group interview occurred in Fall 2018; however, due to a large number of students enrolled in the course in the Fall 2019 semester, the focus group was split into two different sessions.

After the lead instructor introduced the concept of a focus group interview, the photographs and captions were distributed to each student. Participants were then asked to share their photographs and describe (a) what the photograph depicted, and (b) why it represented a concern they had about teaching in SBAE. During this phase, we encouraged the other participants to respond by sharing similar or divergent perspectives and experiences. We also asked participants to reflect critically on ways they could address such concerns as they progressed in their teacher preparation. As a result, the process was highly interactive as the students' co-constructed knowledge and assigned meaning to the concerns depicted in the photographs. Occasionally, however, the discussion would pause and we would restart the conversation by posing a probing

question. Each focus group interview lasted two hours and was captured using a Sony® video recorder. Throughout the exercise, we also took field notes to record key interactions and critical moments in which students exchanged visceral responses (Emerson, Fretz, & Shaw, 2011).

Data Analysis

After data collection, we transcribed the video recordings verbatim. All data sources were then uploaded to NVivo® qualitative analysis software to examine their complexities. To facilitate analysis, we systematically engaged the data through the use of coding (Saldaña, 2016). In particular, we began our initial cycle of analysis using an *in vivo* coding approach by which participants' words were used to create textural codes (Saldaña, 2016). This process allowed us to become familiar with the participants' language and the concerns they emphasized. Further, we were also provided unique insights into emotional journeys that participants endured during the meaning-making process (Saldaña, 2016). A product of this process was the development of a textural description of the students' concerns that depicted the intersecting storylines that emerged from the data corpus through the use of participants' words (Riessman, 2008). For the second cycle of coding, we used Labov's (1972) narrative structure coding to conceptualize each source of data – photographs, captions, narrative responses, and field notes – as storied units, that when considered in tandem, formed a rich narrative. Such was accomplished by interrogating the data in the following ways: *What and who was involved in this story? What is the central issue? What was the result?* and *What does the story mean?* (Labov, 1972). Through this structural analysis of the data, we dissected confirming and disconfirming evidence and began to distill participants' co-constructed meanings of their visual representations of teaching concerns. And a result, we created a structural description that portrayed the ways in which the data functioned as a storyline (Labov, 1972). In our final level of analysis, we used Saldana's (2016) notion of code weaving to merge findings from the two previous coding cycles while also negotiating existing discrepancies. To accomplish this, we approached the data using a symbolic interactionism lens (Crotty, 1998) to synthesize and integrate the textural and structural descriptions. As a consequence of this process, a narrative of participants' teaching concerns emerged through three themes. Before offering our interpretation of the findings, however, it is important to provide insight into how we imbued rigor and trustworthiness.

Building Quality into the Study

For this investigation, we used Tracy's (2010) criteria for qualitative quality to ensure that our findings were honest and valid. For example, we began this process by designing an investigation that focused on the concerns of students, which was relevant, timely, and significant for the discipline of agricultural education (Tracy, 2010). Then, we instilled *rich rigor* by using sufficient data collection and analysis techniques (Tracy, 2010). In this phase, we also promoted *sincerity* by recognizing our biases and minimizing them when possible (Tracy, 2010). Meanwhile, *credibility* was achieved by providing a rich description of our procedures and triangulating data sources (Tracy, 2010). We also provided evocative descriptions of our participants and findings to promote *resonance* (Tracy, 2010). Finally, we stressed *ethics* throughout each phase of the investigation to ensure our work provided a *significant contribution* (Tracy, 2010). We feature this contribution in our narration of this study's findings next.

Findings

Findings from this investigation emerged through a code weaving process in which we wove our textural and descriptions together and narrated the final product through three themes: (1) *Blurred Expectations: Representations of Incompetence*; (2) *Framing Success: Depictions of Achievement*; and (3) *The Narrowest Lens: Views of Time*. The themes tell the story of the concerns that students encountered from the *trenches* of secondary agricultural education during their EFEs. In particular, the themes draw on the visual representations that the students captured through photographs while also using their words to describe the ways in which they co-constructed knowledge and assigned new meaning to their teaching concerns.

Blurred Expectations: Representations of Incompetence

I am concerned about helping students with their SAE's. This is a student's aquiculture SAE. The reason I am concerned is that I want my students to be successful. Many of the possible projects my students could have, I may know nothing about. That's my biggest concern – Participant #7, Photo Caption

My concern is about SAEs. This program ha[d] a lot of livestock, cattle, sheep, pigs, goats, and I have no experience in those areas. I majored in ag because I really like the type of people that these programs attract and produce. So, I'm just worried I won't be successful because I do not have the right skills. – Participant #13, Photo

One of my concerns is having enough knowledge as a single ag teacher. I do not know a lot about all of the different areas [of SAEs] so I think I may struggle to supervise students. This concerns me because each student deserves the same amount of time and feedback, but it is not easy to juggle it all. – Participant #28, Photo Caption

Figure 1. Photos and captions from Participant #7, #13, and #28.

The students encountered a host of concerns about teaching during their lived experiences through EFEs in secondary agricultural education. And as a consequence, they chose to represent their concerns through capturing photographs of items, relics, and other salient objects that elicited an emotional response of concern. Although the photos the agricultural education majors captured were largely high quality in regard to resolution and pixel strength, their interpretations

of such were often *blurred.* For example, the photos and captions sampled in Figure 1 stoked emotive exchanges from the students in the meaning-making process by which they expressed concerns about whether they were “knowledgeable enough” (Participant’s #1, #3, #6, #7, #10, #13, #17, #23, #28, & #29) to be a successful SBAE teacher.

As an illustration, Participant #13 shared, “These photos represent a concern of mine. I feel like there is so much that I do not know, especially for SAEs. I just feel disadvantaged because I did not have much ag experience, so I feel unprepared.” Participant #17, who shared “agricultural education is just so broad,” also echoed feelings of incompetence. She continued “during my early field experience, I just felt overwhelmed. I mean how am I going to be able to do all of this in a few years?” (Participant #17). These sentiments appeared to form the basis of most students’ concerns, but they also provided scaffolding for intense moments of co-construction of knowledge, and, in turn, shaped the ways in which the students planned to move forward. Participant #1 explained,

> When I first saw these pictures, I was straight up like, yup, that’s me, that's exactly where I am at right now. But I think we also have to remember that like nine times out of ten, this is going to happen to us everyday. I think we just have to start taking these moments as learning experiences because you'll learn something from it that you can use in the future. And eventually, you’ll get the confidence and the knowledge you need to teach it better down the line.

In essence, the representations of incompetence captured by the agricultural education majors helped elicit the meaning they collectively assigned to this concern as a result of their EFEs. However, after recognizing that other peers “shared this concern” (Participant’s #6, #10, #17, & #23) the participants began to negotiate meaning and develop a new way forward. Nevertheless, it is important to recognize that sentiments of “incompetence” (Participant #2, #4, #15, #19, & #24) appeared to serve as a foundation for other concerns narrated by the students in this investigation, especially regarding how they framed success.

Theme 2: Framing Success: Depictions of Achievement

"My biggest concern is making sure students are successful. I want to make sure they are proud of their program and this is best achieved by hanging up banners. But achieving this is my biggest concern." – Participant #9, Photo

"My biggest concern is I want them [future students] to feel the success of winning their desired contest. But I am worried that all of hard work and commitment it takes to win will make me burned out." – Participant #21, Photo

"This picture represents my concern because I am worried that I might not be competitive enough for this job. I see a lot of banners hanging on the walls of ag buildings but I am just not that competitive" – Participant #29, Photo

Figure 2. Photos and captions from Participant #9, #21, and #29.

As the students began to come to terms with feelings of incompetence regarding their lack of technical knowledge, their tensions reemerged after viewing photographs (see Figure 2) submitted by their peers that depicted success in agricultural education. As an illustration, many of the participants reported the "banners" (Participant #1, #4, #8, #9, #14, #18, #19, #20, & #29), "trophies" (Participant #2, #3, #11, #16, #21, & #23), and other forms of success they observed concerned them during their EFEs. As an illustration, Participant #18 shared:

> The idea that you have to win banners to be considered successful is a big concern for me. My FFA chapter was really competitive in high school and we brought home a lot of banners, but I kind of saw some downsides. One of my ag teachers actually got divorced. Thinking back on it now, I guess I should have paid more attention. I guess it just makes me realize you have to really protect family time while also figuring out how to be a successful ag teacher.

Other students echoed these views as well. For instance, many participants revealed they felt "pressure" (Participant #7, #10, #17, #18, & #24) from various individuals of influence in their lives to "win and make sure their [future] students get recognized" (Participant #1, #3, #4, #6, #10, #18, #20, #21, #22, #23, & #24). As the students

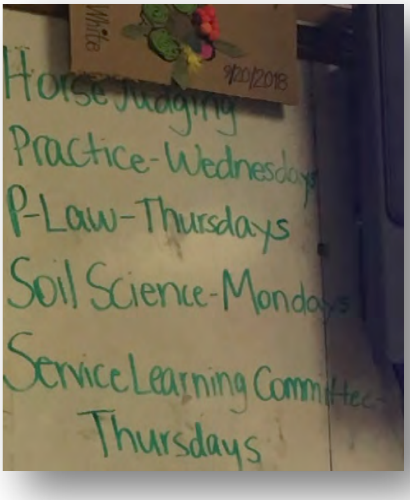
wrestled with such depictions, they began to acknowledge that, perhaps, the parameters of success could be expanded.

Participant #6, for instance, argued, “Obviously winning is important, but I think we just have to keep reminding ourselves to see the big picture.” In response, the students began to collectively consider how definitions of success and achievement could be reframed in agricultural education. In particular, the students in all three focus group interviews came to a consensus that more “empathy” (Participant #1, #5, #12, #14, #26 & #30) should be shown when “representing” (Participant #8, #16, #17, #19, #20 & # 27) and “talking” (Participant’s #2, #3, #6, #7, #10, #13, #17, #23, & #29) about successful teachers in SBAE. Participant #26 explained:

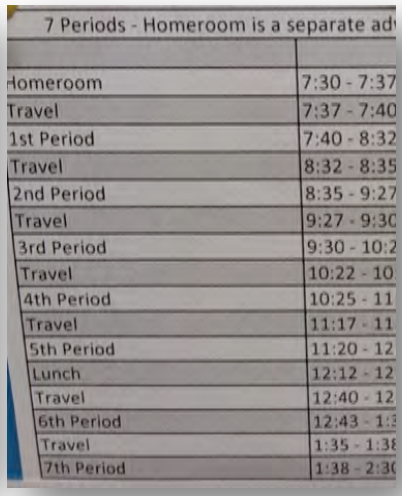
> These photos made me realize that I need to change my perspective on what it means to be a successful ag teacher. I place too much value on winning when in reality it should be about more than just winning. So maybe, I need to quit idolizing those ag teachers with big winning chapters. Instead, I need to start looking at the bigger picture…are they doing a good job with work, life, family, etc. It is just a different way of thinking I guess.

As students came to understand the role that their representations played in shaping their teaching concerns they began to “reevaluate” (Participant #11, #16, #23, & #25) their prior assumptions. For example, Participant #7 shared, “I think if we start picturing it [success] differently maybe it will help relieve some of our worries and stress when we become ag teachers.” As such, the students navigated new understandings and acknowledged that their original perspectives should, perhaps, be “reframed” (Participant’s #3, #4, #5, #8, #9, #10, #17, #20, #23, #27, #28, & #29)

The Narrowest Lens: Views of Time



This is a photo of the white board in Ms. [Blinded]'s room. It has her after school schedule. My main concern is the time it takes to ensure students are successful in similar activities. – Participant #1, Photo Caption



Mr. [Blinded]'s schedule represents my biggest concern because time seems to be the biggest constraint when teaching. Depending on how much time you are given affects what activities you can do. And this does not even take into account time after school. – Participant #14, Photo Caption

One of my big concerns is just how busy ag teachers are. It seems like their schedules are crazy. – Participant #30, Photo Caption

Figure 3. Photos and captions from Participant #1, #14, and #30.

As the students witnessed glimpses of everyday life during their EFEs, the "realities of teaching" (Participant #7, #14, #23, & #27) became more real. As a consequence, they began to reject their neat and tidy views of teaching and, instead, represent it in more authentic ways. This notion was especially prevalent regarding the issue of "time" (Participant #1, #2, #4, #5, #9, #12, #14, #19 #23, #24, #27, #28, #29, & #30). For example, Participant #2 expanded on this notion: "These photos make me think about how realistic it is to teach ag. Your schedule is so packed you have very little free time." Participant #24 added:

> Basically teaching ag is almost like a 24-7 job. Yes, you get to go home, eat, and sleep, but then you wake up, go to school, have class all day, then there is always something going on after school. You've got to work with your students, do stuff for your program, schedule this and that. You have a certain time that you teach, but you still are going to have a way longer day than most people.

The students also felt pressure to emphasize work over their personal time once they enter the teaching profession. Participant #25 elaborated: "I worry that if I am not willing to sacrifice my personal life, someone else will, and I might be out of a job." However, Participant #13

emphasized the importance of coming to terms with this concern. In a moment of critical reflection, she revealed, "when thinking about the big picture, I think this concern could be really good for me. I now recognize that I need to work on my time management and learn how to say no" (Participant #13). As the students began to internalize the realities of time, they articulated that engaging in social reflection catalyzed key shifts in their perspectives regarding their teaching concerns. And, as a result, they would approach their remaining teacher preparation experiences with a new sense of resolve.

Conclusions

The purpose of this investigation was to describe the ways in which agricultural education majors at Louisiana State University visually represented and spoke about their teaching concerns as they critically reflected on EFEs. To accomplish this, we narrated our findings through three themes: (1) *Blurred Expectations: Representations of Incompetence*; (2) *Framing Success: Depictions of Achievement*; and (3) *The Narrowest Lens: Views of Time*. When interpreted through the lens of social interactionism (Crotty, 1998), the findings suggested that students encounter a range of teaching concerns during EFEs (Fritz & Miller, 2003; Paulsen et al., 2015). However, we also conclude that for students in this study, participation in focus group interviews allowed them to reflect more critically on their EFEs, and as a result, helped to broaden and expand their perspectives on their teaching concerns in productive ways – a notion supported by existing evidence (Ferriter, 2010; Lock, 2006; Lieberman & Miller, 2011). These findings are encouraging in light of calls for teacher preparation programs in agricultural education to discover ways to help students better navigate their teaching concerns and be more inclined to enter the teaching profession (Claycomb & Petty, 1983; Fritz & Miller, 2003; Garton & Chung, 1997; Hillison, 1977; Johnson, Lindhardt, & Stewart, 1989; Stair et al., 2012).

In our analysis of students' emergent concerns, the first theme suggested that students grappled with feelings of incompetence. This finding aligns with those reported by Stair et al. (2012) concerning the role that self-concerns play in shaping agricultural education majors' efficacy. We conclude, therefore, that building their self-efficacy and competence through critical reflection on EFEs is a crucial strategy to help ensure that students enter the profession confident in their abilities. Perhaps, this strategy could also be useful for other teacher preparation programs as they seek to address agricultural education's current national teacher shortage (Smith et al., 2018). In our second theme, students' depictions of success as *winning banners and awards* emerged key tensions. As they assigned new meaning to this concern through the co-construction of knowledge, however, the agricultural education majors embraced a more sophisticated view of success. On this point, Trani, Chaflin, Stewart, & Velez (2019) reported that early career teachers struggle to find symmetry between success and work-life balance. However, little evidence exists regarding the role that social reflection on EFEs plays in shaping agricultural education majors' views of success as secondary agricultural education teachers. The final theme spoke to how the EFEs opened the students' eyes to the realities of teaching, especially in regard to the time required to effectively deliver agricultural education's comprehensive, three-circle model. This notion aligns with some existing evidence reported by other researchers (Baker et al., 2017; Smalley & Retallick, 2012). However, we also conclude that a critical reflection on the concerns that students encountered during EFEs allowed them to glean valuable insights and, perhaps, matured their perspectives on teaching – a notion not currently reflected in the literature.

Implications, Recommendations, and Discussion

Because of the critical need for teacher preparation programs to enhance the recruitment and retention of SBAE teachers (Kantrovich, 2010; Talbert et al., 2007; Smith et al., 2018), this study's findings illuminated a number of possibilities for future research and practice. However, more work is needed to understand how society, culture, attitudes, interactions, and previous experiences shape students' concerns. For instance, future research should examine the ways in which agricultural education majors' concerns may influence their use of teaching methods, assessments, and coaching strategies after becoming SBAE teachers. Additional effort is also needed to understand how students' concerns influence the outcomes of EFEs. In this investigation, for instance, we described three critical dimensions of agricultural education majors' concerns. Moving forward, we recommend that teacher educators emphasize these concerns in their teacher preparation courses. Such a practice could open up critical conversations by which agricultural education students disclose more profound concerns, which allows teacher educators to better respond through targeted resources and support.

This investigation also demonstrated how students' teaching concerns formed an evocative narrative. Despite this, however, additional examination is needed to determine whether this storyline can be applied across agricultural education's diverse teacher preparation programs. Therefore, we recommend that future investigations explore how students' concerns influence the discourse, curriculum, and EFEs in teacher preparation. Our findings also suggested that social reflective practices helped the students come to terms with their teaching concerns. For example, students articulated the importance that the co-construction of knowledge played in facilitating their new perspective changes. As a consequence, additional research should explore the reflective techniques that most profoundly help students to successfully process and make meaning of their concerns over time. We also recommend that professional development opportunities be created for teacher educators so that they can acquire a better understanding of effective strategies that can be used to assist students in navigating their teaching concerns (Stair et al., 2012). Further, teacher educators should also consider new ways to engage students in EFEs to help mitigate their concerns before entering the classroom. For example, perhaps the use of video and augmented reality could be used to enhance agricultural education majors' EFEs in the future. Such could be achieved by teacher preparation programs partnering with agricultural education state supervisors, teachers, and students to create content that students could engage in and reflect on more purposefully.

To this point, existing research in agricultural education has largely attempted to measure students' concerns (Fritz & Miller, 2003; Stair et al., 2012). However, by interrogating the phenomenon from a visual narrative approach, this study provided unique insights into how students capture and story their teaching concerns. Further, in this study, symbolic interactionism (Crotty, 1998) served as a flexible and useful lens for narrating our emergent findings. However, we recommend that future investigations design research studies using a variety of conceptual and theoretical perspectives. Perhaps, by examining this phenomenon with a different lens and sets of assumptions, more complex dimensions of agricultural education majors' concerns could be discovered. Through our intent to story students' concerns, we also demonstrated how such helped broaden opportunities for future research and practice. By more intensely investigating how such concerns intensify, blend, and collide in diverse settings, we argue that further limits and possibilities of agricultural education majors' concerns could be revealed moving forward.

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Effectiveness of Utilizing an Evidence Based Safety Curriculum to Increase Student Knowledge

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The purpose of this study was to determine the effectiveness of utilizing an evidence based, "Train the Trainer" approach to increase the safety knowledge and awareness of secondary students. Participating teachers attended a 10-hour inquiry-based summer training workshop utilizing National Safe Tractor and Machinery Operations Program (NSTMOP) materials focusing on roll-over protection structures, mini-tilt table construction, and on-farm tractor risk assessments. Teachers incorporated workshop lessons into existing curricula and had students complete pretests prior to instruction and posttests after instructional units were delivered. A total of 118 students provided completed pre- and posttests, with most students identifying as male and more than half enrolled in ninth grade. A paired samples t-test examining potential differences between students' pre- and posttests revealed a statistically significant positive change. The data from this study suggests that the Fair Labor Standards Act exemption provided for youth between the ages of 14 and 15 years old who have completed specific safety training needs to be revisited. Additionally, increasing the age restriction for hazardous occupations in agriculture would be consistent with other industries. In order for students to learn agricultural safety in the classroom setting, teacher preparation and continuing education programs need to incorporate more production-based experiences.

Introduction/Theoretical Framework

From 2001-2014, the National Institute for Occupational Safety and Health reported 121,252 injuries of youth who live on, work on, or visit farms in the United States. Youth living on, working on, or visiting a farm have been identified as a special population at high risk for non-fatal and fatal injuries (National Institute for Occupational Safety and Health [NIOSH], 2014). In 2001, Marlenga, Pickett, and Berg reported a total of 2,389 jobs were performed by 1,138 children from 498 farms. The leading categories of work performed by these youth were animal care, crop management, and tractor with implement operation (Marlenga et al., 2001). Research has shown that most injuries occur to males between 10-15 years old (Hendricks, Layne, & Goldcamp, 2012). Youth that are working in agriculture are susceptible to agricultural hazards (Hard & Myers, 2006). Prevention strategies that integrate established safety training curriculum and student leadership organizations, such as the National FFA, have been recommended to reduce these childhood agricultural injuries (Jepsen, 2012; Myers, 2002; National FFA, 2014; NIOSH, 2014; Sanderson, Dukeshire, Rangel, & Garbes, 2010). School-based agricultural teachers are uniquely poised to address the critical issue of agricultural youth safety by disseminating effective safety education curriculum to secondary students. However, school-based agricultural teachers have often

expressed professional development needs related to safety education (McKim & Saucier, 2011; Saucier, Vincent, & Anderson, 2014; Shultz, Anderson, Shultz, & Paulsen, 2014).

Several studies have shown professional development opportunities to be an effective means of increasing teacher self-efficacy and competence (Overbaugh & Lu, 2008; Tschannen-Moran & McMaster, 2009; McKim & Velez, 2017), which can create greater opportunities for the provision of quality teaching to students (Chandrashekar, Nanditha, & Geetha, 2017). Professional development opportunities can vary widely and supporting research is inconsistent and often contradictory (Guskey, 2003). However, one distinguishable characteristic of effective professional development is consistently noted. Guskey's (2003) review of professional development literature revealed the most frequently cited characteristic was the enhancement of teachers' content and pedagogical knowledge to better understand the content they teach, and the ways students learn. Other research (Ingvarson, Meiers, & Beavis, 2005) suggests that professional development is most effective at improving teacher and student efficacy when structured in an active learning environment, experiential in nature, and intricately tied to the problems and skills students most commonly face. Regardless of approach, professional development should focus on closing the presumed linkages between professional learning strategies and student outcomes (Ingvarson et al., 2005), including those in safety education.

An increasingly common area of scientific exploration is the evaluation of increased injury rates by examining the relationship between injuries and students' attitude or perception of safety. When students appear to have favorable safety attitudes, fewer injuries and serious incidents are reported (Lawver & Fraze, 1995). Favorable student attitudes and consequent improved learning have been reported to possess direct ties to positive teacher attitude (Mensah, Okyere, & Kuranchie, 2013). Recognizing that teachers learn similarly to students and participate through active engagement development to internalize new ways of thinking (Swan, Pead, Doorman, & Mooldijk, 2013), professional development has the potential to alter teachers' knowledge and thinking, which in turn can alter practice thereby ultimately improve students' learning of safety (Kennedy, 2016). Interactive experiential learning approaches have been mentioned among the essential elements to improving student learning, specifically to the safety and health discipline (Torres, 2007). Therefore, if we want to reduce injuries and improve safety awareness attitudes of students, teachers should focus on educating students on ways to apply their theoretical safety processes through incorporation of experiential learning (Jin & Nakayama, 2013).

This study utilizes experiential learning to conceptualize the linkages among student and teacher attitude, learning, and experience (Jin & Nakayama, 2013; Kennedy, 2016; Torres, 2007). Kolb's (1984) experiential learning theory (ELT) stated, "Learning is the process whereby knowledge is created through the transformation of experience." Several key theorists (Dewey, 1934, 1938, 1958; James, 1890; Rogers, 1961) have built upon the ELT working definition of learning as the "process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). The experiences are characterized as occurring in a cyclical fashion (Figure 1) as students engage in concrete experiences (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE) (Kolb, 1984). Kolb (1984) focused on experiential instruction being characterized as a continuous learning process, a process requiring the resolution of conflicts, a holistic process of adapting, and that learning involves transactions between the person and environment that creates knowledge. ELT focuses on two modes of grasping experiences that

focus on CE and AC. In addition, two modes of transforming experiences focus on RO and AE (Kolb, 1984). The results of these two dimensions include four forms of knowledge: divergent, assimilative, accommodative, and convergent knowledge.

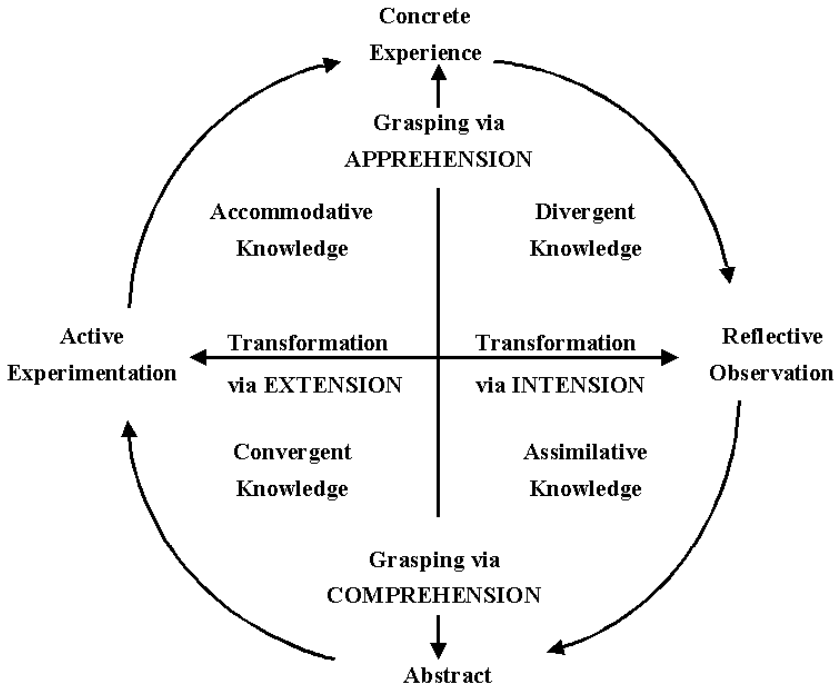

Figure 1. Model of Experiential Learning Process. Reprinted from *Experiential Learning: Experience as the Source of Learning and Development* (p. 42), by David A. Kalb, 1984, Englewood Cliffs, NJ: Prentice- Hall, Inc. Copyright 1984 by Prentice-Hall, Inc. Reprinted with permission.

Similar to the foundation of Kolb's (1984) ELT, inquiry-based learning can be defined as a process of discovering new causal relations, with learners formulating hypotheses and testing them though experiments and/or observations (Pedaste, Mäeots, Leijen, & Sarapuu, 2012). Inquiry-based learning served as a conceptual framework for the professional development experience described in this study due to its emphasis on active participation and the learner's responsibility for discovering new knowledge (de Jong & van Joolingen, 1998). Although inquiry-based learning models may vary slightly from one to another, Pedaste et al.'s (2015) review of descriptions and definitions of inquiry phases led to a new inquiry-based learning framework that included five general inquiry phases: *Orientation*, *Conceptualization*, *Investigation*, *Conclusion*, and *Discussion*. *Orientation* focuses on stimulating interest and curiosity and culminates with a problem statement. The problem statement is then operationalized into either a specific, investigable research question or hypothesis during *Conceptualization*. The *Investigation* phase is characterized by curiosity turning into action in an attempt to respond to the stated research questions or hypotheses. Based on the learner's experiences and collected data, final conclusions are drawn in the *Conclusion* phase and set the foundation of communication and reflection that occur during *Discussion* (Pedaste et al., 2015).

Purpose/Objectives

Education research has several strong theories for student learning but lacks well-developed ideas on how teachers learn or how to help teachers incorporate new ideas into practice that ultimately influence student outcomes (Kennedy, 2016). The purpose of this study was to determine the effectiveness of utilizing an evidence based "Train the Trainer" approach to increase the safety knowledge and awareness of secondary students. The study was part of a larger project tasked with developing and evaluating an agricultural machinery safety curriculum through teacher trainings utilizing inquiry-based activities (Pate, Lawver, Smalley, Perry, Stallones & Shultz, 2019), This information could help contribute to current research exploring effective professional development strategies that affect student learning as outlined in the 2016-2020 American Association of Agricultural Education's (AAAE) National Research Agenda Priority 4: Meaningful, Engaged Learning in All Environments (Edgar, Retallick, & Jones, 2016). This study's research objectives included:

1. Describe selected demographic characteristics of school-based agricultural education students whose teachers participated in an agricultural safety professional development.
2. Determine the effect of a train the trainer agricultural safety education professional development program on school-based agricultural education students' knowledge of tractor and machinery safe operation.
3. Explore potential associations among selected demographic characteristics and changes in students' knowledge of safe tractor and machinery operation.

Methods/Procedures

Teacher Participation and Training

School-based agricultural teachers were recruited from Montana and South Dakota to participate in a 10-hour summer teacher training workshop. Teachers were asked to register for the workshop on a voluntary basis and participation was via a "first-come, first-serve" process. To increase participation, incentives were provided to the first 50 registered participants (Dillman, Smyth, & Christian, 2009). Incentives primarily comprised of safety materials and supplies, which included tractor power take-off safety guards, warning labels, personal protective equipment, and supervisor safety toolboxes. Flash drives loaded with workshop curriculum were also provided to participating teachers. Additional incentives included professional development credit towards licensure and safety educational resources for students. The human subject research protocol was reviewed and approved under Utah State University's Institutional Review Board protocol 10514. An Institutional Review Board reliance agreement was established and approved between Montana State University and Iowa State University with Utah State University as the institution of record. Informed consent forms were provided to teachers and subsequently to their respective students. A total of 83 teachers agreed to participate in the training program.

The 10-hour workshop was developed using National Safe Tractor and Machinery Operations Program (NSTMOP) materials and the Safety in Agriculture for Youth Supervised Agricultural Experiences Risk Assessment Resource Guide (Pate et al., 2019). A lesson plan was developed that included two large group activities and rotations between three small groups, inquiry-based activities. During the summer of 2017, the two seminars occurred separately and were hosted at different times. To ensure fidelity of the training, a university teacher educator from each state was

trained to present the workshop (Pate et al., 2019). Participating teachers began by completing a large group activity followed by completion of three inquiry-based rotation activities:

1. NIOSH Cost Effective Roll-over Protection Structures (CROPS)
2. Pennsylvania State University's Extension mini-tilt table construction
3. Supervised Agricultural Experience On-Farm Tractor Risk Assessment

After completing the small group rotation modules, teachers were brought back together to conclude the workshop with a final large group activity. During this concluding activity, teachers were asked to incorporate workshop lessons into their existing curricula and have their participating students complete a pretest prior to instruction and a posttest after instructional units were delivered.

Population and Sample

During the 2017-2018 academic year, a representative convenience sample of students whose teachers participated in the Montana and South Dakota trainings was sought for this study. To be included in the study, students needed to be enrolled in a course taught by a participating teacher and be between the ages of 14-18 years old. Students were provided an informed consent/assent form to review with their parent or legal guardian. Students and parents who agreed to participate sent a copy of the signed informed consent/assent forms back to the researchers. A total of 318 students agreed to participate and provided test data, but 200 students submitted incomplete tests or did not meet requirements to be included for the research and were removed from the data set. A total of 118 students (37.1%) provided a complete pre- and posttest and were included in the analysis. The anonymous nature of responses precluded follow-up of absent or non-responding students (Johnson, Edgar, Edgar, Pate, & Steffen, 2015).

Instrumentation

A paper-based instrument was used to collect test results and demographic information from participating students. A pretest of 50 multiple choice and true/false NSTMOP exam questions were randomly generated from the Pennsylvania State University NSTMOP instructor curriculum resources. The posttest was constructed to be an equivalent from using pretest items with re-ordered questions and answer choices to limit participants' sensitization to the instrument (Ary, Jacobs, Sorensen, & Razavieh, 2010). Additionally, teachers were instructed to wait an interval of one month between administering student pretest and posttests. One point was recorded for each correct answer. Prior to beginning instruction, students completed the written NSTMOP exam to establish knowledge of tractor and machinery operation safety. Instrument items were developed by experts and were evaluated to be content and face valid (Garvey, Murphy, Yoder, & Hilton, 2008). Instrument items are used for student certification nationally and were deemed reliable. The standard minimum passing score for the written NSTMOP exam is 70% or higher. The maximum possible score for the pretest and posttest was 50. Post-hoc reliability analyses for the pretest and posttest yielded alpha coefficients of 0.67 and 0.76, respectively.

Analysis

Test scores and demographic variables were entered into and analyzed through IBM SPSS version 25. Descriptive statistics for participating students' demographics were reported and included

frequencies, percentages, means, and standard deviations. Means and standard deviations were reported for participants' tests scores. A matched pairs paired samples *t*-test was used to determine if there was a statistically significant difference between participants' pretest and posttest scores (Gall, Gall, & Borg, 2007). A Chi-square test of association was used to identify association between demographic variables and pass/fail test scores (Leedy & Ormrod, 2019).

Results/Findings

The purpose of objective one was to describe select demographic characteristics of school-based agricultural education students whose teachers participated in an agricultural safety professional development program. Sixty percent (*n = 71*) of students self-identified as male and 51.7% (*n = 61)* were enrolled as a 9-grader. The average student age was 15.4 (*SD* = 1.3) and 16 students did not report their age. A complete detail of participating student demographic characteristics is provided in Table 1.

Table 1
Student Demographic Characteristics (n = 118)

	f	%
Sex		
Male	71	60.2
Female	47	39.8
Grade Level		
9th	61	51.7
10th	18	15.3
11th	15	12.7
12th	24	20.3

Objective two sought to determine the effect of a train the trainer agricultural safety education professional development program on school-based agricultural education students' knowledge of safe tractor and machinery operation. One measure of effectiveness was the evaluation of students' pre- and posttests. The maximum score for pre- and posttests was 50. Students' overall pretest average was 31.8 (*SD* = 5.3) and the overall posttest average was 35.2 (*SD* = 6.2). A matched-pairs paired samples *t*-test was used to determine if test scores differed significantly between pre- and posttest. Students scored significantly higher ($t(116) = 5.67$, $p < .001$) on the posttest. Additionally, pretest and posttest correlations were significant ($p < .01$) and positive ($r = .41$).

Table 2
Results of Paired Samples t-Test Test and Mean Difference

	Overall		
	n	*M* [a]	SD
Pretest Score	118	31.8	5.3
Posttest Score	118	35.2	6.2
Test Difference	118	3.4	6.3

[a] = Mean test difference was calculated by averaging the difference between students' pretest and posttest scores

To provide further context to changes in school-based agricultural education students' knowledge of safe tractor and machinery operation, each NSTMOP test question was analyzed according to content as it pertained to workshop focus. Frequencies and percentages are reported in Table 3, and discussions relating to workshop focus are detailed in later sections.

Table 3

Posttest questions most frequently answered incorrectly by students (n = 118)

Question	*f*	%
Loads should only be attached to the following. a) 3-point hitch b) axle c) drawbar d) all of the above	78	66.1
Government regulation of work hazards and risks is evident at all levels of farm work. a) True b) False	74	62.7
Throttle controls next to the tractor seat increase engine speed when moved: a) rearward and downward b) rearward and upward c) forward or upward d) forward or downward	68	57.6
What percent of tractor-related fatalities are a result from tractor overturns? a) 1% b) 25% c) 50% d) 75%	62	52.5
If a farm owner uses only his/her own labor or only farm labor, the Occupational Safety and Health Act has no jurisdiction in that operation. a) True b) False	61	51.7
According to the North American Guidelines for Children's Agricultural Tasks (NAGCAT), which age group should not operate a medium/large tractor (more than 70hp) a) there is no minimum age b) 12-13 years old c) 14-15 years old d) 16+ years old	59	50.0

The third objective was to explore potential associations among selected demographic characteristics and changes in students' knowledge of safe tractor and machinery operation. Two categories were created for grade levels: under-class (9th-10th grade) and upper-class (11th-12th grade). There were 79 students (66.9%) classified as under-class and 39 students (33.1%) as upper-class. Under-class students averaged 30.7 (*SD* = 5.59) on the pretest and 35.0 (*SD* = 6.76) on the posttest, while upper-class students averaged 34.2 (*SD* = 3.91) and 36.0 (*SD* = 4.73) on the pre- and posttests, respectively. A passing score for NSTMOP test is considered a 70.0% (35 out of 50 questions). An ordinal variable was generated for passing test scores and coded as zero for scores

< 70 % and one for scores ≥ 70%. There was no significant association between students' gender and passing the pretest ($\chi^2(1) = 0.82$, $p = .775$) or posttest ($\chi^2(1) = 0.17$, $p = .680$).

An ordinal variable was also generated for age. This variable was coded as zero for ages between 14 and 15 years old and one for ages ≥ 16. For the student age category 14-15 years old, the average pretest score was 30.3 (*SD* = 5.61) and the average posttest score was 35.0 (*SD* = 7.12). For the student age category ≥ 16 years old, the average pretest score was 34.3 (*SD* = 4.1) and the average posttest score was 37.0 (*SD* = 4.62). Table 4 provides a summary of test difference by student age. There was a statistically significant association between students' age category and passing the pretest ($\chi^2(1) = 10.1$, $p = .001$, $\phi = .315$). Students who indicated an age of 16-18 years old were more likely to pass the pretest than students who indicated being 14-15 years old. There was no significant association between students' age category and passing the posttest ($\chi^2(1) = 0.74$, $p = .390$).

Table 4
Mean Test Difference by Student Age Category (n = 102)

	Pretest		Posttest		Test Difference	
Age Category	*M*	*SD*	*M*	*SD*	*M* [a]	*SD*
14-15 (*n* = 61)	30.3	5.61	35.0	7.12	4.9	6.5
≥ 16 (*n* = 41)	34.3	4.1	37.0	4.62	2.0	4.9

[a] = Mean test difference was calculated by averaging the difference between students' pretest and posttest scores

Teachers who participated in the train the trainer workshop had an average of 14.7 years of teaching experience (*SD* = 9.79). This variable was collapsed as ordinal and renamed "Teacher Life Cycle Stage" with 1-5 years of teaching experience classified as a beginning teacher, 6-15 years as mid-career, and 16 or more years as a veteran. Thirty three (28.0%) students were associated with beginning teachers, *n* = 26 (22.0%) with mid-career teachers, and *n* = 50 (50.0%) with veteran teachers. Using the Chi-square test of association, pretest and posttest scores were compared between under- and upper-class students across teacher life cycle stages. Between under- and upper-class students of beginning teachers, there was no significant differences on pretest ($\chi^2(1) = 0.448$, $p = .503$) or posttest passing scores ($\chi^2(1) = 0.203$, $p = .653$). Between under- and upper-class students of mid-career teachers, there were no significant differences on pretest passing scores ($\chi^2(1) = 3.328$, $p = .068$). However, upper-class students of mid-career teachers were significantly more likely to have a passing score on the posttest than under-class students ($\chi^2(1) = 3.914$, $p = .048$, $\phi = .388$). Upper-class students of veteran teachers were significantly more likely to have a passing score on the pretest than under-class students ($\chi^2(1) = 5.501$, $p = .019$, $\phi = .305$). Between under- and upper-class students of veteran teachers, there were no significant differences on posttest passing scores ($\chi^2(1) = 0.325$, $p = .569$). Table 5 provides test differences of under- and upper-class students by teacher life cycle category.

Table 5
Students' test difference by teacher life cycle category.

	Beginning		Mid-career		Veterans	
Test Difference	*M* [a]	*SD*	*M*	*SD*	*M*	*SD*
Under-Class Student	1.3	7.0	4.2	5.2	3.6	7.0
Upper-Class Student	5.6	6.8	3.0	4.6	2.6	4.9

[a] = Mean test difference was calculated by averaging the difference between students' pretest and posttest scores

Conclusions/Recommendations/Implications

Recognizing that teachers learn similarly to students (Swan et al., 2013) and that the most effective way of improving teacher and student efficacy is through an experiential based, active learning environment (Ingvarson et al., 2005), the train the trainer professional development program examined in this study delivered curriculum through an inquiry-based approach in an attempt to determine its effectiveness in increasing the safety knowledge and awareness of secondary students. Research has shown that teachers learn similarly to students (Swan et al., 2013) and that the most effective way of improving teacher and student efficacy is through an experiential based, active learning environment (Ingvarson et al., 2005). It is openly acknowledged that student performance cannot be definitively tied to teacher training in this study alone. However, the following discussion can provide insight regarding current connections and future areas of exploration.

The first research objective was to describe selected demographic characteristics of school-based agricultural education students whose teachers participated in an agricultural safety professional development. The typical student participating in our study was a self-identified 9th-grade male. NIOSH injury statistics reported most injuries occur to males between the ages of 10 and 15 years old (Hendricks et al., 2018). Marlenga et al. (2001) reported that male youth were more likely to be assigned to tractors with implement operations and female youth were more often assigned to animal care. To further understand potential impacts, we recommend completing an experimental study to examine causal effects of a train the trainer professional development program among agricultural youth. Specifically, additional research should explore the impact of this training according to gender.

The second research objective sought to determine the effect of the train the trainer program on students' knowledge of safe tractor and machinery operation. The primary measure of effectiveness was the evaluation of students' pre- and posttests. Overall, school-based agricultural education student scores increased from pre- to posttest. The average test scores changed from failing on the pretest to passing on the posttest. However, students' average post-test scores were 70%, which was the cutoff for passing, indicating more work is needed to improve student learning.

Pate et al. (2019) documented one of the most incorrectly answered questions by teachers (f= 54, 49.1%, n = 110) after completing the professional development program was related to rear-rollovers and improper hitching. More than a quarter of the teachers (28.1%, n =110) answered that loads be attached to the three-point hitch Pate et al. (2019). Similarly, the posttest question most incorrectly (f = 78; 66.1%) answered by students of these teachers dealt with rear-rollover tractor hazards due to improper hitching. In this study, more than a third of students (36.4%, f = 43, n = 118) answered that loads be attached to the three-point hitch. Connecting this to Guskey's (2003) review, the enhancement of teachers' content and pedagogical knowledge would help teachers better understand the content that they teach and improve student learning. We concluded that while the topic of side-rollover hazards was discussed in depth during the interactive session involving the mini-tilt table exercise, more targeted curriculum is needed for hitching and backing of equipment. A recommendation is to provide training for an additional round of professional

development with teachers that includes an interactive module demonstrating angle of pull and a tractor's center of gravity.

The second most incorrectly answered posttest question (*f* = 74; 62.7%) dealt with government regulatory enforcement of safety standards. Several government agencies are involved in regulating different aspects of production agriculture (Occupational Safety and Health Administration, Environmental Protection Agency, and Food and Drug Administration). Students' potential lack of work experience, given their age, warrants additional learning activities be developed to improve their understanding of regulatory standards impacting their Supervised Agricultural Experiences (SAE) activities.

The third most incorrectly answered posttest question (*f* = 68; 57.6%) dealt with tractor controls and their functions. This is likely due to the changes in standardization of tractors controls and color coding prior to 1969. Many older farm tractors are still used in production agriculture. Older tractors lack many standard safety features. Students should be encouraged to use modern tractors equipped with roll-over protection structures and seat belts, and tractors that have standardized controls for operation. An interactive activity to assist teachers and students in identifying tractor controls and remembering their function is recommended for future workshops with similar participant outcomes.

The third objective was to explore potential associations among selected demographic characteristics and changes in students' knowledge of safe tractor and machinery operation. Students who were 16 years old and older were significantly more likely to pass the pretest, but there was no significant association between student age categories and passing the posttest. We concluded that all students, regardless of age, should complete some form of interactive tractor and machinery safety training. This was evident as pretest average scores for both age categories failed the test. After the training, average posttest scores for both age categories reached the passing mark of 70%. This finding has implications for the Fair Labor Standards Act concerning hazardous occupations in agriculture and young worker age restrictions. We recommend decision makers consider removing the exemption provided for youth between the ages of 14 and 15 years old who have completed specific safety training. Additionally, we recommend increasing the age restriction for hazardous occupations in agriculture to 18 years old in order to be consistent with other industries and students' safety knowledge to perform these tasks. Even when working for a parent or legal guardian, we suspect these youth lack the knowledge and skills to perform these hazardous tasks on the farm. When considering Kolb's (1984) experiential learning model, this group of students has not had enough concrete experience or abstract conceptualization to effectively engage in learning. Kolb characterizes experiential instruction as a continuous learning process, requiring the resolution of conflict, process of adapting, transaction between the person and environment in addition to creating knowledge.

The inclination that experiences of teachers may influence whether a student passes their pre- and posttests relates to Kolb's experiential learning model. Success on the posttest was seen when teaching experience and maturing students were connected. Students that had a beginning teacher were less likely to pass the pretest or posttest. However, upper-class students (11-12 grades) with mid-career teachers were significantly more likely to have a passing score on the posttest. Upper-class students (11-12 grades) with veteran teachers were more likely to have safety training and

experiences that contributed to their preexisting safety knowledge. This is evident as upper-class students were significantly more likely to have a passing score on the pretests when working with veteran teachers. Mid-career and veteran teachers could have more exposure to agricultural experiences through professional development or life experiences, which allows them to incorporate personal knowledge into their teaching. Within the literature of teacher professional development, Guskey (2003) revealed the most frequently cited characteristics in the enhancement of teachers' content and pedagogical knowledge was better understanding the content they teach and the ways students learn. In addition, Ingvarson et al. (2005) suggested professional development is most effective at improving teacher and student efficacy when structured in an active learning environment that focuses on the problems and skills students most commonly face. Teachers without a production-based agricultural background may not have had exposure to tractors and/or agricultural safety, which could limit their ability to share relevant experiences. Teacher preparation and continuing education programs need to incorporate more production-based experiences for pre-service and in-service teachers.

Based on the findings and conclusions of this study, future research should focus on the background, experiences, and training teachers have had and the outlets they sought to receive the professional development focused on agricultural safety. Additionally, research should focus on the youth background and the safety measures that are implemented within their SAE. We recognize that an increase in safety knowledge does not equate to performing appropriate safety behaviors. A qualitative field observational study is recommended to be conducted with these students to ascertain the impacts of these training on their performance of safety behaviors.

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Reconceptualizing Problem-Solving: Applications for the Delivery of Agricultural Education's Comprehensive, Three-Circle Model in the 21st Century

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Abstract

Problem-solving has been an integral tenet of school-based, agricultural education (SBAE) since its inception. However, in many ways, the pedagogy has changed considerably. This shift appears to have caused problem-solving's pedagogical dimensions and underlying philosophical foundation to become conflated with other methods of instruction. Consequently, fundamental questions persist:"Should problem-solving be practiced as a distinct pedagogy?" And if so, "What implications exist for its use in SBAE?" In response, this philosophical study sought to examine perspectives on problem-solving and explain how it has been advanced in the discipline. A product of this investigation was the emergence of three principles that appear to be foundational to problem-solving: (1) identify problems, (2) analyze information, and (3) evaluate solutions. Distinguishing such principles helped describe how problem-solving has been operationalized historically. However, it also revealed a need to expand its current understanding and use. In response, we proposed the Integrated Problem-Solving Model for Agricultural Education to illuminate how it could be reconceptualized as a guiding philosophy for SBAE to better navigate increasingly complex issues and problems in the 21st Century.

Introduction

Over the past few decades, a variety of instructional methods have been advanced in education to encourage students to obtain the skills they need to thrive in the 21st Century (Ulmer & Torres, 2007). However, more recently, it has become critical for educators to adopt methods of instruction that encourage students to develop higher-order thinking skills (Fuhrmann & Grasha, 1983; Jonassen, 2000; Ulmer & Torres, 2007). One explanation for this shift is that employers often view the ability to solve problems, a higher-order skill, as essential in the workplace (Gokhale, 1995; Robles, 2012; Zimmerman & Risemberg, 1997). Nevertheless, many students are not challenged to engage in real-world problems in their schooling (Jonassen, 2000). Instead, they learn through rote memorization and other forms of direct instruction in which the instructor passively transfers knowledge – an approach that does little to prepare students for a successful career (Jonassen, 2000). As a consequence, a need has emerged to embed more opportunities for students to authentically engage in problem-based experiences that accurately reflect the world in which they operate. Previous research has demonstrated that engaging students in learning activities that challenge their problem-solving abilities can foster metacognitive growth, i.e., the ability to reflect on learning and modify one's behavior accordingly (Sproull, 2001). For example, through the use of such an approach, students learn to grapple with problems, from simple to complex, by developing solutions that complement the knowledge and skills they developed through their coursework (Jonassen, 2000).

From a historical perspective, the problem-solving approach can be traced to classical philosophers such as Socrates and Plato, who believed that individuals came to truth by socially constructing meaning through participation in debates (Phillips, 2010). For example, *The Socratic Method* draws on cooperative dialogue in which individuals answer questions that stir new thoughts and ideas about the nature of knowledge and knowing (Phillips, 2010). This early approach to problem-solving appeared to serve as a basis for contemporary views on the method and helped further distinguish it as a pedagogy (Dewey, 1910; Phillips, 2010). Using this foundation, John Dewey (1910) further concretized the key dimensions of problem-solving. For instance, in Dewey's (1910) *How We Think*, he outlined five tenets called the *Complete Action of Thought or Reflective Thinking* that included: (1) a felt difficulty; (2) location and definition of a problem; (3) creation of possible solutions; (4) test solutions; and (5) further explorations and evaluation. These processes provided a basis for conceptualizing problem-solving as a process that could be used to mature students' intellectual development and critical thinking (Dewey, 1910). However, Dewey never used the term *problem-solving* in his academic work.

Despite this, Dewey, along with other educational philosophers, paved the way for problem-solving to be recognized and practiced as a pedagogy in the 20th Century (Moore & Moore, 1984). In recent decades, however, discourse on problem-solving has been muddled by the introduction of terms, such as problem-based learning (PBL) and inquiry-based instruction (IBI), that although are distinct in form and function also appear to exhibit striking "pedagogical congruence" (Parr & Edwards, 2004, p. 104). As a result, a definition for problem-solving does not appear to have reached consensus. Some disciplines have responded to this issue by crafting descriptions of the pedagogy that integrate the various perspectives of philosophers, researchers, and practitioners (Crunkilton & Krebs, 1967; Jonassen, 2000; Merwin, 1977). The definition of problem-solving, therefore, varies considerably among academic disciplines. For example, in technology education, Merwin (1977) defined problem-solving as "a sequence of procedures in the thinking process that a learner employs in dealing with a problem or task" (p. 123). Jonassen (2000) added that problem-solving could also allow students to "find [answers to] the unknown." (p. 65). In agricultural education, however, Crunkilton and Krebs (1967) defined problem-solving "as a method of teaching in which the teacher guides the class through a series of questions. . ." (p. 90). Because of such variant depictions, therefore, problem-solving's philosophical and operational tenets remain unclear.

Nevertheless, the pedagogy appears to have been considered an integral tenet of school-based, agricultural education (SBAE). For example, the use of the pedagogy emerged in SBAE in concert with the Smith-Hughes Act of 1917 (Moore & Moore, 1984). During this period, the U.S. experienced an industrial revolution, which shifted education and catalyzed reform efforts (Roberts, 1957; Roberts & Ball, 2009; Talbert, Vaughn, Croom, & Lee, 2007). This shift also piqued national interest in the enhancement of skilled laborers (Roberts & Ball, 2009). Because of these changes in U.S. society, it is believed that problem-solving became diffused as a method of instruction in SBAE (Moore & Moore, 1984) and experienced more widespread adoption (Boone, 1990; Cano & Martinez, 1989; Crunkilton & Krebs, 1967; Dyer & Osborne, 1996; Flowers & Osborne, 1988; Hammonds, 1950; Krebs, 1967; Newcomb, McCracken, Warmbrod, & Whittington, 1993; Phipps & Osborne, 1988; Torres & Cano, 1995a; Torres & Cano, 1995b). However, problem-solving has been described, represented, and depicted in a variety of ways

throughout its rich history in SBAE. Such variances were made explicitly clear in submissions that described problem-solving in *The Agricultural Education Magazine* (*The Magazine*).

For example, as evinced in *The Magazine*, problem-solving's use in SBAE emerged in the mid 20th Century (Hammonds, 1950; Krebs, 1967). However, in many ways, the pedagogy has evolved considerably in the early 21st Century as practitioners responded to key shifts in American society. In particular, in the early 2000s, the enactment of *No Child Left Behind* (NCLB) created a turning point in U.S. education policy that resulted in wide-sweeping reform efforts, which required states to adopt learning standards and assessments to monitor better and track students' progress, especially regarding mathematics, reading, and science (U.S. Department of Education, 2001). Such changes also largely influenced approaches to teaching and learning that were depicted in *The Magazine*. For instance, contributors published articles on learning approaches that featured: (a) PBL, (b) IBI, and (c) experiential learning that focused on applications of science, technology, engineering, and mathematics (STEM) (Retallick & Miller, 2005; Torres & Cano, 2005a).

Although such work was pivotal to positioning SBAE as relevant, during this period, problem-solving's pedagogical dimensions and underlying philosophical foundation also appeared to become blurred and conflated with other teaching and learning approaches. As a consequence, a dichotomy emerged in which some practitioners began to represent problem-solving as a distinct method of instruction, while others articulated it as an approach that was largely synonymous with other pedagogies (Parr & Edwards, 2004). Because of these discrepancies in the problem-solving literature, a lack of clarity exists in SBAE regarding how problem-solving should be delivered conceptually. To complicate this issue further, however, early literature in SBAE (Crunkilton & Krebs, 1967; Moore & Moore, 1984) on problem-solving argued it lacked a solid theoretical foundation and should be approached with caution when used as a method of instruction. As a consequence, two questions persist: *"Should problem-solving be practiced as a distinct pedagogical approach?* And if so, *"What implications exist for using problem-solving in the 21st Century and beyond?"* These questions motivated the current study.

Purpose

To address this issue**,** the purpose of this philosophical investigation was threefold: (1) describe existing perspectives and theories on problem-solving; (2) explain how problem-solving has been used as a method of instruction in SBAE; and (3) illuminate how the problem-solving could be reconceptualized to enrich the delivery of SBAE's comprehensive, three-circle model. This research aligns with the American Association for Agricultural Education's National Research Agenda Research Priority 7: *Addressing Complex Problems.* Specifically, this research addresses question one, "What methods, models, and programs are effective in preparing people to solve complex problems, interdisciplinary problems?" (Andenoro, Baker, Stedman, & Pennington, Weeks, 2016, p. 59).

Methods and Procedures

Philosophical research seeks to analyze existing axioms and beliefs in a given domain (Salevouris & Furay, 2015). This study, therefore, synthesized educational theories and perspectives from prominent problem-solving advocates, while also advancing new

understandings for SBAE. From a philosophical perspective, problem-solving aligns with the worldview of pragmatism, which advances the belief that individuals construct meaning from their experiences as they interact with others and navigate issues and problems in a real-world context (Crotty, 1998). To meet the study's purpose, we synthesized theoretical and practitioner-oriented work as well as empirical evidence supporting problem-solving through the use of the following sources: (a) books, (b) peer-reviewed journal articles, and (c) *The Agricultural Education Magazine*.

All references were subjected to internal and external criticisms to triangulate our findings (Salevouris & Furay, 2015). For instance, we evaluated each source for authenticity concerning its origin and content (Salevouris & Furay, 2015). Further, we analyzed how the investigation's (a) findings, (b) conclusions, (c) implications, and (d) recommendations might provide inferences for future work. To accomplish this, we used a conceptual mapping technique in which we scrutinized each source's existing similarities and discrepancies (Salevouris & Furay, 2015). For example, through mapping, we revealed each source's interconnectedness and congruence with the study's purpose (Salevouris & Furay, 2015). As a result, we developed key empirical assertions through the use of an analytic memoing technique (Saldaña,, 2015). Then, we synthesized our findings by weaving our assertions into a narrative that described how problem-solving could be reimagined to deliver agricultural education's comprehensive, three-circle model in transformative new ways.

Perspectives and Theories on Problem-Solving

Through our analysis, six leading perspectives – John Dewey, Rufus Stimson, Werrett Charters, William Lancelot, John Bransford, and Scott Johnson – on problem-solving appeared to most prominently shape existing thought and use of the pedagogy in SBAE as well as in teaching and learning more broadly. Our description of each perspective is provided next.

John Dewey. John Dewey largely gained prominence as a thought leader as a result of his time at the University of Chicago after creating a progressive school, called the *Dewey Laboratory School,* that he used to foment his philosophy and theory on experience and education (Dewey, 1910, 1938). Dewey believed that students should be viewed as active pursuers of knowledge that lived, worked, and interacted in the world as a social being (Hyland, 1993). Dewey was also a strong advocate for students actively engaging in experiences that were based on real-world issues and problems (Dewey, 1938). In particular, Dewey maintained that teaching students to think and solve problems was integral to creating successful members of society (Dewey, 1910). Further, Dewey (1910) detailed in *How We Think* his five-step model for *reflective thinking.* Dewey's five axioms for reflective thinking included: (a) felt difficulty, (b) location and definition of the problem, (c) creation of solutions, (d) development of reasons for solutions, and (e) further exploration and evaluation (Dewey, 1910).

Rufus Stimson. Rufus Stimson has also been identified as a pivotal early leader to agricultural education in the U.S. (Moore, 1988, 2018). Perhaps, his most significant contribution to the discipline was the formalization of the project-based method, which is now recognized as the Supervised Agricultural Experience (SAE) component of agricultural education's comprehensive, three-circle model (Camp & Crunkilton, 1985; Foor & Connors, 2010; Moore,

1988). Although Stimson (1911, 1919) did not use the term *problem-solving*, many of the core features of the project-based method, align naturally with the pedagogy. For example, Stimson (1911) advanced three major projects relevant for farm work: (1) improvement, (2) experimental, and (3) productive. In his description of project types, Stimson (1919) explained that each would require students to identify relevant problems, collect evidence, and design a strategy to respond to each unique issue or problem. Such work also deeply influenced his protégé Werrett Charters.

Werrett W. Charters. Werrett Charters was a student of Dewey for three years at the University of Chicago. It is because of this experience that Charters is often recognized as a disciple of Dewey and a proponent of his philosophy and beliefs on teaching and learning. However, he also made pivotal advancements to problem-solving in his own right. For instance, in Charters' works *Methods of Teaching and Teaching* (1912) and *Teaching the Common Branches* (1924) he emphasized the importance of having students solve real-world problems that piqued their interest and motivated them to be actively engaged in the learning process (Charters, 1912, 1924). Similar to Dewey's (1910) reflective thinking model, Charters advanced both inductive and deductive reasoning (Charters, 1924). However, Charters also theorized that inductive thinking processes could help propel students' deductive thinking as they work through contextualized problems, form hypotheses, and arrive at concrete solutions (Charters, 1912). As a result, Charters (1924) advanced three stages of problem-solving: (a) definition of the problem, (b) creation of a hypothesis, and (c) testing and verifying the solution. Such advancements appear to have profoundly influenced how problem-solving was operationalized in its formative years in SBAE.

William Lancelot. William Lancelot was another early proponent of problem-solving in SBAE. Lancelot received his bachelor's degree in agricultural education in 1919 and shortly after pursued his master's degree in education at Columbia University. During his graduate studies, Lancelot was introduced to the works of Dewey and Charters, which greatly influenced by his views on education and society (Lancelot, 1944). As a result, Lancelot advocated for transitioning education from a rote memorization model to one that closely mirrors problem-solving (Lancelot, 1944). In his book *Permanent Learning* (1944), he described different types of problems that students may encounter during their educational experiences, how to use such problems productively, ways to integrate problems across contexts, and the uses of the problem-solving in regard to teaching and learning. Further, Lancelot (1944) conceptualized 10 steps that educators could use to implement problem-solving as a pedagogy. Similar to Dewey and Charters, Lancelot also articulated the role of inductive and deductive reasoning. Because of his deep connection to SBAE, his work appeared to influence the discipline profoundly. However, in the proceeding decades, other prominent educational leaders influenced SBAE as well.

John D. Bransford. John Bransford was an educational psychologist at the University of Washington who authored several critical works regarding cognition, learning styles, and teaching. For example, in Bransford's and Stein's (1984) *The IDEAL Problem Solver*, he introduced an approach to problem-solving that encompassed the ideas and theories of several key theorists such as Kolb (1984), Newell and Simon (1972), and Sterberg (1981). The IDEAL problem-solving model also drew on concepts from the Socratic method, the scientific method, and John Dewey's reflective thinking model (Phipps, Osborne, Dyer, & Ball, 2008). In particular, the IDEAL problem-solving model largely reconceptualized Dewey's reflective

thinking model using the following processes: (a) identify problems and opportunities, (b) develop goals, (c) explore possible strategies, (d) anticipate outcomes, and (e) look back. It is critical to note that in the IDEAL problem-solving model, each step is fluid and may not unfold successively (Bransford & Stein, 1984). Figure 1 depicts Bransford's and Stein's (1984) IDEAL problem-solving model.

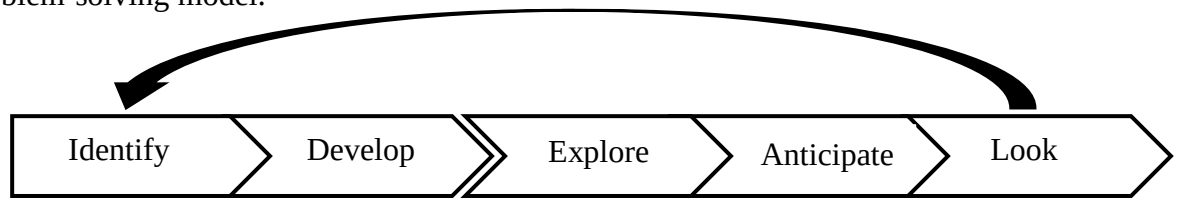

Figure 1. Bransford's and Stein's (1984) IDEAL problem-solving model. Adapted from "The Influence of Cognitive Diversity on Group Problem-solving Strategy" by A. J. Lamm, C. W. Shoulders, G. T. Roberts, T. A. Irani, L. J. Snyder, and J. Brendemuhl, 2012, *Journal of Agricultural Education, 53*(1), p. 19. Copyright 2012 by *Journal of Agricultural Education.* Reprinted with permission.

Scott Johnson. Another vein of literature that has greatly influenced problem-solving theory and practice is troubleshooting. And, perhaps, the individual that has most profoundly advanced thought on troubleshooting is Scott Johnson. For example, Johnson's (1989) technical troubleshooting model provided conceptual guidance for practitioners to support students as they navigate complex curricular problems. In the first phase of the model, students collect and interpret information through two primary sources: (1) procedural knowledge, and (2) external sources (Johnson, 1991). Procedural knowledge refers to an individual's understandings that result from processes such as reading diagrams, using mathematical formulas, and understanding manuals (Johnson, 1989). Meanwhile, external sources of information typically originate from the knowledge that individuals glean from jobs, technical support, and evaluations (Johnson, 1989). Of note, both sources of knowledge help troubleshooters form a more concrete understanding of the problem (Johnson, 1991). Based on Johnson's (1989) model, after individuals acquire information from the aforementioned sources, they enter an interpretation phase (Johnson, 1991). This step is critical because troubleshooters must identify which concepts are relevant based on their prior learning and experiences (Johnson, 1989). If enough information has been gathered, then the troubleshooter can then move into the hypothesis generation phase. During this step, individuals generate one or more hypotheses about the problem (Elstein, Shulman, & Sprafka, 1978; Frederiksen, 1984; Johnson, 1989). After the hypothesis generation phase, troubleshooters evaluate their results, which allows the troubleshooter to test their hypotheses and determine whether it should be accepted or rejected (Johnson, 1991). If the troubleshooter did not solve the problem, they restart the process, as depicted in Figure 2 (Johnson, 1991).

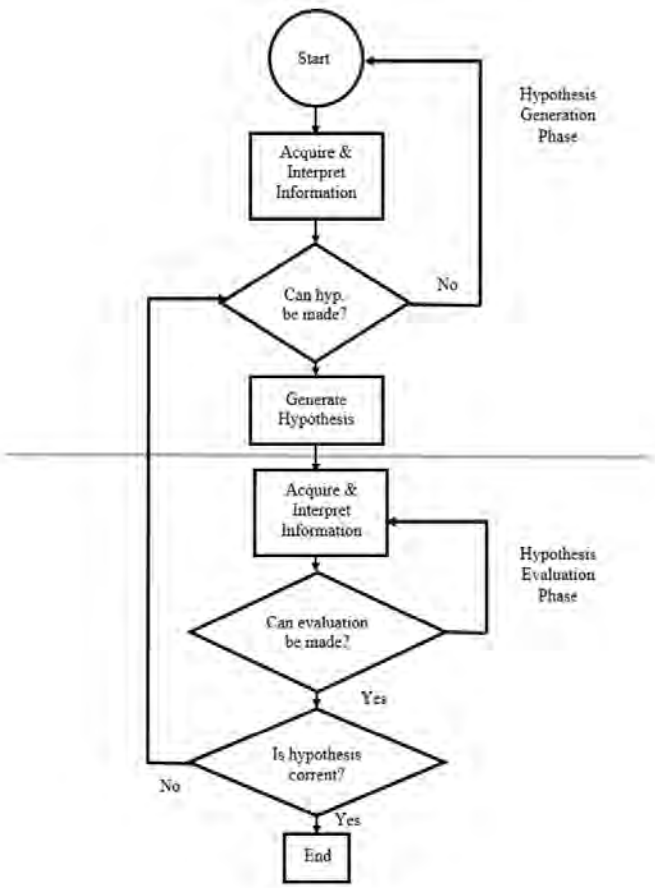

Figure 2. Troubleshooting model. Adapted from "A description of expert and novice performance differences on technical troubleshooting tasks" by S.D. Johnson, 1989, *Journal of Industrial Teacher Education*, *26*(3), p. 20. Copyright 1989 by *Journal of Industrial Teacher Education*. Reprinted with permission.

Problem-Solving's Use in SBAE

In addition to being articulated by leading educational theorist, problem-solving has also been advanced in SBAE since its early inception as a way to facilitate authentic learning for students (Moore & Moore, 1984; Parr & Edwards, 2004; Retallick & Miller, 2005; Torres & Cano, 2005b). As an illustration, Phipps and Cook (1956) advanced Dewey's (1910) stages of problem-solving by contextualizing the pedagogy using examples in agriculture. Later, Crunkilton and Krebs (1967) introduced five key phases to consider when using the problem-solving in SBAE. Those phases included: (a) interest approach; (b) create objectives; (c) anticipate problems; (d) solve the problem; (e) evaluate and apply (Crunkilton & Krebs, 1967).

Further, Phipps and Osborne (1988) described their views on problem-solving in *The Handbook on Agricultural Education in Public Schools*. Phipps and Osborne's (1988) approach included similar elements outlined in previous works on problem-solving. For instance, their six-step method included: (a) experience a situation, (b) locate and define the problem, (c) attempt a trial solution, (d) explore reference and information, (e) arrive at a group solution, and (f) evaluate. Finally, Newcomb et al. (1993) addressed problem-solving in *Methods of Teaching Agriculture*,

which appears to be one of the most recent attempts to outline the pedagogy for SBAE. In this work, the problem-solving method to teaching and learning is outlined in six steps, which were grounded in the previously reported literature. Those six steps to teaching the problem-solving approach in agricultural education included: (a) interest approach, (b) objectives to be achieved, (c) problems to be solved or answered, (d) problem solution, (e) test solutions through application, and (f) evaluate solutions (Newcomb et al., 1993). Therefore, through our analysis, it appeared that leading perspectives on problem-solving and prominent literature in SBAE demonstrated significant "pedagogical congruence" (Parr & Edwards, 2004, p. 104). As a consequence, a synthesis of these concepts was warranted to advance thought on problem-solving for SBAE.

Synthesis: Advancing the Shared Principles of Problem-Solving

To advance new understandings, we distilled shared principles from the leading perspectives on problem-solving and the SBAE literature. To accomplish this, we grounded our approach in a concept known as *consilience*, first introduced by William Whewell (1840). Consilience represents the merging of stands of knowledge from various disciplines, perspectives, and domains to offer new understandings of a phenomenon (Whewell, 1840). Using this approach, we engaged in a mapping technique to visualize each perspective's similarities and discrepancies while also acknowledging that some authors might not have specifically used the term problem-solving but in essence were describing a similar concept. A product of this procedure was the emergence of three shared principles that appear to be foundational to existing descriptions and representations of problem-solving as a pedagogy. To promote understanding, we chose to represent the shared principles using practical language in hopes that practitioners, researchers, and theorists alike might find them useful. Given such caveats, we offer the three principles of problem-solving that emerged from our analysis: (1) identify problems, (2) analyze information, and (3) evaluate solutions.

Principle #1: Identify Problems

A fundamental characteristic of problem-solving is ensuring that students have the knowledge and skills they need to identify relevant problems (Bransford & Stein, 1984; Crunkilton & Krebs, 1967; Dewey, 1910, 1938; Charters, 1912, 1924; Lancelot, 1944; Newcomb et al., 1993; Phipps & Osborne, 1988). This notion applies to whether problems are presented in the context of a classroom or in a more authentic learning environment (Dewey, 1910, 1938). To equip students with such skills, however, requires introducing them to foundational agricultural knowledge so that they can begin to understand connections, notice disturbances, and appropriately detect when an issue or problem exists (Lancelot, 1944). Therefore, developmental appropriateness is of central importance to ensure that students are prepared as they gain exposure to problems (Charters, 1924), especially in the context of SBAE. As a consequence, SBAE teachers should frame problems in ways that challenge students, but that do not trigger forms of dissonance that may be interpreted as *uneducative* (Dewey, 1910). Through a synthesis of the literature, it became apparent that to ensure students are able to identify problems successfully, SBAE instructors must scaffold them in ways that allow students to mature before they confront issues and problems of a greater cognitive complexity (Bransford & Stein, 1984; Charters, 1912, 1924; Crunkilton & Krebs, 1967; Dewey, 1910; Lancelot, 1944).

Principle #2: Analyze Information

As inevitable and ubiquitous as problems are in everyday life, human beings often resist analyzing trends and other relevant data to arrive at possible solutions (Dewey, 1910; Phipps & Osborne, 1988). An essential principle of problem-solving, therefore, is to analyze information. Through our synthesis, we noted that authors of seminal works on problem-solving described a plethora of ways to collect and analyze relevant evidence. For example, articulated strategies included conducting observations (Dewey, 1910, 1938), analyzing test and control specimen (Charters, 1924), as well as generating a hypothesis based on individuals' procedural or external sources of knowledge and then assembling relevant corroborating or disconfirming evidence (Johnson, 1989). Despite the diversity in strategies available, however, SBAE teachers should ensure that students systematically collect information and evaluate it using rigorous procedures (Bransford & Stein, 1984; Charters, 1924; Dewey, 1910, 1938; Johnson, 1989, 1991).

Principle #3: Evaluate Solutions

Because problem-solving is a process, the solution emerges over time, through trial and error (Bransford & Stein, 1984; Crunkilton & Krebs, 1967; Dewey, 1910, 1938; Charters, 1912; Lancelot, 1944; Newcomb et al., 1993; Phipps & Osborne, 1988). Due to the dynamic nature of such, the evaluation of a solution is in a constant state of flux by which new discoveries can alter the beginning, middle, or late phases of the problem-solving process (Dewey, 1938; Johnson, 1989, 1991). This developmental view of the final principle, therefore, recognizes that as students learn and acquire information, an iterative progression transpires in which they co-influence past, present, and future solutions to numerous issues and problems (Dewey, 1938; Charters 1924). It is through this non-linear process; therefore, that SBAE students can critically reflect and begin to authentically evaluate whether their solution to a given problem is viable.

Reconceptualizing Problem-Solving for SBAE

Embedded in the three principles of problem-solving are features that stand as prominent attributes of the pedagogy. Therefore, our synthesis of ideas, theories, and models was a necessary step to illuminate how problem-solving has been advanced and used as a method of instruction. However, this process also revealed the need to expand our current view and understanding of problem-solving in SBAE. We maintain that such a reconceptualization could crystalize new possibilities for future research, theory, and practice.

For example, although problem-solving has largely been represented as a method of instruction, and rightfully so, we maintain that problem-solving's current limits and parameters in SBAE could be expanded so that it may also be viewed as a *guiding philosophy* for the discipline. To that end, we offer (see Figure 3) the Integrated Problem-Solving Model for Agricultural Education to demonstrate how this idea could be operationalized in SBAE. In the model's development, our goal was to enrich agricultural education's comprehensive, three-circle model by embedding the core principles of problem-solving – identify problems, analyze information, and evaluate solutions – in a way that would aptly depict the synergistic and complementary power of this merger.

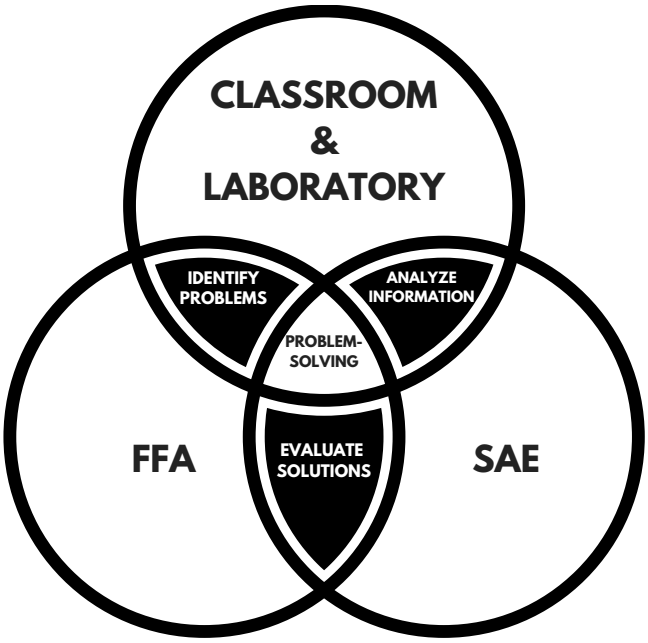

Figure 3. Integrated problem-solving model for agricultural education. *Note*. The principles of problem-solving are shaded to demonstrate their permeability through and between each dimension of SBAE.

Foundationally, therefore, the model advances the notion that problem-solving is entrenched through and between each dimension of agricultural education. Consequently, the principles of problem-solving are interwoven with the three components of agricultural education: (a) classroom and laboratory, (b) Supervised Agricultural Experience (SAE), and (c) The National FFA Organization (FFA). It is important to note that the principles of problem-solving are not exclusive to a single dimension of agricultural education. Instead, they should be considered permeable as the problem-solving process unfolds for students through trial-and-error.

To contextualize the model, we developed the following example to demonstrate how the model might be used in SBAE. To begin, consider a student enrolled in an *Introduction to Horticulture* course (Classroom and Laboratory) who noticed that the Poinsettias she planted in class a few weeks prior appeared to be stunted in growth (Principle #1: Identify Problems). To capitalize on the learning embedded in this problem, her SBAE teacher encouraged her to reflect on the learning concepts introduced earlier in the semester. After a few minutes, she answered, “Maybe it is because the plants are under the shade cloth, so they are not getting enough sunlight.” Her SBAE teacher responded, “That is a great start, perhaps, you should design a project (SAE) that will allow you to collect data to determine whether or not your hypothesis is correct.” Over the next few weeks, she collected data using control and experimental trials, and as a result, began to observe trends through an analysis of relevant information (Principle #2: Analyze Information). After this procedure, she drew the conclusion that because Poinsettias are a tropical flower, they were not getting enough direct sunlight when placed under a shade cloth in the greenhouse. She also developed a solution to this problem for individuals who may be experiencing similar issues. Because her SBAE teacher perceived she had done quality work, he encouraged her to carry out additional trails so this knowledge could be used to impact the community through a service project (FFA). As a result, she decided to work with the local FFA Officer Team to

organize a professional development opportunity for senior citizens based on the knowledge she had acquired through her classroom and Supervised Agricultural Experiences (SAEs). During this session, she also asked the senior citizens to provide feedback on their experience so that she could more carefully evaluate the solutions she provided regarding growing Poinsettias (Principle #3: Evaluate Solutions).

As illustrated above, the SBAE teacher wove the three principles of problem-solving throughout each programmatic dimension of agricultural education – classroom and laboratory, SAE, and FFA – for his student. Such use of problem-solving may be easy to dismiss as *common sense*. However, we counter this position on several grounds. First, what may appear to be common sense for some, may not be viewed as such by those who are new to the discipline, have little experience, or have only considered limited perspectives on problem-solving. And finally, existing descriptions of problem-solving in SBAE do not appear to have represented it in ways that capture the intricacies of the reconceptualization advanced in our philosophical discussion.

Conclusions

Problem-solving has evolved considerably since its early origins. For example, initially, it was depicted as a distinct method of instruction (Charters, 1912). However, since that time, it appears to have become conflated with other pedagogical approaches (Parr & Edwards, 2004). As a consequence, the tenets of problem-solving became ambiguous over time (Crunkilton & Krebs, 1967; Moore & Moore, 1984). In this investigation, therefore, we sought to examine existing perspectives on problem-solving and explain how problem-solving has been used as a method of instruction. Through our analysis, we conclude that six leading perspectives – Dewey, Stimson, Charters, Lancelot, Bransford, and Johnson – appeared to most profoundly influence the ways in which the pedagogy has been operationalized. From these leading perspectives, we also conclude that three shared principles of problem-solving could be distilled: (1) identify problems, (2) analyze information, and (3) evaluate solutions.

The first principle, identify problems, reflected that need for educators to scaffold problems in ways that are challenging but also developmentally appropriate so that students can gain confidence before attempting to solve problems of a greater complexity (Bransford & Stein, 1984; Crunkilton & Krebs, 1967; Dewey, 1910, 1938; Charters, 1912; 1924; Lancelot, 1944). Meanwhile, the second principle, analyze information, represented the need for students to collect and analyze quality data using rigorous procedures before drawing conclusions about a problem (Bransford & Stein, 1984; Charters, 1924; Dewey, 1910; Johnson, 1989, 1991).

The last principle, evaluate solutions, suggested that because problem-solving is a process, students should evaluate their solutions to problems over time through trial and error (Bransford & Stein, 1984; Crunkilton & Krebs, 1967; Dewey, 1910, 1938; Charters, 1912, 1924; Lancelot, 1944; Newcomb et al., 1993; Phipps & Osborne, 1988). Although our distillation of the shared principles helped describe how the pedagogy has been operationalized as a method of instruction, it also called attention to the need to expand our current use of problem-solving. Therefore, we introduced the Integrated Problem-Solving Model for Agricultural Education, which advanced the principles of problem-solving embedded through and between each component of agricultural education's comprehensive, three-circle model: (a) classroom and

laboratory, (b) SAE, and (c) FFA. We argue, therefore, that problem-solving can not only be operationalized as a pedagogy but also a guiding philosophy for SBAE moving forward.

Implications, Recommendations, and Discussion

In recent decades, a growing number of voices from business, government, and higher education have called for more curricular focus to be placed on enhancing agriculture graduates' ability to communicate, think critically, and innovate (Blickenstaff, Wolf, Falk, & Foltz, 2015; Fields, Hoiberg, & Othman, 2003). By fostering these process-oriented skills, it is reasoned that future agriculturalist who enter the workforce will be better prepared to traverse a world fraught with complexities that require them to adapt and solve problems on issues such as climate change, disease, global hunger, and water scarcity (National Research Council, 2014). In response, this philosophical investigation illustrated the ways in which SBAE could draw on its problem-solving foundations to reposition itself, as the headwinds of change threaten to intensify in the 21st Century and beyond (Brown, 2016). However, such a reorientation will be complex for the discipline to adopt, with even basic discussions about this change, presenting numerous conceptual and practical hurdles.

As a consequence, we offer the following possibilities for future research and practice. First, more dialogue is needed about problem-solving, when conceptualized as both a method of instruction as well as a guiding philosophy for SBAE. To achieve this, perhaps professional development sessions could be offered by the *American Association for Agricultural Education* (AAAE) and the *National Association of Agricultural Education* (NAAE). A concerted effort should also be dedicated to diffusing the Integrated Problem-Solving Model for Agricultural Education. As such, we recommend the model be shared, along with illustrative case study examples, in *The Magazine* as well as the *FFA New Horizons*. Teacher educators should also introduce the model to preservice teachers by having them consider innovative ways to integrate such into their future SBAE programs. We also suggest that podcasts, popular press articles, and other communication mediums promote SBAE students, advisors, and programs that use the model in exemplary ways. Finally, we recommend the use of social network analysis to analyze the model's diffusion challenges better by identifying opinion leaders who influence others in SBAE at the node, dyad, and network levels (Borgatti, Everett, & Johnson, 2018).

Although problem-solving has a deeply entrenched philosophical foundation in SBAE (Moore & Moore, 1984), more work is needed to explore its dimensions. Therefore, we recommend that research be conducted to examine the programmatic outcomes associated with use of problem-solving as a guiding philosophy. For example, does such an approach improve students' career readiness, creativity, critical thinking, engagement, learning, and motivation? Further, what motivates a SBAE instructor to adopt such a philosophy in an individual program? Additional research is also needed to examine the outcomes of problem-solving's use as a method of instruction in SBAE. As an illustration, how do the ways SBAE teachers conceptualize, use, and talk about problem-solving affect student outcomes? And do students who solve problems through team-based learning approaches learn better than those assigned individual problem-solving projects? These corollary questions warrant further examination.

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A Comparison of Current and Ideal Program Balances in School Based Agricultural Education Programs Across Three States

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School based agricultural education programs include the components of classroom instruction, supervised agricultural experiences, and FFA activities to deliver content in agriculture and provide opportunities for extending learning outside the classroom. This study sought the input of a stratified random sample of SBAE teachers in Texas, Georgia, and Oregon to investigate perceived levels of component use, compare those levels to what would be "ideal", and make comparisons between the reporting states. Responses (n = 121) indicate SBAE teachers in all three states reported significant differences between their current and ideal programs, particularly in the areas of classroom instruction and SAE. When comparing perceived component levels between the states, Oregon reported significantly more emphasis on classroom instruction than Texas and significantly lower SAE activity levels than either Texas or Georgia. All three states indicated wanting a reduction in classroom instruction emphasis and an increase in FFA activities with the Texas teachers looking for the most change in those areas.

Introduction / Literature Review

There is a current shortage of teachers for school based agricultural education programs, and has been since 1965 (Smith, Lawver, & Foster, 2018; Kantrovich, 2007). A portion of the shortage is attributed to retirements and the creation of new positions, but these do not account for all of the shortfall. According to the 2017 supply and demand study for agricultural education, over 500 teachers left the profession (Smith, et al., 2018). In a study of teacher attrition, Ingersoll and Smith (2003) noted 42% of teachers left the field because of conflict between work and family expectations. Sorenson, McKim, and Velez (2016) found that work obligations interfering with family were significant predictors of intentions to leave the field. Work-life balance has been the subject of several studies that noted the challenges of SBAE teachers working more than 55 hours per week (Hainline, Ulmer, Ritz, Burris & Gibson, 2015; Crutchfield, Ritz & Burris, 2013; Murray, Flowers, Croom & Wilson, 2011). This study is part of a larger line of inquiry looking beyond the idea of work-life balance and into the balance of SBAE programs themselves.

SBAE is generally comprised of three components: classroom and laboratory instruction within the scope of agriculture, food, and natural resource (AFNR) systems, intra-curricular work based experiential learning opportunities through supervised agricultural experiences (SAEs), and opportunities for leadership and personal development through activities associated with the National FFA Organization (FFA). These elements are typically depicted as three equally sized overlapping circles as shown in Figure 1. The description of program with three components is accurate, but not representative of the complexity of each element.

SBAE programs teach content and skills within the context of the broad field of agriculture. The U.S. Department of Education includes AFNR content as one of 16 career clusters within the broader scope of career and technical education (CTE). The National Council for Agricultural Education has eight content areas within the AFNR pathway

including agribusiness systems, animal systems, biotechnology systems, environmental service systems, food products and processing systems, natural resource systems, power structure and technical systems, and plant systems (Council, 2015). Some states have adopted the content areas as presented, while others have combined or eliminated some areas (California Department of Education, 2017; Kansas State Department of Education, 2019; Texas CTE, 2019). Some states further define the content areas and standards. The Texas legislature has published 31 individual subject course listings within the seven content areas used in the state (TEA, 2017).

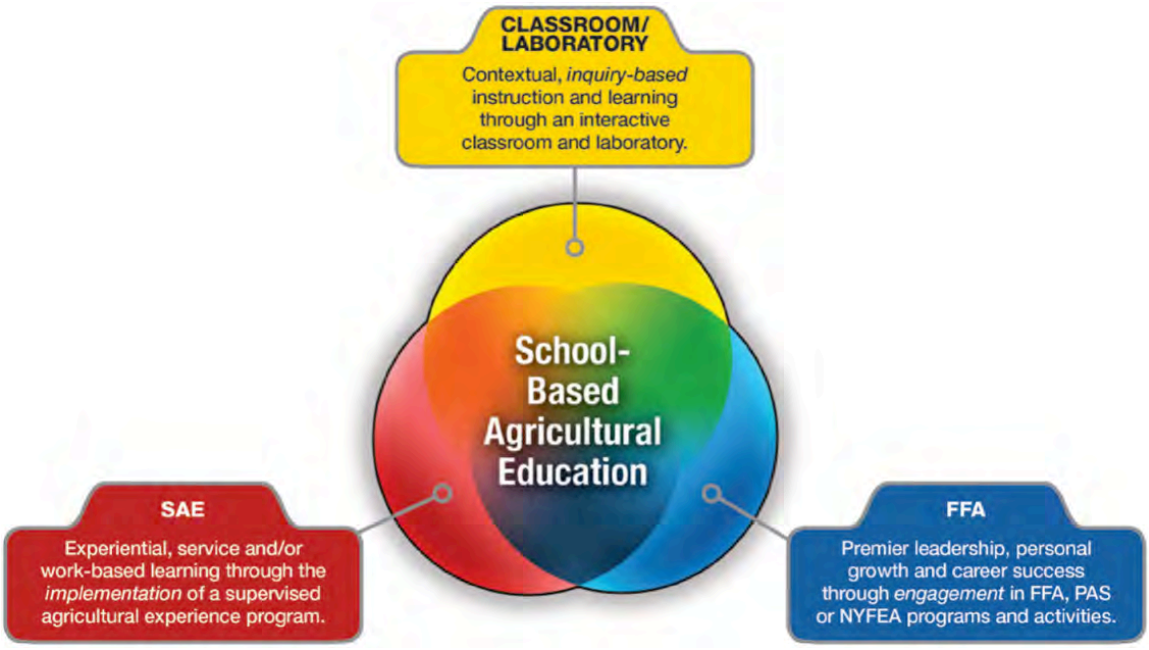

Figure 1. The three-element or three-circle model of agricultural education (FFA 2018).

In addition to the broad scope of subject areas, the program is further complicated by the pedagogical options for teaching the content. The most current model of agricultural education published by FFA, describes the classroom instruction level as contextual teaching through interactive classroom and laboratory teaching. The laboratory setting for the previously mentioned content areas could include more traditional laboratory settings, but often includes metal and wood working shops, greenhouses, farms, and livestock facilities. Though inquiry-based laboratory instruction is often used, it is not the only teaching method SBAE teachers are expected to use. Talbert, Vaughn, Croom, and Lee (2007) describe six different group instruction methods and five individual instruction methods for use in the agricultural classroom.

With roots going back to early apprenticeship programs (Knoll, 1997; Croom 2008), the modern SAE program, as used in formal education, stems from the *Home School Cooperation Plan* developed by Rufus Stimson while at the Smith Agricultural College (Smith & Rayfield, 2016). The National Council for Agricultural Education suggested SAEs to be foundational to agricultural education and provide an opportunity to extend classroom learning beyond the school and into the community (NCAE, 2015). SAEs provide opportunities for students to engage in contextual, real-world learning outside the classroom and extend concepts taught. SAEs also provide opportunities for students to engage in AFNR

areas of interest that may not be offered in their school's program of study (NCAE, 2015; Council 2017).

FFA is the largest career and technical student organization (CTSO) recognized by the department of education with over 650,000 members in all 50 states and the territories of Puerto Rico and the US Virgin Islands (FFA, 2019). Since its inception, the organization has grown in numbers, inclusion, and content to keep current with the industry and the culture of the times. In 1988, the name was changed to The National FFA Organization to reflect the broader mission of the organization to train more than the next generation of "farmers".

To aid in developing leadership and personal growth, FFA offers a wide range of opportunities. Competitive events were part of the early stages of FFA and continue on today. There are currently 19 career development events (CDEs) and seven leadership development events (LDEs) offered by the national FFA that allow students to compete in educational events in a way that extends classroom knowledge (FFA, 2018). In many states additional CDE or LDEs are offered to accommodate state preferences or address content specific to their area (FFA, 2018; Texas FFA, 2018).

Purpose and Objectives

The purpose of this study was to investigate how SBAE teachers perceive the balance of their program within the context of the three-circle model of agricultural education and how, if given the opportunity, they would balance a program under ideal circumstances. The research questions guiding this study were:

RQ1: What are the perceived and ideal levels of focus of the three elements of agricultural education among agricultural educators in Texas, Georgia, and Oregon?

RQ2: Are there differences in perceived and ideal levels of focus for the classroom instruction element of the agricultural education model in teachers from Texas, Georgia, and Oregon?

RQ3: Are there differences in perceived and ideal levels of focus for the Supervised Agricultural Experience element of the agricultural education model in teachers from Texas, Georgia, and Oregon respectively?

RQ4: Are there differences in perceived and ideal levels of focus for the FFA element of the agricultural education model in teachers from Texas, Georgia, and Oregon respectively?

RQ5: Are there differences in perceived levels of classroom instruction, SAE, and FFA activities among teachers from Texas, Georgia, and Oregon?

RQ6: Are there differences in "ideal" levels of classroom instruction, SAE, and FFA activities among teachers from Texas, Georgia, and Oregon?

Theoretical Framework

The theories shaping this study were Expectancy Value Theory (EVT) and the Theory of Planned Behavior (TPB). EVT originated from work with adolescent performance in

mathematic achievement where it was noted achievement, persistence, and engagement were related to the level of success students expected as a result of their efforts and the value placed on the task (Wigfield, 1994; Wigfield & Eccles, 2000). Although the model has developed to include multiple preceding factors, this study referenced the three antecedents theorized to be immediately prior to the decision-making process: expectations for success, intrinsic value of the task, and utility value of attainment (Figure 2).

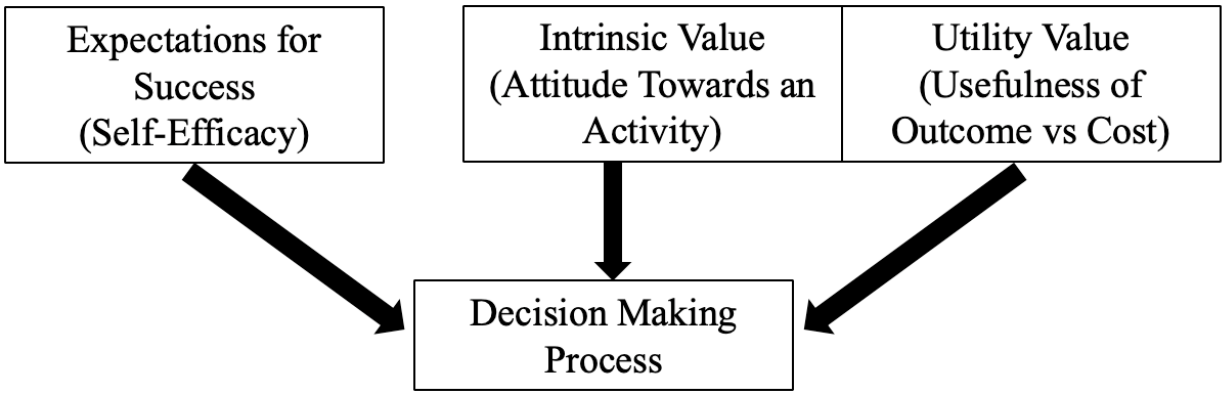

Figure 2. Visual model of expectancy value theory components used in this study.

Wigfield and Eccles (2000) concluded the decision-making process to engage in a given activity is shaped by the expectations held by an individual about their ability to be successful as a result of their efforts coupled with the value of the outcome. The values in the model are the internal value one places on the task and the utility value. Utility value is an internal comparison of the usefulness of the outcome compared against the real costs of completion in terms of time, effort, or money and/or the opportunity cost of not engaging in other tasks (Wigfield & Eccles, 2000). Ajzen's theory of planned behavior was developed in an attempt to predict behavior based on attitudes and beliefs around the activity (Ajzen, 2006). In the model (Figure 3), intentions to make a decision or act are predicated on one's personal attitude towards the behavior, subjective attitudes, and perceived behavioral control.

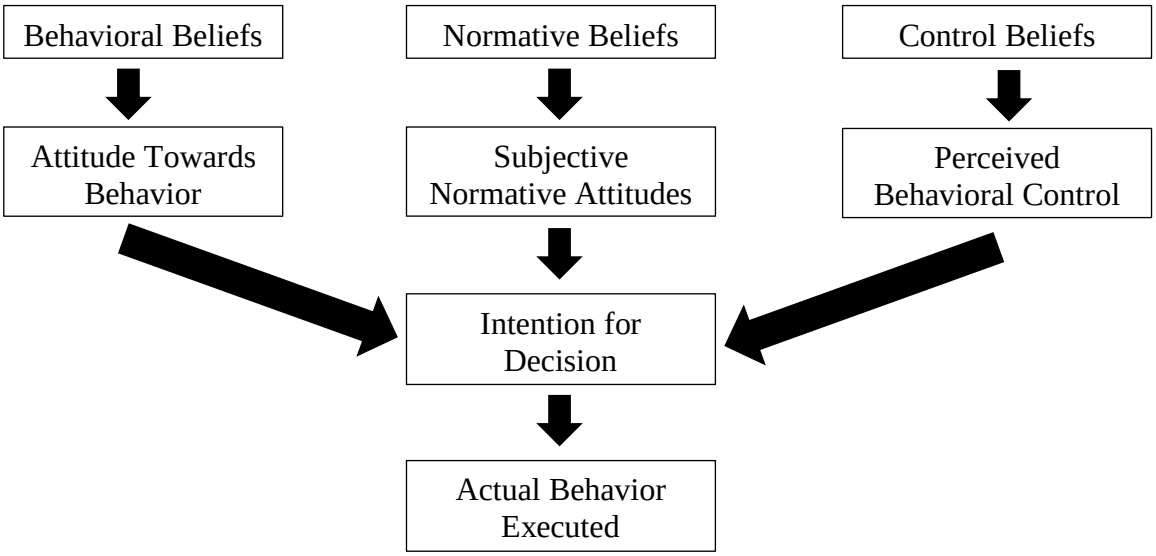

Figure 3. Visual depiction of Ajzen's Theory of Planned Behavior.

Personal attitudes toward the behavior are shaped by a combination of intrinsic beliefs about the task coupled with self-efficacy beliefs shaped by personal or vicarious experiences. Subjective attitudes stem from normative beliefs shaped by perceived social pressure or influence to complete a task. This social pressure is similar to Bandura's idea of social pressure and comes from personal or professional groups containing "important" or "referent individuals" (Ajzen, 2000, pp. 62). Perceived behavioral control is separate from self-efficacy or behavioral beliefs and is described as a notion of potential success or failure stemming from a potential lack of resources or support. (Madden, Ellen, & Ajzen, 1992).

A visual conceptualization of the interconnectedness of the included theories is provided in Figure 4. This framework shaped the study through an assumption of at least partial autonomy and independence of SBAE teachers. SBAE programs have more curricular, SAE, and FFA options to choose from than can be practically engaged. The shape, direction, and "balance" of the program is dictated by the choices of what activities to participate in. These choices, as depicted in the model, are influenced by personal and subjective attitudes, intrinsic and utility values, and expectations for success which are all influenced by personal and external factors.

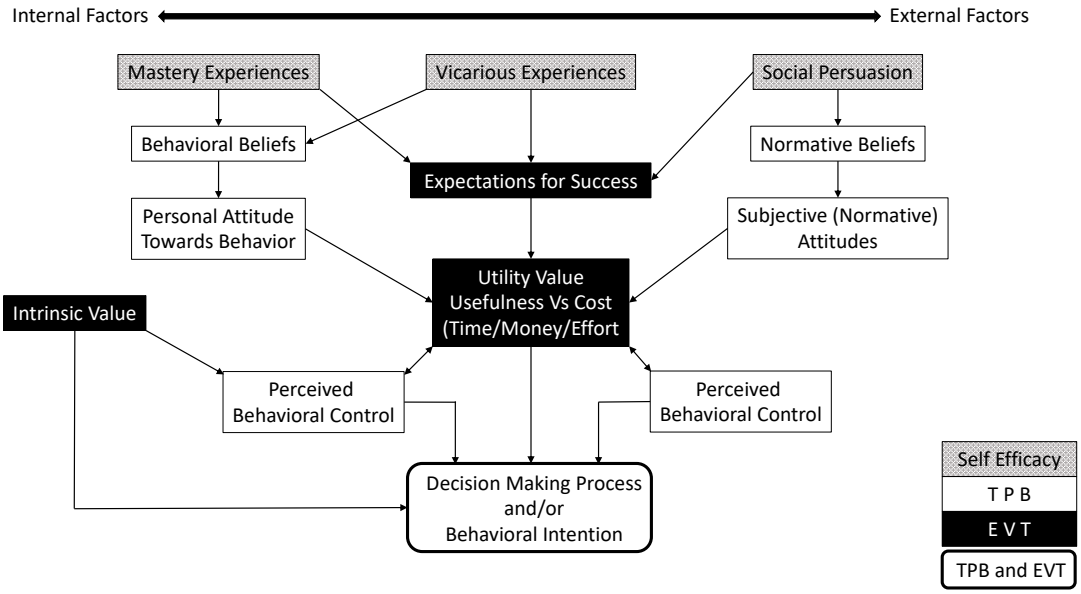

Figure 4. Visual model of merging Theory of Planned Behavior, Expectancy Value Theory, and included elements of Self-Efficacy.

Methods

Population

The target population for this study included all currently employed SBAE instructors in the states of Texas, Georgia, and Oregon. The three states were chosen because they represent distinctly different geographic regions of the country and three different sizes of statewide programs in terms of number of FFA members and agriscience teachers. Sample size was determined based on multiple factors of a larger study. Analysis involved descriptive statistics, *t* -Tests, and ANOVA. Field (2013) stated that ANOVA is robust to violations of assumptions when sample sizes are similar. To achieve parity in sample size while accounting for geographic and programmatic diversity across the three states, a

stratified random sample was selected. The respective state FFA Associations divide their state into smaller segments. Texas is divided into 12 areas, Georgia into three regions, and Oregon in four sections. A random sample was generated that provided five ag teachers from each area of Texas (n = 60), 20 from each region of Georgia (n = 60), and 15 from each section of Oregon (n = 60) for a total sample size of N = 180.

Instrumentation and Data Collection

The instrument used was designed by the researcher and included five demographic questions and two questions on programmatic balance using "slider" response questions (Figure 5). The instrument was reviewed for face and content validity by a panel of experts with experience in agricultural education research. For this study, the components of an SBAE program are operationalized to include the three broad categories found in the three-circle model of agricultural education (Figure 1): classroom instruction, SAE, and FFA. The first question asked respondents to provide perceptions of the balance of their current program and the second asked for an "ideal" balance for a program. Participants provided their responses for each prompt by sliding an indicator representing classroom instruction, FFA, and SAE to a position that represented the percent of the program an area represented. The numerical value of the three sliders had to combine to equal 100%, representing the whole program.

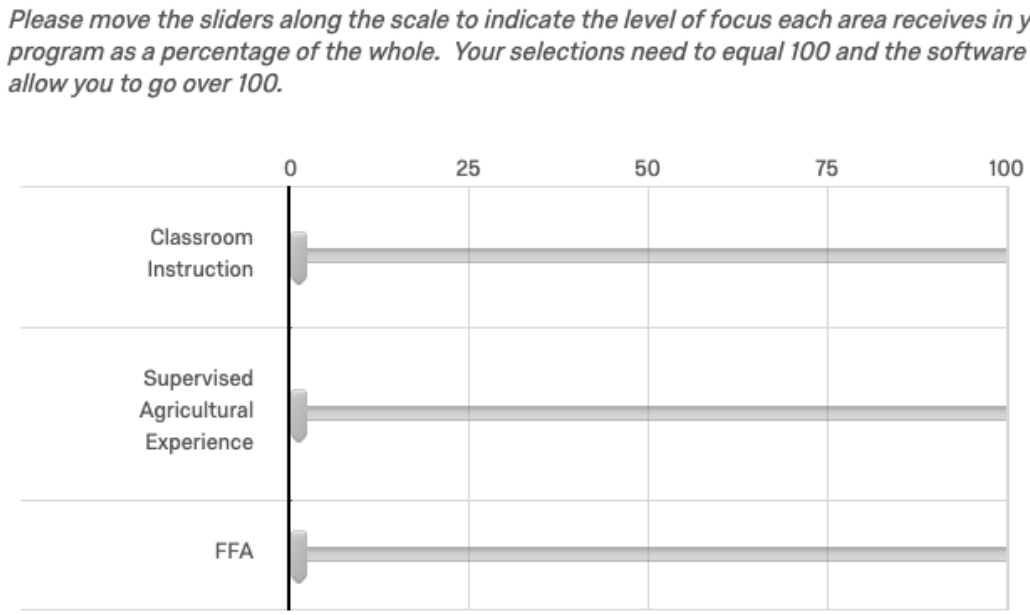

Figure 5. Programmatic balance question utilizing percentages measured by a slider-based prompt in Qualtrics.

The study was approved by the institutional review board and a list of email addresses was generated for each of the state samples using online directories provided by the state FFA or agricultural teachers associations. Following the protocol suggested by Dillman, Smyth, and Christian (2014), an initial contact invitation was sent followed by the first survey distribution and three subsequent reminder distributions at one-week intervals. The survey was generated in Qualtrics and distributed via their email system. It was determined that the protective filters of some school districts were preventing recipients from receiving the Qualtrics emails and a subsequent series of invitations were sent utilizing individualized links and emailing them directly from the researcher's university email account.

Data Analysis

All data were exported from Qualtrics to IBM SPSS 25 for analysis. Prior to statistical calculations and reporting, all data were checked for completeness, skew, kurtosis, and normality. All significance levels were set *a priori* at $\alpha = .05$.

RQ1:

Research question one was descriptive in nature. Data were reported for means and standard deviations of perceived and ideal levels of classroom instruction, SAE, and FFA from respondents for each respective state plus aggregate group means.

RQ2-4:

Research questions two, three, and four asked if there are differences between perceived and ideal levels of classroom instruction, SAE, and FFA activities of Agriscience teachers in Texas, Georgia, and Oregon. The statistical null hypothesis states there are no differences between the means and will be tested using paired sample *t*-tests for each of the conditions. The assumptions for this test require that the dependent variables are continuous and that the observations are independent of each other. Both are met by the nature of data collection. Responses were provided on separate questions for perceived and ideal levels of activity using virtual sliding indicators representing percentage of focus values from 0-100. Normality is another assumption of the test, specifically the normality of the differences between scores (Field, 2013). Although robust to differences based on sample size, normality was checked using histograms, Q-Q plots, Kolmogorov-Smirnov tests, and box plots to verify that the assumption was not violated.

RQ5-6:

Research questions five and six asked if there are differences between perceived and ideal levels of classroom instruction, SAE, and FFA activities between Agriscience teachers in the three sampled states. The null hypothesis for the six conditions states that, in the populations, there are no differences. The hypotheses were tested using six one-way ANOVAs as listed.

Perceived Classroom Instruction Levels:	Texas v Georgia v Oregon
Perceived SAE Levels:	Texas v Georgia v Oregon
Perceived FFA Levels:	Texas v Georgia v Oregon
Ideal Classroom Instruction Levels:	Texas v Georgia v Oregon
Ideal SAE Levels:	Texas v Georgia v Oregon
Ideal FFA Levels:	Texas v Georgia v Oregon

The primary assumption for an ANOVA is homogeneity of variance between the groups. Although ANOVA's are generally robust to violations of this assumptions if sample sizes are relatively equal (Field, 2013), a Lavene's test was run for each ANOVA and a corrected *F* value and degrees of freedom was reported when appropriate using a Welsch correction model. Any ANOVA results showing significant differences between groups were followed with a Bonferoni *post hoc* analysis to determine where the differences lie. Field (2013) suggested that a Bonferoni analysis reduces the chance of committing a type-I error. Both *t* and *p* values were reported with effect sizes. Effect size was reported as Cohen's *f* and calculated based on recommended criterion (Koltrick, Williams, & Jabor, 2011).

Limitations

Limitations for this study are instrument and sample driven. The instrument utilized electronic "sliders" to indicate percentages of a whole in three different areas. This type of response is part of standard question options through Qualtrics but has not been utilized in this manner before in the field of agricultural education. Teachers were sampled from Texas, Georgia, and Oregon and the results cannot be generalized beyond those states. Caution should be exercised when generalizing within the states as well. Part of the statistical analysis strategy utilized one-way ANOVA to compare the mean responses between the three states. ANOVA is robust to violations of assumptions when sample sizes are relatively equal. To account for this, a stratified random sample (N = 60) was selected from each state. Oregon employs just over 100 SBAE teachers while there are over 600 in Georgia and more than 2000 in Texas and a common sample of 60 represented a different percent of the available populations.

Assumptions

An assumption for the sake of research methodology is a concept or statement that is presumed to be true for a specific purpose or timeframe (Vogt, 2005). This study was conducted using survey methods and used a newly designed instrument. The assumptions for this study were:

- The agriscience teachers who received the study were the same individuals completing the instrument,
- Survey completers dedicated adequate time and focus to answer the questions honestly and thoughtfully,
- Participants provided information that was truthful and an honest reflection of their opinions, and
- Though examined for face and content validity, it was assumed the instrument accurately assessed the objectives of the study.

Results

A total of 121 usable responses were collected for a total response rate of 62.1%. Oregon had the highest response rate at 80% (n = 48), followed by Georgia at 70% (n = 42, and Texas at 62.1% (n = 31). Data were explored for normality and the assumption of normal distributions were met. To account for potential non-response error early responders were compared to late responders. Early responders were defined as those who responded in the first three weeks of data collection (n = 79) and responders were those who provided data during the second three weeks (n = 42). No significant differences were found between early and late responders on perceived levels of classroom instruction $t(119) = -.402$, $p = .688$, SAE $t(119) = -.205$, $p = .838$, or FFA $t(119) = .774$, $p = .440$.

The first research question sought to describe the perceived an ideal levels of classroom instruction, SAE, and FFA of the three included states (Table 1). The three states combined reported the most perceived focus on classroom instruction (M = 49.50, SD = 14.46), followed by FFA (M = 32.23, SD = 9.67), and SAE (M = 21.75, SD = 9.55). Oregon reported the highest perceived levels of classroom instruction (M = 50.85, SD = 14.50), followed by Georgia (M = 46.11, SD = 14.43), and Texas (M = 40.27, SD = 12.33). Texas reported the highest levels of activity in FFA (M = 24.85, SD = 9.95) and SAE (M = 34.88, SD = 9.95). Georgia Agriscience teachers reported the next highest levels in FFA (M = 30.72,

SD = 9.94) and SAE (*M* = 23.17, *SD* = 7.92). Oregon teachers reported the lowest perceived focus on FFA (*M* = 30.63, *SD* = 10.00) and SAE (*M* = 18.52, *SD* = 9.82). This pattern continued with reported "ideal" levels of classroom instruction, SAE and FFA as shown in Table 1.

Table 1
Descriptive Statistics for Perceived and Ideal Levels of Classroom Instruction, FFA, and SAE in SBAE Programs in Oregon, Georgia, and Texas

		Classroom Instruction		FFA		SAE	
	N	*M*	*SD*	*M*	*SD*	*M*	*SD*
Oregon	48						
Perceived		50.85	14.50	30.63	10.00	18.52	9.82
Ideal		41.19	13.49	30.16	8.60	28.64	8.06
Georgia	42						
Perceived		46.12	14.43	30.72	9.94	23.17	7.92
Ideal		41.11	15.51	31.14	9.79	27.76	10.41
Texas	31						
Perceived		40.27	12.33	37.88	9.95	24.85	9.95
Ideal		32.18	12.10	36.91	9.77	30.90	10.41
Overall	121						
Perceived		46.50	14.46	31.75	10.05	21.75	9.55
Ideal		38.85	14.34	32.23	9.67	28.91	9.54

Research questions two, three, and four asked if there were differences between the perceived and ideal levels of classroom instruction, FFA, and SAE activities among Agriscience teachers in each state or as a corporate group. Paired sample *t* – Tests were run with *a priori* significance level set at $\alpha = .05$. There were significant differences (Table 2) found between the perceived and ideal means of classroom instruction levels among Agriscience teachers from Oregon ($M_{perceived} = 50.85$, $M_{ideal} = 38.85$, $t(47) = 5.07$, $p < .001$, $d = .69$), Georgia ($M_{perceived} = 40.27$, $M_{ideal} = 32.18$, $d = .33$), $t(30) = 2.68$, $p = .010$), Texas ($M_{perceived} = 40.27$, $M_{ideal} = 32.18$, $t(30) = 5.06$, $p < .001$, $d = .66$), as well as the differences between the entire sample ($M_{perceived} = 46.50$ $M_{ideal} = 38.85$, $t(120) = 7.05$, $p < .001$, $d = .53$). There were also significant differences found between the mean and ideal SAE levels in Oregon ($M_{perceived} = 18.52$, $M_{ideal} = 28.64$, $t(47) = -8.96$, $p < .001$, $d = 1.12$), Georgia ($M_{perceived} = 23.17$, $M_{ideal} = 27.76$, $t(41) = -3.04$, $p = .004$, $d = .50$), Texas ($M_{perceived} = 24.85$, $M_{ideal} = 30.90$, $t(30) = -3.40$, $p = .002$, $d = .60$), as well as the differences between the entire sample ($M_{perceived} = 21.75$, $M_{ideal} = 28.91$, $t(120) = -8.42$, $p < .001$, $d = .75$). There were no significant differences between the perceived and ideal levels of FFA activities in any state or with a combined analysis.

Table 2

Differences Between Perceived and Ideal Levels of Classroom Instruction and SAE in Oregon, Georgia, and Texas

	n	*t*	df	*p*	Cohen's d	Effect
Classroom Instruction						
Oregon	48	5.07	47	< .001	.69	Medium
Georgia	42	2.68	41	.010	.33	Small
Texas	31	5.06	30	<.001	.66	Medium
Overall	121	7.05	120	<.001	.53	Medium
SAE						
Oregon	48	-8.96	47	< .001	1.12	
Georgia	42	-3.04	41	.004	.50	Large
Texas	31	-3.40	30	.002	.60	Small
Overall	121	-8.43	120	< .001	.75	Medium

Research question five sought to determine if the perceived levels of classroom instruction, FFA, and SAE were different between the states (Table 3). One-way ANOVA's were run which indicated there were significant differences between perceived classroom levels $F(2, 118) = 5.44$, $p = .006$ as well as perceived SAE levels $F(2, 118) = 5.18$, $p = .007$ between the states. Bonferoni post-hoc analysis indicated that the mean level of perceived classroom instruction for Oregon ($M = 50.85$, $SD = 14.50$) was significantly higher than Texas ($M = 40.27$, $SD = 12.33$). Georgia was not significantly different from either state in perceived classroom instruction. Post-hoc analysis for perceived SAE levels showed that Texas ($M = 24.85$, $SD = 9.95$) and Georgia ($M = 23.17$, $SD = 7.92$) reported significantly more SAE activity than Oregon ($M = 18.52$, $SD = 9.82$). There were no significant differences found in perceived FFA levels.

Table 3

Analysis of Variance for Perceived Levels of Classroom Instruction and SAE for SBAE Teachers in Oregon, Georgia, and Texas

Source	df	SS	MS	*F*	*p*	η^2	*f*	Effect
Classroom Instruction								
Between Groups	2	2,116.65	1058.32	5.44	.006	.09	.31	Medium
Within Groups	118	22,967.36	194.64					
Total	120	25,084.01						
SAE								
Between Groups	2	884.46	442.23	5.18	.007	.08	.30	Medium
Within Groups	118	10,066.97	85.31					
Total	120	10,951.43						

Research question six sought to determine if there were differences in "ideal" levels of classroom instruction, FFA, and SAE (Table 4). The results from the one-way ANOVA showed significant differences in ideal levels of classroom instruction $F(2, 118) = 4.80$, $p = .010$ and FFA activity $F(2, 118) = 5.37$, $p = .006$ between the states. There were no significant differences found in ideal SAE levels. Bonferoni post-hoc analysis indicated that Texas instructors would, ideally, have a lower percentage of classroom instruction ($M = 32.18$, $SD = 12.10$) than would teachers from Georgia ($M = 41.11$, $SD = 15.51$) and Oregon ($M = 41.19$, $SD = 13.49$). Similarly, post-hoc analysis showed that Texas Agriscience teachers would prefer significantly more FFA activity ($M = 36.91$, $SD = 9.77$) than those from Georgia ($M = 31.14$, $SD = 9.79$) or Oregon ($M = 30.16$, $SD = 8.60$).

Table 4

Analysis of Variance for Ideal Levels of Classroom Instruction and FFA for SBAE Teachers in Oregon, Georgia, and Texas

Source	df	SS	MS	*F*	*p*	η^2	*f*	Effect
Classroom Instruction								
Between Groups	2	1,855.01	927.50	4.80	.010	.08	.29	Medium
Within Groups	118	22,967.36	193.27					
Total	120	22,805.56						
FFA								
Between Groups	2	935.49	467.75	5.37	.006	.08	.30	Medium
Within Groups	118	10,275.68	87.08					
Total	120	11,211.17						

Conclusions / Implications / Recommendations

Significant differences were found between the mean perceived and ideal levels of classroom instruction when measured as a percent of the whole program. Each reporting state indicated a preference to reduce the percent of time allocated to teaching by 5-10%. This perceived surplus of resource allocation could be a potential source of work-work or work-life imbalance which has potential implications on career longevity choices as illustrated in the literature on work life balance (Ingersoll & Smith, 2003; Sorenson, McKim & Velez, 2016). A follow-up study should be conducted to explore where teachers would like to trim or change time allocation.

Similarly, all reporting states had significant differences in perceived and ideal levels of SAE activities where each state indicated a preference for more SAE activities. While a desire for SAE to be a larger part of the greater program, it is unknown from the data if this increase should come from more time allocated for SBAE teachers to be involved in SAEs, more students engaging in SAEs, more opportunities for students to exhibit their projects, or a more diverse offering of SAE project areas. This is particularly salient for a state like Oregon where perceived levels of SAE activity were significantly lower than that of Georgia

and Texas, at less than 20% of the program. Needs assessments should be conducted to help identify additional SAE opportunities and or other areas of improvement for SAE implementation.

The comparisons of ideal program component levels are perhaps the greatest source of discussion. Texas reported the lowest perceived levels of classroom instruction (40.27%) and their ideal levels were even lower at 32.18%. Both of these values were significantly lower than values for Georgia and Oregon. In light of the three-circle model of agricultural education, the balance suggested by Texas (Classroom = 31.2, FFA = 36.9, SAE = 30.9) is closer to the mathematical perfect split (33.3% each) than the combined responses from Georgia and Oregon who indicated a preference for more weight on instruction (Classroom = 41.2, FFA = 30.7, SAE = 28.3).

The origins of the three-circle visual model stem from an evolution of practice and not from empirical studies (Croom, 2008). Perhaps the time has come for the profession to reconsider the model and recognize it as an overly simplified tool suitable for use in "elevator" explanations to lay-persons. A nearly even split of activities may be an appropriate target for SBAE students in terms of time or resource allocation, but not for teachers.

The national average for a "school day" is 6.7 hours (Murray, 2019) plus additional time for grading, administrative work, and preparation. If we assume a (conservative) time allocation of 6 hours per day (30 hours per week) for an SBAE teacher, and further assume equal time allocation to SAE and FFA, we would be projecting a 90-hour workload expectation. Even in recognizing that emphasis shifts throughout the year and 90-hour work weeks are exceptions to the norm, the reality is that most SBAE teachers work, on average, well over 50 hours per week throughout the year (Sorenson, McKim & Velez, 2016; Hainline, Ulmer, Ritz, Burris & Gibson, 2015; Crutchfield, Ritz & Burris, 2013; Murray, Flowers, Croom & Wilson, 2011). Further research is needed to develop a national picture of practitioner experience and preferences. From this data a more accurate and possibly new model should be developed and presented.

It is recommended for student teacher preparation programs to include programmatic balance and planning into their respective curriculum. Similarly, professional development opportunities should be provided to early career and veteran teachers on the same topics. In a distinguished lecture presentation, the attending members of the national research conference of the American Association for Agricultural Education were asked "who was driving the pickup truck?" in reference to providing leadership for the profession. The response options were: Federal Officials, FFA, the Council, Association for Career and Technical Education, and "none of the above" (Moore, 2006). In the time since Dr. Moore posed this question, the changes in legislation and education have only made the factors influencing educators and SBAE programs more diverse. If there is no-one "driving the pickup truck", teacher preparation professionals and programs have the opportunity impact the direction of young teachers and should take steps to assure that new teachers have the tools and training necessary so they can assume leadership in providing deliberate direction to their programs instead of continually reacting to varied inputs or, worse yet, operating without direction at all.

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Investigating the Effects of Cognitive Style on the Small Gasoline Engines Content Knowledge of Undergraduate Students in a Flipped Introductory Agricultural Mechanics Course at Louisiana State University

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Abstract

One of the greatest challenges that classroom teachers face is fostering a learning environment that caters to the needs of diverse learners. Teachers have a wide variety of teaching methodologies at their disposal, ranging from passive, teacher-centered to active, student-centered strategies. The flipped classroom approach allows for teachers to become the facilitator of learning activities and students to become actively engaged in the learning experience. This transition allows for more student-centered activities to occur in class that enhance students' critical thinking and problem solving skills. Team-based learning (TBL) is a modified version of flipped classroom which provides students the opportunity to work collaboratively to solve complex problems. Content knowledge has long been considered an important prerequisite of higher cognitive functions such as critical thinking, problem solving, and reflective thinking. The purpose of this exploratory study was to explain the effect of cognitive style on the small gasoline engines content knowledge of undergraduate students enrolled in a flipped introductory agricultural mechanics course at Louisiana State University. To test the hypotheses, this study utilized descriptive statistics, including the mean and standard deviation, and analysis of covariance (ANCOVA). Pretest content knowledge was employed as the covariate to determine the influence of cognitive style on post-test content knowledge. Overall, no differences in content knowledge were detected. It is recommended to replicate this study longitudinally to increase statistical power. For practice, educators should employ learning strategies that meet the needs of students with diverse cognitive styles.

Introduction and Literature Review

One of the greatest challenges classroom teachers face is fostering a learning environment that caters to the needs of diverse learners. To achieve this, teachers have a variety of teaching methodologies at their disposal, ranging from passive, teacher-centered methods to active, student-centered strategies (Schunk, 2012). One relatively new means of active engagement is through the use of flipped classrooms. Some of the first flipped classroom models can be seen emerging into secondary and postsecondary education in the late 1990s and early 2000s after the inception of No Child Left Behind (NCLB) (Frederickson, Reed, & Clifford, 2005; U.S. Department of Education, 2001; Strayer, 2007). Baker (2000) presented his early version of the "classroom flip" as a new method of teaching that was made possible by an increase in need for new educational methodologies that better engage learners, and the increase in instructional technology availability (pg. 4). Similarly, Lage, Platt, and Tregalia (2000) developed the "inverted classroom" model with the goal to invert the classroom structure and better engage students during class (pg. 32). In both models, it was suggested to move instructional lecture

material out of the classroom and make it available online, thus using class time for the professor to serve as a guide to assist students while providing increased time for application and practice (Baker, 2000; Lage et al., 2000). Over the past two decades, the flipped classroom approach has gained increased attention in secondary and postsecondary education for its student-centered approach and increased emphasis on engagement (Barkley, 2015; McCubbins, Paulsen, & Anderson, 2018).

The flipped classroom model has allowed teachers to become the facilitator of learning activities and students to become actively engaged in the learning process while still focusing on the delivery of course content (Connor, Stripling, Blythe, Roberts, & Stedman, 2014). This transition allows for more student-centered activities to occur during class time to enhance students' critical thinking and problem-solving skills (Allen, Donham, & Bernhardt, 2011; Hanson, 2006). Additionally, active learning strategies promote a student-centered learning environment by creating opportunities for students to solve problems in a real-world context (Michealsen & Sweet, 2008; Sibley & Ostafichuk, 2015).

Further building on the emphasis on collaboration within the flipped classroom, Team-Based Learning (TBL) has emerged as a flipped classroom technique which provides students the opportunity to work collaboratively to solve complex problems during class time (Michealsen & Sweet, 2008; Wallace, Walker, Braseby, & Sweet, 2014). Like the traditional flipped classroom models, TBL is a student-centered approach that shifts instruction away from a traditional, lecture format to create a student-centered learning environment (Artz, Jacobs, & Boessen, 2016; Nieder, Parmalee, Stolfi, & Hudes, 2005). In a TBL formatted course, students take on the responsibility of learning conceptual knowledge outside of class time and spend more time applying that knowledge in class as a part of a team (Michaelsen, Knight, & Fink, 2004). Essentially, TBL is formatted to provide students opportunities to learn both declarative and procedural knowledge to enhance critical thinking and problem-solving skills (Michaelsen & Sweet, 2008). One aspect of TBL that sets it apart from the traditional flipped classroom is its increased emphasis on accountability (Michaelson et al., 2004). An essential element of TBL is the administration of Individual Readiness Assurance Tests (IRATS) and Team Readiness Assurance Tests (TRATS) after each module to ensure students are truly engaging the materials.

Despite the many possible applications of TBL to agricultural education, research supporting the use of TBL in agricultural education has been limited. McCubbins, Anderson, and Paulsen (2016) conducted a study to examine student perceptions of TBL in an agricultural education capstone course. The findings from this study suggest students had a positive view of TBL and were highly satisfied with the student-centered learning environment (McCubbins et al., 2016). This study also indicated working in teams had a positive impact on student motivation to learn in a collaborative setting (McCubbins et al., 2016). A similar study conducted, McCubbins, Anderson, and Paulsen (2018) found that TBL in agricultural education courses supported the development of critical thinking, motivation to learn, and the ability to effectively apply course concepts by undergraduate students. Focusing specifically on agricultural mechanics, a course that is typically heavily focused on problem solving, Figland, Blackburn, and Roberts (2019) reported undergraduate students perceived that TBL supported the development of problem solving skills and promoted positive collaboration between group members, while increasing student self-efficacy within the content area.

The ability to increase critical thinking and problem-solving skills cannot be developed exclusively through the integration of specific teaching methods. Instead, education literature supports the theory that the cognitive styles of students within classes and educational teams can influence the ability of students to problem solve effectively. (Myers & Dyer, 2006; Parr & Edwards, 2004; Thomas, 1992; Torres & Cano, 1994; Torres & Cano, 1995; Witkin, Moore, Goodenough, & Cox, 1977). Cognitive styles are typically defined through as an individuals' preferred way of organizing and retaining information to solve problems (Keefe, 1979; Kirton, 2003). The awareness of a student's cognitive style, therefore, is an important factor in the success of the individuals' ability to solve problems (Jonassen, 2000; Witkin et al., 1977). Within agricultural education, Blackburn, Robinson, and Lamm (2014) and Lamm et al. (2011) concluded that before educators can understand how to tailor lessons to effectively teach critical thinking and problem solving skills, they must be aware of varying cognitive styles and understand how to relate those cognitive styles to successful problem solving and critical thinking development. To better understand how problem solving can be developed within agricultural education coursework, both cognitive style and innovative teaching methods can be utilized to develop students critical thinking ability.

Theoretical Framework

Kirton's (2003) Adaptation-Innovation Theory (A-I theory) served as the theoretical foundation of this study to aid in furthering the understanding of how critical thinking ability can be tied to TBL teaching methodologies. A-I theory is grounded in the premise that all people are creative and can solve problem, regardless of their preferred cognitive style (Kirton, 2003). Per the theory, cognitive style is regarded as the person's preferred way to think, learn, and solve problems (Kirton, 2003). An individual's cognitive style is measured through Kirton's Adaption-Innovation Inventory (KAI). KAI scores that fall below the mean are considered *more adaptive*, while scores above the mean are *more innovative*. However, it is important to note that the scale is a continuum and individuals are never purely adaptive nor purely innovative (Kirton, 2003). In other words, two people can have scores below the mean, indicating they are more adaptive when compared to the normal distribution of scores, but the individual with the higher score is considered more innovative than the other.

When comparing the more adaptive and more innovative, several key distinctions exist in the manner in which these individuals prefer to learn and solve problems. More adaptive individuals prefer well-established problems and favor working within the current problem structure (Kirton, Bailey, & Glendinning, 1991). These individuals tend to collaborate well with group members and generate ideas that favor consensus (Kirton, 2003). On the contrary, the more innovative prefer less structure to solve the problem and often challenge boundaries (Kirton, 2003; Lamm et al., 2012). More innovative individuals tend to stretch the boundaries of problems and generate ideas outside the current group structure (Kirton, 2003). Often, individuals falling more on the innovative side of the continuum tend to be novel and find different ways to solve problems. Whereas, the more adaptive tend to be safer, more predictable, conforming, and less ambiguous when solving problems (Kirton, 1999, 2003).

Cognitive style is one's preferred means of learning and engaging in problem solving tasks (Kirton, 2003). However, learners are often presented with situations in which they must learn or perform that are outside of their preferred style. In these instances, individuals utilize coping behaviors to navigate the environment (Kirton, 2003). Often, this occurs in a setting where the person must work with individuals of diverse cognitive styles. Kirton (2003) describes this as the Problem A and Problem B situation. For example, consider students assembled into a team to complete a group project. Problem A is the group assignment, while Problem B is how well can the group navigate their diverse cognitive styles to perform the task.

Little research exists in the context of agricultural education that investigates the effects of cognitive style on student learning outcomes in a flipped learning environment. A-I theory postulates that cognitive style is not related to cognitive capacity, however little literature exists in agricultural education that tests this notion. Further, no literature was found that tested this hypothesis in a flipped classroom setting. As a result, the principle question that arose after the review of literature was: How does cognitive style effect the small gasoline engines content knowledge of undergraduate students enrolled in a flipped introductory agricultural mechanics course at Louisiana State University.

Purpose and Objective

The purpose of this exploratory study was to explain the effect of cognitive style on small gasoline engines content knowledge of undergraduate students enrolled in a flipped introductory agricultural mechanics course at Louisiana State University. This research supports the American Association of Agricultural Education's National Research Agenda Priority 4: Meaningful, Engaged Learning in All Environments. Specifically, this research addresses question three, "How can delivery of educational programs in agriculture continually evolve to meet the needs and interests of students?" (Edgar, Retallick, & Jones (2016), p. 39). The following objectives guided this study:

The following null hypotheses guided this study:

> $H_0$1: There is no statistically significant differences in small gasoline engines content knowledge of undergraduate students in an introductory agricultural mechanics course based on cognitive style.

Methodology

Data associated with this study were collected as a part of a larger research project that investigated students' abilities to solve small gasoline engines related problems. Specifically, a one-group pretest-posttest preexperimental design was employed to collect data for this research (Campbell & Stanley, 1963; Salkind, 2010). This design is used widely in educational research when all individuals are assigned to the experimental group and observed at two points in time (Campbell & Stanley, 1963; Salkind, 2010). The changes from the pretest to the posttest determine the results from the intervention, however, in this design there is no comparison group which makes it almost impossible to determine if the change would have occurred only from the intervention and not from extraneous variables (Salkind, 2010). Extraneous variables must be

considered and dismissed in order to make any types of generalizations between the interventions and change (Salkind, 2010).

Population/Sample

The population of this study was all students who enrolled in an introductory agricultural mechanics course at Louisiana State University during the spring semester of 2018 (n = 17) and spring semester of 2019 (n = 15). Overall, one student in the spring semester of 2018 did not complete enough course material to be included in the study, therefore, the participating sample totaled n = 31. Institutional Review Board (IRB) approval was sought and granted. Per IRB, students were notified of this research on the first day of class and were given the opportunity to opt out without penalty. All students were over the age of 18 and elected to provided signed consent to participate in this research.

Independent samples T-tests were employed to determine if significant differences existed between students in the 2018 and 2019 spring semesters based on age (t = 2.197, df = 29, p = 0.596) and cognitive style (t = 0.006, df = 29, p = 0.109). Further, a Chi-Square test was employed to determine if differences existed between the two semesters based on gender (X^2 = .313, df = 1, p = .576). Therefore, from the analysis, it is concluded that our population from both semesters were homologous and subsequently the data were merged for further data analysis.

While the course is offered through the [AGED] department at Louisiana State University, it is advertised throughout the college and university. Table one provides personal and educational characteristics of students (n = 31) who enrolled in this course during the springs of 2018 or 2019. Overall, these students' ages ranged from 18 to 24, with 19 (29.0%) and 21(29.0%) being the most commonly reported ages. The majority (n = 17; 54.8%) of students were female, and sophomore (41.9%) was the most frequently reported academic classification. In all, nine majors were represented in this course, with Agricultural & Extension Education being the most common (41.9%).

Table 1

Personal and Educational Characteristics of Undergraduate Students Enrolled in Introductory Agricultural Mechanics Course at Louisiana State University During the Spring 2018 and 2019 Semesters (n = 31)

Variable	*f*	%
Age		
18	1	3.2
19	9	29.0
20	7	22.6
21	9	29.0
22	1	3.2
23	2	6.5
24	2	6.5
Gender		
Male	14	45.2

Female	17	54.8
Academic Classification		
Freshman	3	9.7
Sophomore	13	41.9
Junior	9	29
Senior	6	19.4
Major		
Agricultural & Extension Education	13	41.9
Animal Sciences	6	19.3
Plant & Soil Science	2	6.5
Natural Resources Ecology and Management	3	9.7
Agricultural Business	1	3.2
Mechanical Engineering	2	6.5
Turf & Landscape Management	1	3.2
Horticulture	2	6.5
Sports Administration	1	3.2

Instrumentation

Kirton's Adaptation-Innovation Inventory (KAI) was used to determine the students' cognitive style (Kirton, 2003). This instrument consists of 32 items that ask questions directed toward the individuals preferred way to learn. The KAI scores range from 32 to 160 on a continuum from more adaptive to more innovative, with a theoretical mean of 96 (Kirton, 2003). However, the practical mean of the KAI has been found to be 95 (Kirton, 2003). Therefore, individuals who score 95 or below are considered more adaptive, while individuals who score is 96 or above are considered more innovative. This instrument has been successfully utilized to determine cognitive style of a wide variety of individuals from varying backgrounds (Kirton, 2003). Internal reliability of this instrument has been measured through multiple studies. Kirton (2003) reported that after analyzing data from six different population samples with over 2500 respondents that internal reliability coefficients ranged from .84 − .89. Also, twenty-five other studies that utilized the KAI showed reliabilities between .83 and .91 (Kirton, 2003).

Due to the nature of this preexperimental study, it was important to determine the students' knowledge in small gasoline engine content prior to and after the intervention. A 30-item criterion-referenced test was developed by the researcher to test the individual's knowledge. It should be noted that half of the questions on this test were developed by Blackburn (2013) and further modified to meet the needs of this study. The other 15 questions were developed by the researcher based off the *Small Engine Care & Repair* textbook written by London (2003), a *Small Engines Equipment and Maintenance* textbook written by Radcliff (2016), and the Briggs & Stratton PowerPortal website. The criterion-referenced test was formatted using a four-option multiple choice template including one correct answer and three distractors. To ensure reliability of the criterion referenced test, guidelines offered by Wiersma and Jurs (1990) were followed. Table two provides the factors considered as well as how each were addressed.

Table 2
Examples of Wiersma and Jurs (1990) Eight Factors for Establishing Reliability of Criterion-referenced Tests

Factor	How Factors were Addressed
1. Homogeneous Items	Consistency of the items on the instrument were all constructed using the same font, size, and style
2. Discriminating Items	Items of varying difficulty were included
3. Quantity of Items	The test consisted of 30 multiple-choice items
4. High Quality Test	The test was verified by a panel of experts for formatting
5. Clear Directions	Directions were printed at the top of the test and read aloud
6. Controlled Environment	The test was given in the student's normal classroom
7. Participant Motivation	Students were aware if the test was being used for course grade
8. Scorer Directions	Answer key was developed for accurate assessment

Course Structure and Procedures

On the first day of the small gasoline engines unit, the KAI and 30-item pretest were administered to the students. Due to the use of TBL as the primary teaching strategy, the students were grouped purposively by cognitive style into teams in which they would remain for the duration of the unit. Overall, teams were developed to be heterogeneous, homogeneous adaptive, or homogenous innovative. The course layout was formatted based on Michaelson and Sweet's (2008) recommendations.

Within the small gasoline foci, five individual modules were constructed including (a) small engine tool and part ID, (b) 4-cycle theory and fuel, (c) ignition and governor systems, (d) cooling/lubrication system, and (f) troubleshooting. After each module, students completed an IRAT to determine their content knowledge retained. After completing the IRAT, the students would then join their assigned team and complete the TRAT. During the TRATs, students were allowed to collaborate with other members to come to agreements on items they may have gotten incorrect. The goal of completing the IRAT before the TRAT is to ensure that all group members of the team contribute equally. At the end of the small gasoline engines unit, the 30-item criterion referenced test was administered.

Data Analysis

To test the hypotheses of this study, descriptive statistics were utilized including mean and standard deviation, and analysis of covariance (ANCOVA) were employed. ANCOVA was utilized due to this research containing continuous variables that may influence the dependent variable but are not a part of the primary experimental manipulation (Field, 2009). Specifically, the student's pretest scores were utilized as a covariate in the analysis.

Findings

The overall mean of the pretest was 15.58 (51.9%). The mean of the more adaptive students pretest was 15.48 (51.6%), while the more innovative averaged 15.88 (52.9%). Regarding the post-test, the overall mean was 23.39 (77.9%). The more adaptive students average score was 22.96 (76.5%) and the mean post-test score of the more innovative students was 24.63 (82.1%).

Table 3

Content Knowledge of Undergraduates Enrolled in an Introductory Agricultural Mechanics Course based on Cognitive Style (*n = 31*)

Item	*f*	*M*	*SD*	%	Minimum	Maximum
Overall Pretest Score	31	15.58	5.277	51.9	7	27
Overall Posttest Score	31	23.39	4.660	77.9	12	30
Pre-test						
More Adaptive	23	15.48	5.583	51.6	7	27
More Innovative	8	15.88	4.612	52.9	9	22
Posttest						
More Adaptive	23	22.96	4.343	76.5	12	29
More Innovative	8	24.63	5.605	82.1	15	30

Prior to employing ANCOVA, Levene's test of homogeneity of error variances was calculated and was determined not to be statistically significant ($p = 0.723$). Overall, the covariate, pretest score, was significantly related to posttest score [$F(1, 28) = 30.87$, $p = 0.00$). Cognitive style was determined not to significantly effect [$F(1, 28) = 1.11$, $p = 0.30$) student's content knowledge as measured by the posttest (see Table 4).

Table 4

Analysis of Covariance Summary Table for the Effect of Cognitive Style on Content Knowledge

Source	*df*	*MS*	*F*	*p*
Covariate (pretest)	1	332.89	30.87	.00
Cognitive Style	1	11.92	1.11	.30
Error	28	301.94		

Conclusion and Limitations

Overall, the statistical analysis revealed that cognitive style did not affect the small gasoline engines content knowledge of students enrolled in an introductory agricultural mechanics course at Louisiana State University. Therefore, the researchers failed to reject the null hypothesis. This conclusion aligns with A-I theory in that cognitive style is not related to cognitive capacity. In other words, one's preferred style or manner of learning and problem solving does not influence ability to learn nor performance. Similarly, this research confirms the findings of prior research that investigated factors influencing content knowledge achievement (Blackburn, 2013; Blackburn et al., 2014; Pate, Wardlow, & Johnson, 2004). However, these prior studies did not include a pretest measure of small gasoline engines content knowledge, therefore failed to account for pretreatment differences in content knowledge. Further, research should be conducted to compare the TBL method of teaching small gasoline engines content with the direct instruction. Due to the lack of a comparison group, it is not known whether students in these semesters would have performed better or worse than similar students taught through more traditional means. This type of research could allow practitioners greater confidence that, at a minimum, they are not impeding students learning by employing TBL in their classrooms.

This study was conducted during two spring semesters in an attempt to increase the sample size to enhance statistical power. However, due to enrollment sizes and data attrition, the overall sample was only 31 students. Low sample sizes are a detriment to most parametric statistical tools; however, these data were tested for normality in SPSS. The researchers determined the data to be normal through a P-Plot (Field, 2009), therefore not violating the assumption of normality. However, due to the low sample size the statistical power of this research was inherently low, thereby increased the chances of committing Type-II error.

An additional limitation of this study was the lack of random selection of participants. Due to the nature of using student enrollment in a particular class, caution must be given when interpreting the findings and cannot be generalized past the sample reported in this research. The introductory agricultural mechanics course is required for students majoring in agricultural and extension education and is becoming an increasingly more popular elective for other majors across the university. Students not required to complete this course may have a higher mechanical aptitude or prior knowledge and/or experiences in the content areas which may influence their performance in the course.

Recommendations

To increase statistical power, it is recommended that this research project be extended for a minimum of three more semesters. Depending on enrollments, this would increase the sample size to more than 75 students. A sample size of 75-100 would sufficiently increase power. Further, additional variables such as mechanical aptitude should be assessed to determine impact on content knowledge. Additionally, content knowledge should be utilized as an independent variable to determine its role in the problem-solving ability of students in authentic learning environments. Additional research should seek to determine the effect of these diverse cognitive teams on the ability to generate hypotheses and solve authentic problems. Content knowledge

could also be employed into a multiple regression model to determine what impacts it may have when hypothesizing and solving contextual problems.

Practitioners should be informed that cognitive styles influence the manner in which students prefer to learn and solve problems (Kirton, 2003), but are not related to how well a student learns. Teachers should strive to create learning environments that are conducive to the diversity of learners to ensure all students have an opportunity to learn. As teachers provide opportunities for diverse learning styles – auditory, kinesthetic, and visual – so too should they provide opportunities geared toward the more adaptive as well as the more innovative. This would ensure that one style preference is not constantly required to employ coping behaviors to succeed. Post-secondary educators should consider TBL if they are interested in flipping an agricultural mechanics course. Results from this study indicate that, based on cognitive style, all student are able to learn successfully. Further, the use of frequent IRATs and TRATs ensures a level of accountability not normally found in traditional flipped classes.

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The Influence of Restorative Learning Environments in Horticulture on Attention Capacity of High School Students

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Students rely on their directed attention to engage in school. However, societal trends and increased multitasking in the classroom can cause directed attention fatigue, leading to impaired performance. Attention Restoration Theory suggests that restorative environments can help reduce mental fatigue. This study explored if restorative learning environments in the form of natural agricultural laboratories had an influence on the attention capacity and content knowledge of high school students enrolled in a horticulture program by using a quasi-experimental design. A significant and practical difference was found between the increase in attention for students taught in the natural agricultural laboratory setting and decrease in attention for students taught in the agriscience classroom. More students had no change or an increase in attention in the restorative learning environment, while a greater percentage of students had a decrease in attention capacity in the traditional classroom environment. A significant difference was not found in content knowledge. Agriscience teachers should use natural laboratory environments for instruction. Continued research is needed to investigate long-term impacts of restorative environments on attention capacity.

Introduction / Theoretical Framework

Attention has been defined as the mechanism used to select stimuli relevant to a required behavior (Reynolds, Gottlieb, & Kastner, 2008). It has been used to overcome the brain's limitations to engage in multiple cognitive processes at one time. Attention takes two forms: fascination, which occurs naturally, not requiring effort, and directed attention, which occurs in the absence of fascination and uses energy to inhibit distractions and focus on the required task (Clay, 2001; DeYoung, 2010; Kaplan, 1995). Directed attention has been vital to everyday productivity, efficiency, and decision making of adults and youth (Bagot, 2003; DeYoung, 2015). Shah, Shah, & Saleem (2015) found that students' level of attention directly impacted their academic achievement. Specifically, school-aged children have relied on directed attention for concentration, problem solving, planning, and responding appropriately (Bagot, 2003).

Since directed attention requires effort from the brain to suppress competing stimuli, it leads to directed attention fatigue after prolonged use (DeYoung, 2010; Kaplan, 1995). Current society has created a culture requiring prolonged attention, thus causing directed attention fatigue. When directed attention becomes fatigued, individuals struggle to concentrate and complete mental work (Kaplan & Talbot, 1983). Directed attention fatigue contributes to human error (Kaplan, 1995), ineffectiveness (Berto, 2014; Kaplan, 1995), and reduced competence (Berto, 2014). Multitasking has been shown to divide attention (APA, 2006) and has led to directed attention fatigue (DeYoung, 2010; Shows, Albinssons, Ruseva, & Waryold, 2016). Evidence of increased multitasking in educational environments due advances in communication technologies has been documented (Alkahtani et al., 2016). These multitasking behaviors in the classroom have been associated with decreased academic performance. Although directed attention fatigue and stress

can interact to lead to impaired performance (Kaplan, 1995), supportive environments have been shown to reduce the occurrence of directed attention fatigue, while restorative environments help recover directed attention (DeYoung, 2010; Kaplan, 1995).

Attention restoration theory (ART) highlights the predisposition humans have to attend to and respond positively to natural settings, which were beneficial to survival during evolution (Berto, 2014). The theory focuses on how natural environments influence the cognitive and psychological resources of individuals (Kaplan, 1995). Reducing mental fatigue is fundamental to restoration in this theory (Kaplan & Talbot, 1983) and drives individuals towards restorative environments (Berto, 2014). The theory defines the characteristics of a restorative environment that contribute to recovery from mental fatigue (Kaplan, 1995; Kaplan & Talbot, 1983).

While sleep provides one avenue of recovery from directed attention fatigue, it alone is insufficient (Kaplan, 1995). Restorative environments can provide the necessary break to allow directed attention to be resorted. Restorative environments contain four characteristics: being away, fascination, extent, and compatibility (Kaplan, 1995; Kaplan & Talbot, 1983). Being away has been characterized in three ways: 1) being removed from a distraction whether in a distant location or a quiet, distraction-free location; 2) a break from ordinary work; 3) resting from the pursuit of a specific purpose, which could provide a break from mental effort (Kaplan & Talbot, 1983). Distant settings are not required to be away; natural settings accessible in urban areas provide the opportunity for individuals to rest their directed attention (Kaplan, 1995). Being away requires a conceptual change, rather than a physical change, because moving to a new location while contemplating the same cognitive struggle would not provide the desired effects.

Fascination occurs when attention is effortless (Kaplan, 1995; Kaplan & Talbot, 1983). Since involuntary attention does not require effort, it is not susceptible to fatigue (Kaplan, 1995).While a variety of stimuli can spark fascination, natural elements, such as animals, water, vegetation, and scenery, attract effortless attention (Hartig, Mang, & Evans, 1991; Hartig, Evans, Jamner, Davis, & Garling, 2003; Kaplan, 1995; Kaplan & Talbot, 1983; Ulrich et al., 1991). Content differences in natural versus urban settings account for the differences in restoration and attention rather than, the amount of stimulation in the environment (Ulrich et al., 1991). Extent/Coherence of a restorative environment allows for fascination to be engaged (Kaplan & Talbot, 1983). The environment must provide “a domain of larger scope to anticipate, explore, and contemplate” (Kaplan & Talbot, 1983, p. 189). This setting needs to be large enough, rich enough, and consistent enough to create a feeling of “another world” (Kaplan, 1995; Kaplan & Talbot, 1983). Even small natural environments can offer complex features that make the setting feel vast (Kaplan, 1995; Kaplan & Talbot, 1983).

In addition to being away, fascination, and coherence, compatibility between the environment and the individual’s propensity is needed (Kaplan & Talbot, 1983). Since cognitive activity and actions are influenced both by an individual’s objectives and by environmental restraints or demands, restorative environments boast a setting in which both the individual’s goals and the environmental characteristics support each other. A compatible environment allows for ease in completing the necessary tasks (Kaplan, 1995). Compatible environments are responsive, providing immediate feedback, and require less discernment when problems are encountered (Kaplan, 1995). Nature is particularly compatible with human intent, based on evolutionary development within nature.

Laboratory instruction has been recognized as a vital part of high-quality agricultural education programs at all levels and can take place in many indoor and outdoor settings (Phipps, Osborne, Dyer, & Ball, 2008). Researchers have investigated the impact of laboratory instruction on content knowledge, science process skills, and attitudes towards subject matter (Myers & Dyer, 2006; Rotherberger & Stewart, 1995). The use of laboratory instruction has been found effective in increasing student content knowledge and science process skills (Myers & Dyer, 2006).

Purpose and Objectives

The purpose of this study was to determine the influence of natural agricultural laboratory settings attention levels of high school students, while monitoring the influence on content knowledge. The following objectives were used to guide this study:

1. Determine if a difference in the change of student attention capacity exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting; and
2. Determine if a difference in student content knowledge exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting.

The following research hypotheses were developed based on the research objectives.

H1: Students receiving instruction in a natural agricultural laboratory setting will have a greater increase in attention scores than students receiving instruction in the classroom setting.

H2: Students receiving instruction in a natural agricultural laboratory setting will have higher content knowledge scores than students receiving instruction in the classroom setting.

Methods

This research used a quasi-experimental design in order to manipulate independent variables and pursue hypothesis testing since the randomization needed for a true experimental design was not possible in the school setting (Ary, Jacobs, & Sorensen, 2010; Campbell & Stanley, 1963). The learning environment was the manipulated independent variable. The dependent variables of interest were student attention capacity and content knowledge. This study utilized a counterbalanced, randomized subjects, pretest-posttest control group design to increase experimental control (Ary et al., 2010; Campbell & Stanley, 1963). This design allows any differences which may exist between groups to be rotated, so pre-existing differences cannot influence the results. To limit carryover effect and prevent students from becoming bored, the researcher chose pretest instruments that would minimize these threats, as well as allowing a minimum of one week between treatments. Additionally, a control group of students in another class offered at the same time in the same school was used to account for the practice effect of the attention measures. The researcher worked with the teachers from the schools involved to identify lessons of equivalent complexity. The instructional materials developed were reviewed by a panel of experts to verify the equivalence in complexity.

The research design controlled for the following threats to internal validity: history, maturation, pretesting, instrumentation, statistical regression, differential selection, experimental mortality, interaction of selection with other threats, and subject effects (Ary et al., 2010). Additional measures were taken to control for experimenter effects and diffusion. The pretest in the design

presented a threat to external validity, in that the pretest and treatment could interact, only allowing results to be generalized to those who have been pretested (Ary, et al., 2010). Possible concerns impacting external validity in counterbalanced designs include, interaction for testing and treatment, interaction of selection and treatment and reactive arrangements of the multiple treatment interface (Ary et al., 2010; Campbell & Stanley, 1963). These limitations need to be considered when interpreting the results.

Secondary agriscience students enrolled in horticulture coursework were the population for this study. Two schools were selected from the population as a purposive sample based on the criteria: offering a horticulture program, natural agricultural laboratory resources, differences in the surrounding communities, and proximity to the research team. Purposive sampling allows the researcher to select cases that are typical or representative of the population in which probability sampling is difficult or impossible to achieve (Ary et al., 2010). The use of non-probability sampling limited the ability to generalize the findings beyond the sample. Readers may draw their own generalizability conclusions by comparing this sample to other populations.

The schools offered a Horticulture Science and Services pathway, requiring students to take Agriscience Foundations, Introductory Horticulture 2, Horticulture Science 3, Horticulture Science and Services 4, Horticulture Science and Services 5, and Horticulture Science and Services 6 (Florida Department of Education [FDOE], 2017a). Students taking Agriscience Foundations, Introductory Horticulture 2, and Horticulture Science 3 were included in this study.

School A was a high school in a community of 2,760 people (U.S. Census Bureau, 2018). It was surround by farmland and has served a more rural community. Table 1 provides gender and race data for the school is provided. The majority of students were male (51%) and white (61.9%, FDOE, 2017b). Black, Hispanic, and multi-racial minorities made up a small portion of the school population with less than 10 American Indian or Asian students. The agricultural classroom was a large room (57 feet by 62 feet), however student instruction and laboratory practice occurred in the front half of the room (57 feet by 33 feet). The greenhouse structure was 30 feet by 60 feet. The walls were polycarbonate. Inside were five greenhouse tables extending horizontally from the walls along each side with an aisle down the center. The greenhouse temperature was controlled and ranged from 70° F to 79° F throughout day one. The greenhouse was mostly filled with poinsettias; however, they were arranged to allow space for students to work at the end of each of the greenhouse tables towards the center aisle. Cooler outdoor temperatures resulted in cooler temperatures in the greenhouse on day two with temperature ranging from 64° F to 70° F. About half of the poinsettias from the first day were gone.

Table 1
Gender and race of students by school for 2015-2016 school year (FDOE, 2017b)

Characteristic	School A *n* (%)	School B *n* (%)
Gender		
Male	285 (51.4)	858 (50.2)
Female	269 (48.6)	852 (49.8)
Race		
White, Non-Hispanic	166 (61.9)	400 (46.0)
Black, Non-Hispanic	51 (17.7)	238 (29.1)

Hispanic/Latino	38 (15.9)	108 (13.7)
Multiracial, Non-Hispanic	12 (3.8)	54 (5.8)
American Indian/ Alaskan Native	<10 (<1.8)	<10 (<0.6)
Asian, Non-Hispanic	<10 (<1.8)	45 (4.5)
Hawaiian, Pacific Islander	0	0

School B is located in an Urbanized Area with a city population of 59,253 (U.S. Census Bureau, 2018). The school was surrounded by apartment complexes and housing. Table 1 provides summary of students by gender and race/ethnicity for the 2015-2016 school year. Students were equally distributed by gender (FODE, 2017b). While the largest percentage of students were white (46%), School B had a more diverse student population with 29.1% Black students, 13.7% Hispanic/Latino students, 5.8% multiracial students, and 4.5% Asian students. Less than 10 students were American Indian. The agricultural classroom was 27 feet by 26 feet. An attached room had agricultural mechanic-style laboratory tables where students completed the propagation activity on day one. The natural agricultural laboratory setting was located approximately 300 feet from the agricultural classroom and took students approximately two minutes of walking to arrive there. This was a 30 feet by 50 feet shade house area. Two rows of greenhouse tables covered by shade cloth were filled with plants. Students worked at a third row of tables, which were clear. The area was surrounded by some raised beds and was close to a fence and wood line that separated the school grounds from a neighboring apartment complex. Since this area was not enclosed, the temperature fluctuated more with the outdoor temperature. Day one the temperatures ranged from 64° F with warm sun in the morning to 75° F and overcast in the afternoon. Students did not make any comments about the temperature. On day two, it was mostly sunny with temperatures ranging from 49° F to 66° F. Most students were dressed appropriately for the temperatures; however, one student in the first class was only wearing a t-shirt and commented about being cold. On both days during some afternoon class periods, students from other classes would be in the surrounding area caring for the plants.

In between the day one and day two, School B experienced two events that had the potential to impact student attention levels. A student from the school was shot in front of a house across from the school. Additionally, two students died in a car accident. The teacher at this school noted that some of the agriculture students were close to one of the three people who died in these events.

A total of 86 of the 183 students enrolled in Agriscience Foundations, Introductory Horticulture 2 and Horticulture Sciences 3 in the schools completed and submitted the IRB parental consent and student assent forms and were present for both days of instruction, resulting in a 47% participation rate. Of these students, 44 were assigned to the group 1, treatment first, and 42 were assigned to the group 2, treatment second.

Attention was measured using the Necker Cube Pattern Control Task. The Necker Cube is a three-dimensional wire-framed cube whose perceived orientation spontaneously reverses when viewed for more than a few seconds (Cimprich, 1990; Hartig et al., 2003; Kaplan, 1995; Tennessen & Cimprich, 1995). Directed attention to one orientation will slow the rate in which the reversals occur (Kaplan, 1995). Since maintaining focus on a particular orientation requires the inhibition of the alternative orientation, the Necker Cube has been used as a measure of directed attention (Cimprich, 1990; Kaplan, 1995; Tennessen & Cimprich, 1995). A decreased

ability to inhibit pattern reversals can be attributed to directed attention fatigue (Hartig et al., 2003; Kaplan, 1995; Tennessen & Cimprich, 1995). Cimprich (1990) stated that the Necker Cube "appears to be sensitive to subtle changes in attention capacity over time" (p. 96). Additionally, Hartig et al. (2003) found the Necker Cube to be effective at detecting differences after only 20 minutes of a given treatment. Practice effects for the Necker Cube Pattern Control Test were found when used with high school students (Beer, 1989).

After instruction and practice with the Necker Cube, baseline data were collected for a 30 second interval. Then the instructor directed the participants to focus their attention and hold the cube in a given perspective for as long as possible and data was collected for another 30 second interval to conclude the pre-test. Following the treatment, students were again asked to hold the cube in the same orientation for as long as possible for a final 30 second period. The Necker Cube scores are the percent reduction from the baseline data to the holding conditions (Cimprich, 1993; Williams et al., 2000). A higher score indicated a higher directed attention capacity. In order to determine the change in directed attention capacity across the treatment, difference scores were calculated by subtracting Necker Cube posttest from Necker Cube pretest each day. Positive difference scores indicate an increased directed attention capacity, whereas, negative scores denote a decrease directed attention capacity, or an increased directed attention fatigue.

The researcher developed two content knowledge tests designed to assess the knowledge of students following each lesson. The assessments utilized multiple choice and short answer questions aligned to the lesson objectives. The content knowledge tests were reviewed by a panel of experts, including current high school agricultural teachers and teacher education professors, to ensure content validity.

Prior to instruction and data collection approval was granted by the Institutional Review Board (IRB-02) and students and parents provided signed consent forms. The researcher collaborated with the participating teachers to identify two lessons of equivalent complexity that could be taught in both the classroom and the greenhouse setting. The teachers selected standards related to plant propagation and plant nutrition. The researcher developed a lesson plan and instructional materials on semi-hardwood propagation and plant nutrients and deficiencies aligned to course standards, which could be delivered in both the classroom and greenhouse settings. Instructional materials were reviewed by the participating teachers to ensure proper alignment to course standards and by a panel of experts to confirm content validity and equivalence of complexity. Three agricultural education master's degree students certified to teach high school agriculture with equivalent teaching experiences were recruited and trained to serve as instructors and deliver the instruction throughout the study.

During the initial replication of this study, the research team traveled to each school for one day. Students in each class were randomly assigned to one of two groups. All students completed the pretest assessment of attention. Group 1 received the experimental treatment, which consisted of instruction in the greenhouse environment. Group 2 received the comparison treatment, which consisted of instruction in the agriscience classroom. Two trained instructors from the research team delivered the designed curriculum on semi-hardwood propagation. Following the treatment, all students completed the posttest measures of attention. The next day the classroom teacher administered a content knowledge assessment to all students. The research team debriefed over each break and at the end of the day to discuss issues that arose and to record student feedback

and qualitative observations about the implementation. The lead researcher kept a reflexive journal to record items discussed (Harding, 2013; Yin, 2016). For the second replication, the research team traveled to each school for a second day. Students remained in their initial randomly-assigned groups. They followed the same protocol using the nutrient deficiency lesson, except they were assigned to the opposite treatment group from the initial visit. Instructors taught in the same environment for each lesson to maintain consistency of instruction.

The Statistical Package for the Social Science (SPSS) 22.0 for Windows was used for statistical analysis. To address threats to statistical conclusion validity, the researcher chose tests of high power to detect relationships present. Additionally, all assumptions for the statistical tests were checked and found to be met prior to running the statistical analysis unless otherwise discussed.

Objective one sought to determine if a difference in student attention exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting. The research hypothesis developed for testing stated, students receiving instruction in a natural agricultural laboratory setting will experience a greater increase in attention scores than students receiving instruction in the classroom setting. The null hypothesis tested was that there would be no difference in the change of attention scores for students taught in the natural laboratory setting when compared to students taught in the agriscience classroom.

Extreme outliers were present in the initial dataset. The errors were not due to data entry. The researcher was unable to determine if the errors were due to measurement errors or genuinely unusual values (Keith, 2006; Laerd Statistics, 2015). Previous research using the Necker Cube removed outliers $\pm 3\ SD$ from the mean (Jaggard, 2014). The researcher used this strategy to remove extreme outliers. Table 2 provides the mean, standard deviation, ± 3 standard deviation, and acceptable range determined using this method. Table 3 identified extreme outliers removed.

Table 2
Necker Cube mean scores, standard deviations, three standard deviations, and acceptable range

Variables	*M*	*SD*	3*SD*	Acceptable Range
Day 1 Pretest	3.82	2.78	8.34	0 – 12
Day 1 Posttest	6.30	6.84	20.52	0 – 26
Day 2 Pretest	4.83	5.15	15.45	0 – 19
Day 2 Posttest	9.64	9.79	29.38	0 – 39

Table 3
Necker Cube, extreme values removed

Variables	# Values Removed	Values removed
Day 1 Pretest	1	19
Day 1 Posttest	3	44, 42, 29
Day 2 Pretest	2	42, 21
Day 2 Posttest	3	46, 43, 40

For each day, Necker Cube posttest scores were subtracted from Necker Cube pretest to determine the change in attention for each day. The data were structured into a long form format and a univariate general linear mixed model was completed to test the hypothesis. The dependent variable was the attention difference score. The fixed variables were day, treatment order, and

day*treatment order interaction. Student ID was the random factor. Attention difference scores in the group receiving the treatment the first day, $D(49) = 0.84$, $p < 0.01$, and the group receiving the treatment the second day, $D(40) = 0.09$, $p < 0.01$, were both significantly not normal. Since the general linear model is robust to violations of normality, the data were analyzed without further adjustments (Field, 2013; Keith, 2006). Normality of errors was violated and provided a limitation to the analysis. Residuals for the attention difference scores were statistically not normally distributed $D(151) = 0.84$, $p <0.01$. However, the general linear model is robust to violations of normality (Field 2013; Keith, 2006).

A new variable was computed to categorize the attention difference scores into three change categories: no change, decrease in attention, and increase in attention. The analysis was split by treatment group to determine the changes associated with each environment. Frequencies were completed for these categories for each group for day.

Objective two was to determine if a difference in student content knowledge exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting. The hypothesis stated, content knowledge scores between students instructed in the in a natural agricultural laboratory setting will be statistically significantly higher than students instructed in a classroom setting. A paired-samples t-test was run to test the null hypothesis that content knowledge scores would not be statistically significantly different based upon environment. The data were structured into a long form format and a univariate general linear mixed model was completed to test the hypothesis. The dependent variable was the content knowledge score. The fixed variables were day, treatment order, and day*treatment order interaction. Participant ID was the random factor.

Data were checked to ensure it met the assumptions of the test. The content knowledge scores were significantly not normal on Day 1, $D(56) = 0.95$, $p = 0.03$, but did not deviate significantly form normal on Day 2, $D(33) = 0.94$, $p = 0.08$. Since the general linear model is robust to violations of normality, the data were analyzed without further adjustments (Field, 2013; Keith, 2006). A significant correlation was found between day and content knowledge ($r = -0.33$, $p = 0.01$) violating the assumption of noncollinearity (Keith, 2006).

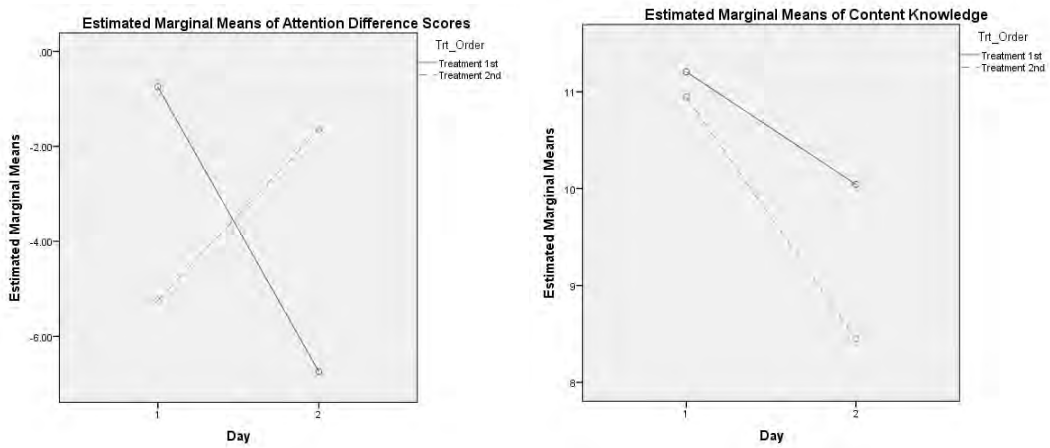
Findings

Objective one aimed to determine if a difference in student attention exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting. The researcher hypothesized, students receiving instruction in a natural agricultural laboratory setting will have a greater increase in attention scores than students receiving instruction in the classroom setting.

A general linear mixed model of day 1 and day 2 attention difference scores by treatment order was constructed to test the hypothesis. A significant model accounted for 13.8% of the variance (Adj. $R^2 = 0.138$, $F(3,147) = 9.01$, $p < 0.01$, $\eta^2 = 0.16$). A significant interaction between day and treatment order existed ($F(1,147) = 24.64$, $p < 0.01$, $\eta^2 = 0.14$). The significant model and interaction effect led to a rejection of the null hypothesis that there was no significant difference in change in attention level between student instructed in the natural agricultural laboratory and the agriscience classroom. Additionally, the effect sizes exceeded the recommended minimum

for practical significance (Ferguson, 2009). Figure 1(A) presents the profile plot for the estimated marginal means of attention difference scores by day and treatment order. Both groups had larger changes in their attention level on the day they received instruction in the natural agricultural laboratory setting.

The percentage of students who experienced a change in their attention level in each environment was calculated. Table 4 presents the results. A larger percentage of students in the treatment group saw no change or an increase in their attention (51.9%) than those in the comparison group (15.1%). At the same time, a larger percentage of students in the comparison group saw a decrease in attention (84.9%) than those in the treatment group (48.1%).



A B

Figure 1.
GLM profile plot (A) estimated marginal means of attention difference scores by treatment order and day(B) estimated marginal means of content knowledge scores by treatment order and day

Table 4
Percentage of students showing no change, a decrease, or an increase in attention by treatment

Treatment Lesson & Environment	No Change *n (%)*	Decrease *n (%)*	Increase *n (%)*
Treatment Total (*N* = 79)	**15 (19.0)**	**38 (48.1)**	**26 (32.9)**
Day 1 Propagation Greenhouse	8 (20.9)	18 (45.0)	14 (35.0)
Day 2 Nutrients Greenhouse	7 (17.9)	20 (51.3)	12 (30.8)
Comparison Total (*N* = 73)	**3(4.1)**	**62 (84.9)**	**8 (11.0)**
Day 1 Propagation Classroom	2 (5.9)	30 (88.2)	2 (5.9)
Day 2 Nutrients Classroom	1 (2.6)	32 (82.1)	6 (15.4)

Objective two intended to determine if a difference in student content knowledge exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting. The following hypothesis was created, content knowledge scores between students instructed in the in a natural agricultural laboratory setting will not be statistically significantly higher compared to students instructed in a classroom setting. A paired samples t-test was completed to test the null hypothesis that a statistically significant difference did not exist between the content knowledge scores of students in the treatment and comparison groups.

Students who received the treatment, instruction in the restorative learning environment, first performed higher on their first content knowledge assessment on propagation (M = 11.65, SD = 1.84) than their second content knowledge assessment on plant nutrients (M = 10.40, SD = 2.58) for which they received instruction in the comparison environment, the agriscience classroom. This represented a mean increase of 1.25 points (SE = 2.83). The difference was not statistically significant, $t(19) = 1.98$, $p = 0.06$, $d = 0.44$. This finding supports the null hypothesis. Students who were instructed in the agriscience classroom, the comparison environment, for the propagation lesson had a higher mean on the propagation content knowledge score (M = 11.11, SD = 2.14) than when instructed in the restorative learning environment, the greenhouse, for the plant nutrient lesson and content knowledge assessment (M = 8.56, SD = 1.01). This represented a mean difference of 2.57 points (SE = 0.63). This difference was statistically significant $t(17) = 2.54$, $p = 0.02$, $d = 0.60$. This finding did not support the null hypothesis.

A general linear mixed model of day 1 and day 2 content knowledge scores by treatment order was constructed to test the hypothesis. A significant model accounted for 12.2% of the variance (Adj. $R^2 = 0.122$, $F(3,116) = 6.52$, $p < 0.01$, $\eta^2 = 0.14$). The interaction between day and treatment order was not significant ($F(1,116) = 2.08$, $p = 0.15$). However, there was a significant main effect of day ($F(1,116) = 15.61$, $p < 0.01$). Figure 1(B) presents the profile plot for the estimated marginal means of content knowledge scores by day and treatment order. The profile plot illustrates the higher mean scores, which were relatively equal, for both groups on Day 1 and lower scores on Day 2 with a larger spread between the mean scores of each group.

Conclusions and Recommendations

The statistically significant and practical difference between the increase in attention for students taught in the natural agricultural laboratory setting and decrease in attention for students taught in the agriscience classroom supports the Attention Restoration Theory (Kaplan & Kaplan, 1989). Natural environments have been found to provide more cognitive renewal from mental fatigue than urban environments (Berto, 2005; Cimprich & Ronis, 2003; Hartig et al., 1991; Hartig et al, 2003) and natural views have also been show to increase directed attention capacity (Tennessen & Cimprich, 1995).

Since students elect to take their agriscience coursework, they may have a natural fascination with the content. The natural fascination, or involuntary attention (James 1892), would allow students to focus on instruction without the effort required for suppressing competing stimuli when directed attention is required in the absence of fascination (Kaplan, 1995). When fascination allows directed attention to take a break, individuals benefit from reduced mental fatigue (Kaplan & Talbot, 1983).

Mental fatigue is associated with irritability and challenges with concentration and completing mental work (Kalplan & Talbot, 1983). In addition, directed attention fatigue has the potential to affect selection, inhibition, fragility, perception, thought, action, and feelings which could lead to human error (Kaplan, 1995), ineffectiveness (Berto, 2014; Kaplan, 1995), and reduced competence. If time spent in natural agricultural laboratories allows students to reduce their mental and directed attention fatigue, these students may be able to avoid some of these challenges associated with directed attention fatigue.

Despite the fact that a third of students taught in the restorative environment of the natural agricultural laboratory increased their directed attention capacity and another 20% experienced no change in their directed attention capacity, 48% of students still experienced a decrease in their attention levels. Although this percentage of students who experienced a decrease in their directed attention capacity was much smaller than those students receiving instruction in the classroom setting, some may be concerned that it is still nearly half of the students. Kaplan (1995) explained that directed attention fatigue can take longer to develop, consequently requiring more time to restore. Students who did not experience increased attention during the span of the class period, may need additional time to help recover from their directed attention fatigue. During this study, students spent approximately 30 minutes in the restorative environment. Students exposure to the restorative environment could occur in the form of longer periods of exposure during a class period or repetitive exposure throughout the week course. The impact of each of these should be investigated.

Additionally, other reasons for a decrease in attention levels should be investigated. Characteristics of particular environments may require students to use directed attention in these environments instead of reverting to fascination. For example, the research team noted that when the fan in the greenhouse was on, it produced a loud noise. This noise could have required students to rely on their directed attention to suppress that stimuli and focus on instruction.

Since the results from this study are not generalizable, additional research should investigate the findings in a larger, generalizable sample of agriscience students. Additionally, researchers should attempt to measure the long-term impact of time spent in restorative learning environments on directed attention. Although the greenhouse/shade house setting was investigated in this study because of their wide-spread usage (Franklin, 2008; Shoulders & Myers, 2012), teachers have a variety of laboratory areas available to them (Shoulders & Myers, 2012), many of which could be categorized as restorative learning environments. Future research should investigate these other laboratory environments to test for similar results.

Failure to reject the null hypothesis that no statistically significant difference existed between the content knowledge scores of students who received instruction in the treatment and comparison environments meant that this study did not find evidence to support the research hypothesis for this objective. The researcher hypothesized that students instructed in the natural agricultural laboratory, the restorative environment, would have higher content knowledge scores, thus indicating improved academic achievement from the restorative impacts of the natural environment outlined by the Attention Restoration Theory (Kaplan & Kaplan, 1989).

While attempts were made to overcome the limitations of the counterbalance design by ensuring the equivalence of learning material for each lesson (Ary et al., 2010), students noted differences in the material to instructors. The significant main effect for day in the general linear model points to issues with the equivalency of the material. Prior experience with the content, the students' perceived differences of challenge in the content, and different learning activities in the lessons, may have impacted the content knowledge scores. Future studies should increase the equivalence of their replications by assessing prior knowledge of the content, assessing difficulty of standards with students from a comparative group, and selecting lesson materials that can be taught using the same instructional practices. Additionally, the use of established reliable and valid measures of content knowledge should be used over research designed measures. Finally,

one of the teachers had forgotten to give the content knowledge assessment the day following the second day of instruction. Although the teacher did attempt to give the assessment later, a lot of missing data existed for this variable which could have biased the results of this test.

Previous research on laboratory instruction in agriscience noted increased content knowledge when laboratory instruction was utilized (Myers & Dyer, 2006; Rotherberger & Stewart, 1995). In addition to the issues with equivalency, the limited time for instruction and in the laboratory setting may have influenced this finding. The previous studies investigated laboratory instruction and content knowledge scores over a longer duration. The impact of restorative environments on content knowledge should be investigated over a longer duration. Additionally, the prolonged effects of increased attention on content knowledge should be explored. While the findings of this study do not support this previous literature, it is important to note that even though an increase in content knowledge was not identified, neither was a decrease in content knowledge scores. This finding has implications for practitioners because they do not have to worry about sacrificing content knowledge in order to teach in these natural agricultural laboratory settings.

Although this study was not generalizable, results from this study show the possibility of increasing student directed attention capacity without sacrificing content knowledge. Recommendations are provided for practitioners to capitalize on these findings while additional research is being investigated. Agriscience teachers have reported frequent use of their greenhouse laboratories (Shoulders & Myers, 2012). Based upon the findings of this study, which showed that a large percentage of students either increased or maintained their directed attention ability when instructed in the greenhouse setting while an even larger percentage of the same students showed a decrease in their directed attention capacity in the agriscience classroom, agriscience teachers should continue to utilize these natural agricultural laboratories with frequency. Additionally, many agriscience teachers have access to variety of natural agricultural laboratory settings (Shoulders & Myers, 2012). To allow students to restore their directed attention, Agriscience teachers should purposefully plan to utilize these facilities, despite the additional preparation some of them require. Teachers should explore new and different ways to utilize these natural laboratory settings in order to increase their use the opportunities for students to benefit from the increased directed attention capacity.

This exploratory study on the influence of natural agricultural laboratory settings on student attention capacity has uncovered some interesting findings. Continuation of this line of inquiry is recommended to further investigate the role of restorative learning environments in the agriscience classroom. As research on restorative learning environments in agriscience develops, the following recommendation should be considered. Additional research should investigate these findings in a larger, generalizable sample of agriscience students. In addition to looking at the short-term impacts to directed attention and stress, researchers should attempt to measure the long-term impact of time spent in restorative learning environments. Future research should investigate other agricultural laboratory environments to test for similar results. Research should investigate the perceived restorativeness of different learning environments with different populations of students. The influence of each characteristics of a restorative environment should be investigated in the educational setting. Perceived restorativeness of the learning environment should be investigated for mediating effects on stress and attention levels of students. As findings on the impact of restorative learning environments are confirmed, experimental trials should be completed to offer prescriptive recommendations.

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Examining Differences in Noncognitive Skills for State-Level Career Development and Leadership Development Event Participants

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Abstract

Educators are increasingly pressured to include experiences for students which will help develop noncognitive abilities. Noncognitive skills lie outside of the physiological ability to process information. Grit, optimism, and self-efficacy are three noncognitive traits which overlap substantially with the three-component model for agricultural education. In agricultural education, Career and Leadership Development Events (CDE/LDE) allow students to work persistently toward a task and develop expectations for ability to perform and outcomes of the competitive event. This study was designed to describe the grit, optimism, and self-efficacy of CDE & LDE competitors in Idaho and determine if differences exist between students who performed at the gold-rank level, and those who did not receive a gold ranking in their respective events. This study was a census of all students (N = 413*) who competed at a CDE or LDE at the 2018 Idaho Leadership Development Conference. Results of independent samples t tests revealed differences between the grit and self-efficacy scores of participants based on ranking. The conclusions drawn from this study allow us to recommend areas for continued examination related to noncognitive traits in agricultural education, and practical solutions for agricultural educators to enhance noncognitive traits in their classrooms.*

Introduction/Review of Literature

The focus of education has changed from simply teaching content-level information for cognitive development of students to proportionate development of both cognitive and noncognitive abilities (Bazelais, Lemay, & Doleck, 2016; McGeown, St. Clair-Thompson, & Clough, 2016; Morrison-Gutman, & Schoon, 2013). According to Sousa (2011), cognitive traits are those involved in bringing in and processing information, but they are not inclusive in their ability to predict academic success. The term noncognitive emerged in education in the last decade as a descriptor for factors outside of those dealing with a mental capacity for processing information (Brunello & Schlotter, 2011). Researchers entering the noncognitive investigation have examined many noncognitive related concepts. Some of the associated research terms include soft skills, 21st century skills, employability skills, big-five personality factors, growth mindset, meta-cognitive skills, and social-emotional skills (Almeida, 2016; Brunello & Schlotter, 2011; Camfield, 2015).

Regardless of the term used, there is no doubt among educational researchers that noncognitive factors play a role in student academic success (Aspinwall & Taylor, 1992: Duckworth & Yeager, 2015; Farrington, et al., 2012; Khine & Areepattamannil, 2016; Rosen, Glennie, Dalton, Lennon, & Bozick, 2010). Researchers have connected heightened noncognitive performance with increased GPA and standardized test scores (MacCann, Duckworth, & Roberts, 2009; Petway, Brenneman, & Kyllonen, 2016). Noncognitive skills were predictive of reading, science and math achievement scores, and could even mitigate differences between demographic categories, school attendance, and home environment (Rosen, et al.,

2010). A comprehensive meta-analysis of hundreds of noncognitive studies allowed Rosen et al. (2010) to highlight the influence of noncognitive skills on graduation rates, honor roll status, science fair achievements, reading comprehension, math fluency, and AP course enrollment. Students who successfully develop noncognitive traits in their education are more prepared to be successful intellectually, socially and economically in society (Brunello & Schlotter, 2011). In a 2006 study, Heckman, Stixrud, and Urzua (2006) examined the longitudinal impacts of noncognitive abilities on overall life decision factors. Results indicated positive associations between higher noncognitive scores and successful employment, job satisfaction, and lifetime earnings, and a negative association with diagnosed health issues. In many cases, noncognitive factors were more predictive than cognitive ability for overall quality of life (Heckman et al., 2006).

The volumes of evidence to support the integration of noncognitive education in public schools has fundamentally shifted the way teachers are expected to interact with their students (Camfield, 2015; Farrington, et al., 2012: Rosen, et al., 2010). The focus in the late 1990s on developing noncognitive skills in the educational arena led into the 21st century skills movement with school programs designed to help K-12 students develop positive noncognitive skills (Rosen, et al., 2010). The continuation of noncognitive educational initiatives is currently expressed through nationwide efforts to help students develop a growth mindset, and continued efforts to bring noncognitive skills into the mainstream classroom (Camfield, 2015; Petway, et al., 2016).

Farrington et al. (2012) described five classes of skills and attributes related to success and noncognitive performance. These traits include academic mindsets, perseverance, behaviors, learning strategies, and social skills. Concepts related to the five categories can be found in almost all noncognitive education literature (Khine & Areepattamannil, 2016; Rosen, et al., 2010). Mindsets are overarching beliefs with the potential to influence outlooks on education, study behaviors, and personal success (Farrington, et al., 2012). Two prime examples of academic mindsets are optimism and self-efficacy (Farrington, et al., 2012), while perseverance in academic settings relates to student motivation to persist in a task despite obstacles or challenges (Farrington, et al., 2012).

Optimism is a mindset with the potential to influence academic performance and is defined as the positive outlook towards future (Scheier & Carver, 1985). As a personal disposition, optimism refers to belief that one will generally experience positive outcome in life (Scheier & Carver, 1985). Optimism has been studied extensively in the field of education and noted as an overarching theme to guide student perceptions of all educational activities including assignments, grades, outcomes, and can have a large influence in the amount of time and effort students are willing to put into completing their school work (Beard, Hoy, & Hoy, 2010). In adolescents, researchers share demographic differences between genders, with females having higher optimism scores than males (Tetzner & Becker, 2019).

Self-efficacy is another academic mindset with influences on academic performance. Bandura (1982) defined self-efficacy as the innate ability to achieve goals, and the related personal assessment of the skills required to achieve goals. Pajares (2009) examined self-efficacy in the academic arena, noting self-efficacy as a concept with overwhelming potential to influence

academic success. Differences in self-efficacy have been reported between genders for adolescent populations, with the gender more stereotypically successful by societal norms having the advantage in most situations (Hampton & Mason, 2003; Zimmermen, 2000).

Researchers support the use of grit as a tool to measure academic perseverance (Farrington, et al., 2012). Grit has been defined as "perseverance and passion of an individual to achieve a goal" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087). In recent years, grit studies allowed researchers to highlight the importance of grit as an important noncognitive skill related to academic success (Crede, Tynan, & Harms, 2017). Angela Duckworth conceptualized grit as a concept which could explain success in the face of challenges noting that grit may be more predictive of success than cognitive ability (Duckworth & Quinn, 2009; Duckworth & Robertson-Kraft, 2014). Although there is evidence that grit increases as respondents age, gender differences are not common in either adolescent or adult populations (Duckworth & Quinn, 2009).

The literature related to developing noncognitive skills including grit, optimism, and self-efficacy in adolescents (Bandura, 1982: Duckworth & Yeager, 2015; Scheier & Carver, 1985) bares strong similarity to the literature related to perceived benefits of student growth within school-based agricultural education (SBAE) (Croom, 2008). To grow positive noncognitive skills, researchers suggest allowing students to encounter practical problems, develop situational solutions, engage regularly with the guidance of a caring mentor, and experience authentic assessments of work (Farrington, et al., 2012; Khine & Areepattamannil, 2016). In addition, researchers note that in order to facilitate noncognitive growth, students should be presented with authentic opportunities to overcome failure and work toward prolonged goals (Khine & Areepattamannil, 2016).

The overlap in agricultural education program components and potential implications for noncognitive growth are profound. Leadership or Career Development Events (LDEs/CDEs) in agricultural education are activities which can be interwoven into class time and allow students to work over time toward individual or team success in events designed to assess content or leadership knowledge and tangible skills (Croom, 2008). Students and teachers can spend a great deal of time in and out of the classroom preparing for CDEs, and increased time practicing relates to higher levels of team and individual performance (Ball, Bowling, & Bird, 2016; Rayfield, Fraze, Brashears, and Lawver, 2009). CDEs and LDEs, when incorporated into a total agricultural education programs provide opportunities for students to work with a caring mentor, fail positively with opportunities for additional learning, and work persistently toward a task (Croom, 2008).

Although there may be numerous opportunities for students to enhance their noncognitive skills in an agricultural education program, little is known about the overlap between noncognitive factors and SBAE. Examining the role of noncognitive skills in CDE/LDE participants, who through their preparation have experienced components related to developing noncognitive skills, could provide a starting point to begin the discussion about opportunities that exist for development of noncognitive skills within SBAE.

Theoretical/Conceptual Framework

The theoretical base for this study stems from existing models of school success and academic achievement. Carroll (1963) proposed that academic success can be achieved based on both school and student learning factors. According to Carroll (1963), student natural ability to learn (aptitude) is filtered through the student factors of ability to understand instruction and perseverance and school factors including opportunity to learn and quality of instruction to determine the output of academic achievement. Benjamin Bloom's work in taxonomy of learning led him to publish a subsequent model for school learning in 1976. The model included student characteristics of cognitive behaviors and affective behaviors as student input factors and quality of instruction as the school input factor to yield student level of achievement, rate of learning, and affective outcomes.

The conceptual framework for this study draws from Bloom (1976) to describe student factors for learning including cognitive ability, reclassifying Bloom's "affective behaviors" as noncognitive factors based on the recommendation of Farrington, et al. (2012). In addition to student factors, school factors including opportunity to learn and quality of instructional events is included. Academic performance is noted as the outcome of the interaction between student learning factors and school learning factors (Figure 1).

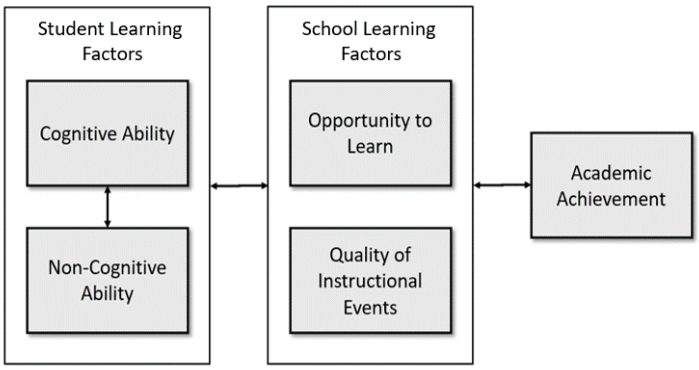

Figure 1. Conceptual model of cognitive and noncognitive factors affecting learning. Adapted from Bloom (1976)

Purpose & Objectives

Building upon the framework for this study provided a unique opportunity to examine the role of noncognitive factors in student performance within school-based agricultural education (SBAE). The purpose of this exploratory study was to examine the noncognitive traits of state-level CDE and LDE participants and to examine associations between noncognitive factors and performance. To meet this purpose, we were guided by the following research objectives:

1. Describe the noncognitive skills of Idaho CDE and LDE participants (self-efficacy, grit, optimism)
2. Describe noncognitive skills between demographic categories (gender, grade, CDE/LDE)
3. Examine differences in noncognitive skills (self-efficacy, grit, optimism) between participants receiving higher (gold) ratings in their respective event and those not receiving gold ratings.

Methods

This portion of a larger study was conducted through descriptive survey methods to gather self-reported noncognitive scores, along with use of performance data collected from the Idaho FFA. The population for this study was a census of students (N = 413) who participated in LDE or CDEs at the Idaho FFA State Leadership Conference in April 2018. University of Idaho IRB approval was obtained prior to this study, and students were required to provide parental consent, which was collected in conjunction with student registration for the event. All event participants (N = 413) completed the parental consent process. The on-site orientation for each event included a University of Idaho research team member who provided information about the study, collected student assent forms, and administered the survey instrument. Following registration and orientation, 92.9% of participants (n = 382) completed consent, assent, and survey instruments and were included in the analysis. A limitation of this study is the use of a specialized population. We caution against the generalization of the findings from this study to other populations, as this census is not representative of all SBAE students.

Instrumentation

Participants in this portion of a larger study completed a paper survey instrument prior to competing. The survey included four sections. Section one allowed participants to provide demographic information including name, gender, age, year at school and FFA chapter. Section two was the short form of Duckworth's (2015) grit scale which included 10 Likert-type response items, on a scale from 1-5, where 5 was the highest level of agreement. The third section related to optimism was a modified version of the 10-item life orientation test (LOT-R) Scheier, Carver, and Bridges (1994) designed the LOT-R to allow respondents to rate levels of agreement with statements on a scale from 1-5. We followed the recommendation of Bandura (1986) in fourth section to measure self-efficacy. Bandura (1986) posited that self-efficacy is situational, and recommended self-reported self-efficacy instruments be both situational and inclusive of a tangible outcome. The self-efficacy section of the instrument allowed participants to rate how confident they were situationally related to the outcome of their event and rate their efficacy on a scale from 1-10, with ten being completely confident they would perform better than other competitors.

The instrument was examined by three faculty members in agricultural education to determine readability and content validity. The instrument was also piloted to a group of undergraduate students n = 12 enrolled in a research methods course. Students provided feedback related to formatting and semantics. A post hoc analysis of reliability for this population yielded $\alpha = 0.72$ for grit and $\alpha = 0.87$ for optimism.

Data Collection

Data were collected at the event orientation for each of the CDE and LDE events for the pre-event survey. Participants were incentivized with candy for those who completed consent, assent, and survey instruments.

There are ten state-level events held at the Idaho FFA Leadership Conference. These events include both Career Development Events and Leadership Development Events. Some of the events require qualification at the district/area level, while others are open to one team per FFA chapter. A description of the student events included in this study along with participant numbers is included in Table 1.

Table 1

Descriptions for 2018 Idaho CDE/LDE Events (n=382)

Event	*n*	Event Type	Eligibility
Agricultural Issues Forum	45	CDE	One team per chapter
Agricultural Sales & Service	38	CDE	District winning team advances (4)
Creed Speaking	10	LDE	District winner advances (1)
Employment Skills	10	LDE	District winner advances (1)
Extemporaneous Public Speaking	10	LDE	District winner advances (1)
Farm Business Management	40	CDE	District winning team advances (4)
Floriculture	107	CDE	One team per chapter
Nursery/Landscape	53	CDE	One team per chapter
Parliamentary Procedure	60	LDE	District winning team advances (6)
Prepared Public Speaking	10	LDE	District winner advances (1)

Gold-ranked individuals include the top three scoring individuals for individual events and the members of the top three placing teams for team events. Gold rankings also extend to any participants placing in the top five individuals in team events regardless of their team's ranking. Within the population were $n = 11$ participants who competed in more than one event. These students were identified prior to data collection and asked to complete the entire survey instrument at their first orientation, and only the self-efficacy section at a second orientation. Students were duplicated in data analysis for grit and optimism, and had event specific self-efficacy scores recorded. Analysis revealed inclusion or exclusion of the $n = 11$ duplicate cases had negligible impact on results for all analyses, and duplicate cases were included.

Data Analysis

Responses were manually entered in an MS Excel workbook. At random, 10% of instruments were selected and used to validate data entry. Descriptive results were calculated using IBM SPSS v 23 to describe the frequencies and percentages for demographic information and the mean and standard deviation for grit, optimism, and self-efficacy scores. To compare differences between gender, event type, and event ranking, Pearson Chi Square was calculated for each combination of variables. Data were analyzed using independent samples *t* test to determine if differences existed between performance level based on grit, optimism and self-efficacy scores. An independent samples *t* test is the appropriate tool to use when examining differences between dichotomous categorical or ordinal dependent variables and a continuous independent variable (Lakens, 2013). The level of significance for *t* tests was determined *a priori* at $p \leq 0.05$.

Subject Characteristics

The ages of participants were *M* = 16.38 (*SD* = 1.17) with an age range of 13 to 18 years old. Upon further analysis, 91.9% (*n* =332) of participants were between 15 to 18 years old. The bulk of participants were juniors (*n* =128, 33.5%) or seniors (*n* =111, 29.1%). Only two participants were noted at the junior high level. The descriptive analysis of gender yielded 32.4 % (*n* =117) male and 66.8% (*n* =241) female respondents, and *n* =3 respondents preferred to not answer the question regarding gender classification. With regard to event participation and accomplishment, *n* = 130 participants received gold rankings, while *n* = 253 participants failed to reach the gold level ranking in their respective event. Subject characteristics are included in Table 2.

Table 2

Subject Characteristics for Idaho CDE/LDE Participants (n=382)

Characteristic	*f*	%	Min	Max	*M*	*SD*
Age			13	18	16.38	1.17
Grade						
7th	1	0.3				
8th	1	0.3				
9th	55	14.4				
10th	86	22.5				
11th	128	33.5				
12th	111	29.1				
Gender						
Male	117	32.4				
Female	241	66.8				
Prefer not to say	3	0.8				
Event Type						
CDE	238	62.3				
LDE	144	37.7				
Event Ranking						
Gold	130	34.0				
Non-Gold	252	66.0				

Note. Due to rounding, not all percentages add to 100%

Results

Our first objective was to describe the noncognitive scores of students participating in 2018 Idaho FFA CDE and LDE participants. Participant grit scores ranged from 1.8 to 4.9 on a five-point scale, with a mean of *M* = 3.66 (*SD* = 0.51). Optimism scores for participants ranged from 0.0 to 5.0 with a mean of *M* = 3.44 (*SD* = 0.71). Self-efficacy scores ranged from 1 to 10 with a scores of *M* = 6.18 (*SD* = 1.51) on a ten-point scale. Noncognitive scores for participants are shown in Table 3.

Table 3

Noncognitive Scores for 2018 Idaho CDE/LDE Competitors (n =382)

Noncognitive Category	Min	Max	*M*	*SD*
Grit	1.8	4.9	3.66	0.51
Optimism	0.0	5.0	3.44	0.71
Self- Efficacy	1.0	10.0	6.18	1.51

Note. Grit and optimism scores reported on a 1 – 5 scale, self-efficacy on a 1 – 10 scale

Descriptive results of noncognitive skills related to demographic and event were examined prior to exploring differences between scores related to performance rank. An examination of demographic and event factors related to noncognitive skills is shown in Table 4.

Table 4

Noncognitive Scores for 2018 Idaho CDE/LDE Competitors Based on Event and Demographic Characteristics (n =385)

	Grit		Optimism		Self-Efficacy	
Characteristics	*M*	*SD*	*M*	*SD*	*M*	*SD*
Gender						
Male	3.62	0.46	3.36	0.67	6.43	2.53
Female	3.69	0.53	3.49	0.70	6.05	2.49
Prefer not to say	3.59	0.47	3.14	0.70	7.00	2.70
Grade						
9th	3.60	0.58	3.42	0.72	5.78	2.67
10th	3.58	0.51	3.46	0.61	6.05	2.64
11th	3.69	0.51	3.50	0.63	6.37	2.41
12th	3.73	0.47	3.42	0.70	6.26	2.44
Event Type						
CDE	3.66	0.46	3.38	0.65	5.46	2.42
LDE	3.69	0.58	3.56	0.70	7.36	2.51
Event						
Agricultural Issues Forum	3.71	0.50	3.44	0.57	7.10	2.04
Agricultural Sales & Service	3.88	0.54	3.48	0.85	7.15	2.52
Creed Speaking	4.00	0.49	3.90	0.49	8.40	1.54
Employment Skills	4.43	0.25	3.92	0.82	8.50	0.91
Extemporaneous Public Speaking	3.90	0.58	3.25	0.89	7.45	2.19
Farm Business Management	3.61	0.37	3.25	0.59	4.51	2.13
Floriculture	3.62	0.48	3.40	0.58	5.10	2.36
Nursery/Landscape	3.62	0.40	3.41	0.69	5.87	2.13
Parliamentary Procedure	3.51	0.58	3.42	0.69	7.12	2.44
Prepared Public Speaking	3.48	0.59	4.13	0.51	7.63	2.14

Note. Grit and optimism scores reported on a 1 – 5 scale, self-efficacy reported on a 1 – 10 scale. Single respondents for both 7th and 8th grade were not included in reporting.

Differences in noncognitive scores were examined for gender and event type using independent samples *t* tests. No differences existed in this population based on male or female

grouping for grit ($t(379) = -1.11$, $p = 0.26$), optimism ($t(379) = -1.73$, $p = 0.24$), or self-efficacy ($t(379) = 1.39$, $p = 0.16$). An examination of event type (CDE or LDE classification) revealed no differences between CDE or LDE event participants for grit ($t(381) = -0.54$, $p = 0.59$) or optimism ($t(381) = -1.15$, $p = 0.16$). Differences were observed between CDE and LDE participants for self-efficacy scores ($t(381) = -7.55$, $p = 0.01$), with LDE participants reporting higher self-efficacy than CDE participants.

Differences between gender and performance type were examined using a Pearson Chi-square analysis was conducted. The low number of respondents ($n = 3$) reporting "prefer not to answer" related to gender resulted in their exclusion from difference testing with regard to gender. Results indicated no difference between male and female participants with regard to performance rank ($\chi^2(1, N = 379) = 0.02$, $p = 0.88$) Differences were also examined between event type (CDE or LDE) and performance, no differences were observed ($\chi^2(1, N = 382) = 2.87$, $p = 0.09$).

To examine differences between gold-ranked and non gold-ranked participants based on noncognitive scores, we first examined the means for both groups relative to each of the noncognitive factors of interest. Descriptive results of noncognitive scores based on performance factor are included in Table 5.

Table 5

Noncognitive Scores for 2018 Idaho CDE/LDE Competitors Based on Event and Demographic Characteristics (n =382)

		Grit		Optimism		Self-Efficacy	
Ranking Level	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Gold-Ranked	130	3.74	0.51	3.51	0.68	7.54	1.95
Non Gold-Ranked	252	3.62	0.51	3.40	0.67	5.48	2.01

Note. Grit and optimism scores reported on a 1 – 5 scale, self-efficacy reported on a 1 – 10 scale

To determine if differences in noncognitive skills were observed between gold and non-gold ranked participants, a *t* test was conducted to compare gold and non-gold groups for each of the noncognitive factors. Results of the *t* test revealed differences in performance rank for both grit and self-efficacy while revealing no differences between performance ranks based on optimism score. Participants who received a gold rank had higher grit scores than those not receiving a gold ranking ($t(381) = 2.11$, $p = 0.03$). Gold-ranked students also exhibited higher self-efficacy scores than non-gold ranked students ($t(381) = 8.22$, $p = 0.01$). The calculated effect sizes using Cohen's *d* were small for grit and medium for self-efficacy (Lakens, 2013).

Table 6

t Test for Noncognitive Factors and Event Ranking

Independent Variable	*t*	*df*	Sig.	Mean difference	*SE* difference	*Cohen's d*
Grit	2.11	381	0.03	0.12	0.05	0.24

Optimism	1.63	381	0.10	0.13	0.08	0.11
Self-Efficacy	8.22	381	0.01	2.07	0.25	0.54

Note. Grit and optimism scores reported on a 1 – 5 scale, self-efficacy reported on a 1 – 10 scale

Conclusions & Discussion

This study provided a snapshot view of noncognitive skills in secondary agricultural education students who participated in state-level LDEs/ CDEs. Results allow us to establish baseline data for noncognitive skills in state-level participants, examine differences in noncognitive traits based on demographic factors, and discuss differences in noncognitive skills between levels of CDE and LDE performance. Based on these conclusions, we can also make recommendations for the integration of noncognitive skill development within agricultural education programs and suggest areas for continued examination of the role of noncognitive factors within SBAE.

Descriptive data analysis in the population for noncognitive skills revealed grit mean at $M = 3.66$ ($SD = 0.51$). According to Duckworth et al. (2007), the average normative grit scores for adolescents is 3.4 on a scale from 1 to 5 (Duckworth, et al., 2007). The participants in this study had self-reported scores above the adolescent average. Students participating in CDEs and LDEs, especially those which require qualification at the district/area level have likely encountered obstacles on their preparatory path (Rayfield, et al., 2009). According to Duckworth and Yeager (2015), adolescents with increased grit are more likely to seek opportunities for challenging their knowledge and skills. In agricultural education, CDE and LDE experiences may therefore attract students who already have the ability to overcome challenges. In this population no differences were found between grit scores for males and females, which aligns with the conclusions of Duckworth and Quinn (2009). Students who received gold-rankings had higher levels of grit than those with lower rankings. While we are cognizant of the low effect size and cautious in our interpretation of these differences, this conclusion allows us to suggest continued examination of grit and the development of grit in agricultural education programs. Many of the activities related with preparing for CDE and LDE events align with recommendations for building grit and academic perseverance in adolescents (Farrington, et al., 2012; Khine & Areepattamannil, 2016; Lambert, Ball, & Tummons, 2011; Rayfield, et al., 2009).

Respondent optimism scores were $M = 3.44$ ($SD = 0.71$). Across competitive events, previously reported optimism on the LOT-R for adolescents is 3.7 on a five-point scale. Rosen et al. (2010) noted the importance of optimism as a noncognitive factor, but caution that optimism is often tempered in higher stakes environments, and may decrease in adolescents when situations increase in pressure or prestige. A possible that student pressure for state-level events influenced the outcomes expected by participants. Optimism scores were not different between males and females or event type. Scheier and Carver (1994) suggest stable situational optimism across event participants could be indicative of students relying on self-efficacy rather than optimism to set outcome expectations.

Self-efficacy in this population was $M = 6.18$, $SD = 1.51$, with a wide range of scores between different events, which is to be expected for students who have prepared for a state-level competition (Rosen, et al., 2010). In analyzing optimism and self-efficacy for this study, it is interesting to note that Duckworth, et al. (2007) suggested experiences in which adolescents have strong beliefs in their own ability (self-efficacy) but do not expect overly high outcomes (optimism) are particularly effective in helping students develop grit. In these cases, if the outcome is positive, students may increase their overall perception of self and be motivated to pursue more challenging activities in the future; if they fail, adolescents have the opportunity to build grit through a reflection on their abilities and performance and the development of a plan for improvement and overcoming the failure (Duckworth, et al., 2007).

Differences were observed between self-efficacy scores for students competing in CDEs and those competing in LDEs. The nature of events at the Idaho FFA Leadership conference provides some insight into this finding. All LDE participants qualified to compete at the state-level event, while most CDE participants could enter at-large. Prior success is a key factor in building adolescent self-efficacy (Rosen, et al., 2010), which could account for increased LDE participant self-efficacy. Gold-ranked students had higher self-efficacy than their non-gold ranked competitors, which substantiates previous research indicating a strong relationship between increased self-efficacy and increased performance (Rosen, et al., 2010). No differences were observed between male and female participants for self-efficacy. Rosen, et al. (2010) cited gender equality in self-efficacy as a factor to determine if gender stereotypes exist related to the examined event. It is therefore promising that neither male nor females emerged as more efficacious with regard to this investigation.

Overall, participants in this study demonstrated their competency related to solving practical problems with tangible solutions through the CDE and LDE process. By treating CDE and LDE performance as an assessment of student success, we determined that differences did exist between student performance categories based on noncognitive factors, substantiating much of the previous literature related to noncognitive skills in adolescents. With this study coming to an end, we have evidentiary support for continued examination of the role of noncognitive factors in the total agricultural education program.

Recommendations

This exploratory examination of noncognitive skills in agricultural education allow us to make several practical recommendations for agricultural educators interested in heightening the noncognitive skills of students in their programs, along with promising directions for continued examination of noncognitive factors in SBAE.

We have several recommendations for developing noncognitive factors through SBAE. The design of the three-component model for agricultural education allows for a natural expansion of classroom content into individualized exploration through Supervised Agricultural Experiences (SAEs) and into authentic, real-world assessments of skills through CDE and LDE events (Croom, 2008). We recommend a holistic approach to integrating noncognitive skills into SBAE. Much of the noncognitive development potential in agricultural education occurs in the places where the three-components of an agricultural education program interact.

Classroom instruction may include the opportunity for students to encounter practical problems, the opportunity for true extension into noncognitive skill development occurs when students participate in a CDE or LDE as the assessment for the content learned in class. Reports of time spent by agricultural educators indicate much of CDE and LDE preparation happens outside of regular class time (Lambert, et al., 2011; Rayfield, et al., 2009). Jones and Edwards (2019) suggested revisiting the purpose of competition in agricultural education, we agree. When only a handful of students are provided the opportunity to prepare for CDE and LDE events, the bulk of students are robbed of the critical noncognitive development that could stem from purposeful use of these educational tools. We recommend teacher educators highlight the importance of CDE and LDE participation as educational tools to help increase not only content knowledge, but also noncognitive skills.

Another component of facilitating noncognitive growth is the opportunity to overcome failure and work toward prolonged goals (Khine & Areepattamannil, 2016). We recommend allowing students opportunities to experience CDE and LDE components in the classroom while working toward a local, district/area, or state-level competition. Competitive events can provide tangible situations for students to anticipate outcomes and weigh skills (Khine & Areepattamannil, 2016). Our recommendation is to expose as many students as possible to assessment of skills within a CDE/LDE environment. Agricultural educators could set up and allow students to participate in invitational events if district or area events limit the number of participants, or create chapter events which are held within class time, using the same evaluation procedures or outside evaluators to increase the authenticity of assessment and likelihood of increasing noncognitive skills (Farrington, et al., 2012; Khine & Areepattamannil, 2016).

Our recommendations for future research include a continued examination of noncognitive factors within a total agricultural education program. General data related to noncognitive factors of secondary agricultural education students is not prevalent in the literature base. We recommend replicating the study with broader agricultural education populations, to determine baseline scores for noncognitive skills. We also recommend tracking noncognitive skills of SBAE students longitudinally to observe if changes exist in students from time of entry to leaving the program. Another recommendation is comparing noncognitive factors between post-secondary students based on past SBAE enrollment and participation levels to determine if differences exist between those with strong participation in SBAE and those with little or no SBAE background. There are numerous other noncognitive skills which warrant investigation through an agricultural education lens. We recommend identifying noncognitive factors which align to the AAAE national research agenda, and pursuit of studies to examine noncognitive factors as predictor variables for student academic performance, participation in programs, and leadership within agricultural education.

There is more to a student than their cognitive ability, and there is more to agricultural education than a classroom. This study allowed us to scratch the surface relative to examining noncognitive factors in agricultural education, and yielded promising results. By purposefully integrating noncognitive skills in the existing agricultural education model, we may have the potential to not only enhance student performance in school, but also in our communities and our world.

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Describing the Inclusiveness of Students with Disabilities in Iowa School-based Agricultural Education Programs

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Abstract

Through the conceptual lens of federal legislation / codified regulations (e.g., IDEA, 2004; NCLB, 2002) and civil rights statutes (e.g., Rehabilitation Act of 1973, § 504), this study explored the experiences that school-based agricultural education (SBAE) teachers associated with providing special education and related services for students with disabilities in all aspects of SBAE programs (i.e., classroom instruction, FFA membership, and Supervised Agricultural Experience [SAE] programs). Nine SBAE teachers from various career phases participated in semi-structured interviews with open-ended questions. Three main themes emerged from the interviews: communication, inclusiveness for a complete program, and transfer of responsibility for provided services. Future research should take a deeper look into the issue of providing free and appropriate public education (FAPE) for students with disabilities in SBAE programs. These studies should seek to determine special education teachers' and administrators' perceptions and experiences with students with disabilities placed in SBAE settings.

Introduction / Conceptual Framework

Special education and the inclusion of students with disabilities are not new subjects in today's education system. Since 1975, the mainstreaming of students with disabilities has specified students should be educated in the least restrictive setting (Treder, Morse, & Ferron, 2000). Students with disabilities have individual characteristics, which present challenges during learning. These challenges vary but may include the lack of attention span needed for secondary education courses (Aschenbrener, Garton, & Ross, 2010). The modifications and accommodations are different for each student, necessitating adaptations (Mastropieri & Scruggs, 1995). Modification is defined as changing what is taught to a student or what you might expect a student to learn. Through accommodations, students are still learning the same material as their classmates, just in a different way. Shortening exam questions, for example, is one way to accommodate students. Federal laws (e.g., Individuals with Disabilities Education Act, 2004) and civil rights statutes (Section 504 of the Rehabilitation Act, 1973) mandate the inclusion of students with disabilities in learning environments with their peers who do not have disabilities. Specifically, Individuals with Disabilities Act (IDEA) states, "each public agency must ensure that to the maximum extent appropriate, children with disabilities…are educated with children who are nondisabled" (34 C.F.R. § 300.114). While Murdick, Gartin and Crabtree (2002) pointed out the least restricted environment (LRE) is predicated on the assumption that "the preferred placement for students with disabilities is the regular classroom" (p. 24), certain district court cases (e.g., Daniel R. R. v. State Board of Education, 1989; *MR v. Lincolnwood Board of Education*, 1994) have ruled the general education environment is not appropriate in some instances (Boyle & Weishaar, 2001; Murdick et al., 2002). Over the course of time and due to the vagueness of the LRE, the specific requirement varies according to the student's personal

needs, which has caused educators to struggle providing a free and appropriate public education (FAPE) in the LRE to students with disabilities (Rozalski, Stewart, & Miller, 2010).

With the current philosophical educational stance of inclusion and mainstreaming as well as the IDEA mandated LRE, students with disabilities are being included in more secondary education courses (Yell, 2012). However, research is limited in providing details for modification and accommodation needs for students with disabilities to be successful in secondary education classrooms. Special education services apply to core classes, as well as to Career and Technical Education (CTE; e.g., School-based Agricultural Educators). Casale - Giannola (2011) noted students with disabilities benefited from participation in CTE courses because they were provided with the opportunity to participate in hands-on, real-life application activities. In addition, she suggested CTE provides a strong backing of differentiated instruction. Regardless of a student's ability, differentiated instruction involves a multitude of choices in content, interest, and learning styles. However, Casale–Giannola (2011) also provided detail into areas of weakness for CTE educators. CTE educators lack understanding of special education laws. Some teachers do not understand IDEA. Further, the No Child Left Behind (NCLB, 2002) increases the number of students with disabilities in their classroom, as well as making them accountable for the inclusion of these students (Casale-Giannola, 2011). Cognitive development and reading comprehension can be areas of struggle for a student with a disability if the curriculum of pedagogy does not accommodate their cognitive skills (Casale-Giannola, 2011). Lastly, Casale-Giannola (2011) mentioned being everywhere at one time can be difficult for CTE teachers with several activities going on inside a classroom. Because of the opportunities differential learning presents, CTE teacher's cannot always provide adequate supervision.

Understanding the role, a CTE teacher plays in the development of a student with disabilities is vital. Wonacott (2001) believed CTE teachers must be aware of the rights students with disabilities have, in addition to being actively involved in meeting the needs of these students. Due to the nature of CTE classes it is extremely important CTE educators participate in conversations with administration and special education teams. Wonacott (2001) suggested many students with disabilities could benefit from the structure of a CTE program. Students with disabilities have been a focus point of research in SBAE for multiple years (Elbert & Bagget, 2003; Kessell, Wingebach, Burley, Lawver, Fraze, & Davis 2006a, 2006b). Current SBAE teachers are increasing their awareness of students with disabilities, as well as their desire to provide quality education for diverse learners (Hoerst & Whittington, 2009).

The workforce preparation and life-skill activities offered in CTE courses provides "a great deal of value for students with disabilities (Haber & Sutherland, 2008). These inquiry-based / problems-based learning activities allow for students to construct their own understanding of various concepts, which are reinforced by the reflection process. Experiential learning has been the foundation of SBAE since the beginning (Baker, Robinson & Kolb, 2012). According to Kolb (1984), experiential learning is defined as "the process whereby knowledge is created through the transformation of experience" (p. 38). For educators to build upon the learning experience, students should be engaged in the learning process. Learning is linked to a student's personal experiences and adaptations to the world (Baker et al., 2012). Kolb's (1984) experiential learning study suggested knowledge is the result of experiences that have been transformed.

Johnson, Wilson, Flowers, and Croom (2012) examined the perceptions of North Carolina's SBAE teachers regarding including students with disabilities in Supervised Agricultural Experience (SAE) and FFA. Of the 77 responses received, 97.1% agreed students with disabilities receive similar benefits from SAE; however, 58.6% agreed participating in an SAE is more difficult. Regarding FFA, results showed FFA activities were more limited for students with disabilities than other students (Johnson et al., 2012). Aschenbrener et al. (2010) sought to assess the perceptions of early career teachers' ability to teach students with disabilities. Results indicated administrative support contributed the most to success in working with students with disabilities, while in-service activities contributed the least. Previous research in agricultural education have indicated SBAE teachers need training associated with teaching students with disabilities (Duncan, Ricketts, Peake, & Uesseler, 2006; Garton & Chung, 1997; Haynes & Stripling, 2014; Joerger, 2002; Smalley, Hainline, & Sands, 2019; Sorensen, Lambert, & McKim, 2014). While these studies have signified the need for SBAE teacher training related to working with students with disabilities, it is important to take a more granular look at the issue and explore how teachers are integrating students with disabilities in each aspect of SBAE programs. The instructional components of SBAE programs encompass classroom / laboratory instruction, student participation in the National FFA Organization, and engagement with SAE programs (Phipps, Osborne, Dyer, & Ball, 2008; Talbert, Vaughn, Croom, & Lee, 2014). The National FFA Organization is a co-curricular student organization that provides leadership and career preparation opportunities for SBAE students; SAE programs are experiential learning component of SBAE programs (Phipps et al., 2008; Talbert et al., 2014). According to Talbert et al. (2014), SAE programs include the "application of concepts and principles learned in the classroom to planned, real-life settings under the supervision of the agriculture teacher" (p. 368). The inclusion of students with disabilities in each aspect of the triatic model of Agricultural Education expands well beyond adherence to an IEP in a classroom setting. The complexity of SBAE programs warrants the investigation of how SBAE teachers are providing appropriate support for students with disabilities in each aspect of Agricultural Education.

Federal legislation and regulations such as IDEA (2004) and NCLB (2002) served as a reauthorization of the Elementary and Secondary Education Act of 1965 and an addition to Improving America's Schools Act of 1994). Civil rights statutes (e.g., Rehabilitation Act of 1973, § 504) provided a federal-based foundation for FAPE in an LRE for all students with disabilities. Conceptually, these statutes, regulations, and legislation served as the framework for this study. Through these lenses, we were able to explore the experiences of SBAE teachers associated with the inclusion of students with disabilities in the various instructional components of SBAE programs.

Purpose and Objectives

The purpose of this study was to explore the SBAE teachers' experiences associated with the inclusiveness of students with disabilities in the various aspects of SBAE programs.

The following research questions guided our study.

1. How do SBAE teachers describe their experiences when working with students with disabilities in their SBAE programs (i.e., classroom instruction, FFA membership, SAE)?

2. What additional support do SBAE teachers provide for students with disabilities in all three components of the SBAE program (i.e., classroom instruction, FFA membership, and SAE)?
3. What support do SBAE teachers receive from members of the IEP team (e.g., parents / guardians, special education teachers, administrators, etc.) to effectively implement special education and related services?

Methods

After receiving Iowa State University Institutional Review Board approval for this study, a purposive sample of Iowa SBAE teachers was selected for this case study based on maximum variation sampling. According to Creswell (2013), the maximum variation approach "maximizes differences at the beginning of the study" and "increases the likelihood that the findings will reflect differences or different perspectives—an ideal in qualitative research" (Creswell, 2013, p. 156). To achieve maximum variation in the purposive sample of SBAE teachers, we selected teachers with different levels of teaching experience—a variable which has been indicated to have a positive relationship with student achievement (Hanushek & Rivkin, 2010). The stratification of teaching experience, as part of the participant selection criteria, was operationalized in Christensen's (1983) stages of teachers' careers. Specifically, researchers stratified teachers based on teaching experience into the following three groups: (1) early year teachers with between one and three years of experience, (2) middle year teachers with four to 20 years of experience, and (3) later year teachers with between 20 to 30 years of experience.

This case study included a total of nine SBAE teachers. Researchers assigned pseudonyms to each SBAE teacher to protect their identities. Five of the teachers were male and four were female. Based on the teaching career stages predicated by Christensen (1983), two teachers were considered to be early year teachers, five were middle year teachers, and two were later year teachers. The group of teachers had an average of 12.88 (SD = 14.48) years of teaching experience. ***Ms. Johnson*** and ***Ms. Tucker*** were early career teachers. Ms. Johnson had taught for two years and indicated she had worked with over 130 students with disabilities. Ms. Tucker had three years of teaching experience and noted less than 10% of her students had some sort of disability. ***Ms. Harris***, ***Mr. Cohen***, and ***Ms. Adams*** were middle year teachers who all had five years of teaching experience. In regard to the number of students they worked with who had a disability, Ms. Harris had worked with seven students; Mr. Cohen noted 15% of his students had a disability; and Ms. Adams said 40% of her students had a disability. ***Mr. Thomas***, a middle year teacher with six years of experience, reported having a total of four students with disabilities. Another middle year teacher, ***Mr. Williams***, had 15 years of teaching experience and indicated he had about 15 to 20 students this year with a disability. The final two teachers, ***Mr. Miller*** and ***Mr. Hamilton***, were later year teachers. Mr. Miller had a total of 35 years in education and reported having around 30 students with disabilities in his classes each year. Mr. Hamilton indicated in his 40 years of teaching experience he has had very few students in his SBAE program with disabilities.

Data Collection

Researchers derived the contact information (i.e., name, school, affiliation, and email addresses) of each teacher from the publicly available teacher directory on [Website]. We then

sent teachers a recruitment email, which included information about the study, instructions for participating in the study, and a copy of the interview protocol. Data collection involved semi-structured interviews with open-ended questions regarding students with disabilities and the support provided for inclusion in a traditional agricultural education classroom. The interview process was comprised of two interactions with each individual. The following six interviews along with probing questions guided the initial interviews (see Table 1).

Table 1
Interview Items Used During SBAE Teacher Interviews

Interview Items
1. Describe your past experience associated with working with students with disabilities.
2. Describe your SBAE program and how much instructional time is spent on each aspect of the three-circle model (i.e., classroom instruction, FFA, and SAE programs).
3. Describe how you incorporate students with disabilities into each component of the three-circle model.
4. Describe the support you are provided by school administration / special education department for students with disabilities.
5. Describe your role in the IEP process and the types of modifications and accommodations you have provided / provide for students with disabilities.
6. Describe previous situations / potential eventualities where a student with disabilities was not permitted to engage in an educational activity.

Researchers conducted a follow up interview two months after the initial interview. The purpose of the second interview was two-fold: first, this interaction allowed the SBAE teachers to further reflect on the previously mentioned items and provide additional information which was applicable to this study; moreover, the follow up interview provided a platform to conduct member checking procedures with the teachers. Researchers recorded interviews using a basic audio device that was later used to transcribe the data. We also took handwritten notes (i.e., descriptive and reflective) for each interview.

Data Analysis

After researchers transcribed the interviews, we analyzed the responses and notes using the constant comparative method. The open-coding coding process allowed us to organize the data into major categories of information (Creswell, 2014). We employed various qualitative strategies and procedures (e.g., peer review of data, clarifying researcher bias, member checking, and providing rich, thick descriptions) to ensure the trustworthiness of the data (Creswell, 2013; Lincoln & Guba, 1985). We independently reviewed the interview field notes and interview data to develop notes and code the data. Then, we then met as a research team to compare notes which were used to create common themes and identify noteworthy accounts.

We used member checking to ensure the credibility of the findings and interpretations. According to Creswell (2014), member checking can be used to determine the accuracy of findings by “taking the final report or specific descriptions or themes back to the participants and determining whether these participants feel that they are accurate” (p. 201). In the follow-up interview, we presented the preliminary analysis and theme descriptions to the participants. In

alignment with Creswell's (2013) recommendations for member checking procedures, we asked our participants to provide their views of the preliminary analysis and to indicate if there was any missing information or misinterpretations associated with the presented themes.

We used the method of bracketing to establish confirmability and bolster the trustworthiness of our study (Merriam, 2009). According to Creswell (2013), bracketing requires researchers to put aside their beliefs of the research topic to remove biases. As members of the research team who were actively involved in the coding process of the data, we have different and converging experiences associated with working with students with disabilities in a SBAE setting. We are all involved with post-secondary agricultural education teacher preparation in various capacities. Two of us currently serve as agricultural education teacher preparation faculty members who have worked with students with disabilities at the post-secondary level. We also both previously served as SBAE teachers where we worked with students with disabilities in secondary environments. One of us is a graduate student who previously engaged in a SBAE student teaching experience and had the opportunity to teach students with disabilities.

According to Lincoln and Guba (1985) reliability and validity are established through the methods ensuring credibility, transferability, dependability, and confirmability. Through triangulation efforts, credibility can be correlated to the level of confidence in the researcher. We utilized analyst triangulation to ensure findings were comprehensive and robust through field notes. To assure accuracy of notes from teachers and interviews they were cross referenced. To ascertain transferability, we purposively selected research participants to be sure that our study reflected diversity in the population. Wheeler (2015) stated that diversity is needed in order to make inferences about the group. Following Wheeler (2015), we established and maintained procedures and benchmarks to assure researchers achieved a high level of dependability.

Findings

The purpose of this study was to explore the SBAE teachers' experiences associated with the inclusiveness of students with disabilities in the various aspects of SBAE programs. Moreover, this study focused on determining the modifications and accommodations teachers provided for students with disabilities in their SBAE programs and the support provided from administration. It is important to note that during the interview's teachers used the terms accommodation and modification interchangeably. A total of three main themes emerged from the data: (1) need for communication, (2) inclusiveness for a complete program, and (3) transfer of responsibility for provided services. These themes are discussed in detail in this section.

Communication: When the SBAE teachers discussed their experiences working with students with disabilities, they commonly mentioned the importance of communication. They mentioned the importance of communication in regard to communicating with students, parents, special education staff members, and administration. Each teacher identified communication as a main priority for the success of students with disabilities. When discussing the importance of communication, Mr. Williams stated "A high school is like an airport, but without the planes. Everyone is going a million ways. And if we do not communicate, no one would ever reach the main goal." In addition, Mr. Williams emphasized the importance of communication with parents and guardians: "Communication is key. Get the family involved." He also perceived many of his students with disabilities to have parents who were "somewhat disengaged." Therefore, he felt if he worked closely with the students' parents, he could encourage the parents

to assist in motivate their children to be involved. Mr. Thomas agreed and reiterated the need of actively engaging parents by saying "we have dialogue in regard to the success of the students, being sure to set attainable goals together." Mr. Miller described parental involvement as a yes or no answer. He stated, "I have taught many other students with lesser levels of needed accommodations and they are like a traditional student, participating frequently, occasionally, or rarely. In the end, when parents are involved the participation level seems to increase." Mr. Miller also indicated he made a point to meet with parents to review IEP components / revisions, to ensure the success of their children.

In addition to the need for communication with parents, the SBAE teachers who were interviewed for this study noted communication with students is very important. Ms. Harris indicated her constant communication with her students allowed her to develop "modified expectations" for each student. Sharing Ms. Harris' sentiment, Mr. Miller indicated he holds one-on-one conversations at the beginning of the semester to map out the course goals of each student based on their ability level. Ms. Johnson perceived communication and overall care of students to be imperative when serving as a teacher. Ms. Johnson asked, "how are you a good teacher if you do not make modifications for the success of your students?"

To bolster his ability to effectively communicate with and accommodate students with disabilities, Mr. Hamilton created an online website. The site offers papers, activities, and games for additional support. He stated, "this webpage serves as an additional resource and form of communication for students. Using this interactive page, students are actively engaged not only with me as the instructor, but their classmates as well."

The SBAE teachers also mentioned the importance of communication with special education staff members and their administration. Some of the teachers described the IEP document as the first line of communication between them and their special education department. With an exception of Ms. Adams and Ms. Johnson, all other teachers received a copy of their students' IEPs by the end of the first week of classes. Ms. Harris explained she did not attend IEP Meetings and special education teachers did not come by to explain the IEPs, but she always knew she could ask, and they would help with whatever she needed. Congruent to Ms. Harris' comments, Mr. Cohen, Mr. Miller, and Mr. Thomas all noted their special education instructors served as a great resource. The teachers noted, specifically, that the special education instructors could be helpful to answer questions on providing appropriate instructional support for students with disabilities and understanding revisions posted on students' IEP forms. Mr. Thomas explained, "communication with my special education department is a two-way street." He perceived it to be his duty to continue the dialogue with his school staff who had expertise in special education. When explaining the importance of communicating with special education staff, Mr. Williams said "I am in constant communication with the IEP instructors to make sure the students with disabilities are successful. It is putting forth a dedicated effort and trying the best for those students. And they will be successful with their modifications."

Mr. Hamilton, Mr. Thomas, and Mr. Williams indicated they tried to attend all of their students' IEP meetings. They explained these meetings were valuable to understand the students' needs and build a bridge for communication with students, parents, administration, and special education staff members. Mr. Hamilton noted his special education department faculty members

are actively engaged in reviewing all of the materials he uses in class and his digital materials he provides in his online resource. Most of the teachers were satisfied with the support they received from the special education departments at their schools. However, aside from Mr. Williams, the other teachers were not sure if their district had a mandated deadline in which they were supposed to receive all IEP information for students in their classes.

Inclusiveness of complete program: When discussing the inclusion of students with disabilities in their SBAE programs, many of the SBAE teachers provided specific examples of modification and accommodations they made to provide enriching learning opportunities in all aspects of the SBAE program (i.e., classroom instruction, FFA, and SAE). Of the three parts of SBAE programs, teachers most commonly discussed the facilitation of students with disabilities in their classroom. Mr. Williams indicated he had a student with a visual impairment in his horticulture class. When they go out to the greenhouse, he provides the student with their own plant and tells them "do not be afraid to break this plant apart. Do whatever you need to do to be able to visualize the components I am talking about." Mr. Williams also acknowledged, however, that he had encountered various concerns when attempting to accommodate students with disabilities in a laboratory-based setting. For example, he had a blind student in a class where they were performing a dissection. He worked with a para-educator to have them make the incisions and let the student feel the parts once they were removed. He felt teachers needed to remember that "learning occurs through all of the body's senses. Too often in education we think learning is done through sight and sound. Touch, smell, and taste (if appropriate) is for all students even."

Mr. Miller described the accommodations he made for a student with a spatial orientation disability. He would give the student "typed copy of notes, complete exams/quizzes in the resource room, and extra time to complete homework assignments." Like Mr. Miller, Ms. Harris noted she would pair her lower achieving students with more advanced students and try to grade her students with disabilities on the skills they were able to perform. Mr. Hamilton reported he had an elevator installed in their shop to allow students with physical disabilities to have full access to shop activities.

Three of the SBAE teachers (Ms. Johnson, Mr. Thomas, and Mr. Hamilton) noted they made modifications for all students in their classrooms if they had a student with an IEP in their class. Ms. Johnson said she makes the educational adjustments for all students because she never wants a student to feel singled out because of their disability.

Along with the inclusion of students with disabilities in SBAE classrooms, the teachers described how they provided opportunities for students to participate in various aspects of the National FFA Organization. Mr. Thomas and Mr. Williams described experiences they had when working with students with disabilities who wanted to engage in FFA speaking contest. Mr. Thomas described an instance where he worked with a student to develop a prepared public speech. The student wanted to work on developing his speaking skills but did not feel comfortable competing in the FFA contest. To accommodate this student, he organized a group to listen to the student's speech. He noted the student "stepped out of his comfort zone. He still improved his speaking skills, wore his FFA jacket, and demonstrated his ability to speak in front of a group of people. I call that a success." Mr. Williams noted some of his students with

learning disabilities seem to shy away from public speaking. To accommodate these students, he has the students present one-on-one with him, a SPED teacher, or another student.

Mr. Miller provided an example of one of his students with cerebral palsy who was involved with the FFA parliamentary procedure team. Instead of standing to address the chairperson, the student remained seated. Mr. Miller considered this to be a simple modification that allowed the student to participate in the event. Mr. Williams provided a similar example where he had a legally blind student on the autism spectrum who expressed having aspirations of serving as an FFA officer for their local chapter. He worked with her on the officer application packet and she was elected as the chapter Sentinel. Mr. Williams was very proud of her hard work and expressed "she did really well."

The SBAE teachers also provided examples of modifications / accommodations they made for students who participated in SAE programs. In fact, all of the SBAE teachers who provided input in this study indicated they required all of their students to engage in SAE programs. Mr. Thomas said he helps students find SAE projects closely related to their interest. For example, he had a student who was severely autistic who participated in the morning coffee program at the high school. In coordination with the student's parents, Mr Thomas helped the student set up a coffee shop in town to serve as his required SAE project. He indicated the student now imports beans from Colombia and plans to make this his career after graduating from high school.

Mr. Miller mentioned a student who struggled with disabilities that impaired his balance and depth perception. He said the student had a strong desire to farm, which prompted Mr. Miller to talk with the student's parents about possibly developing a production-based SAE project where he could experience farming practices. The project resulted in the student getting to ride along with family members as they farmed 40 acres of corn and soybeans. Mr. Miller said "He never said anything, but his brother and parents told me how much he loved driving. They loved that he received class credit for working (or simulating working) in the real world."

Mr. Williams reported he tries to find on-campus SAE opportunities for his students with disabilities to engage in. He assigns each of these students a greenhouse task, which they have to perform throughout the semester. By "using the greenhouse as a learning tool," Mr Williams stated, "students improve their time management, budget management, and overall responsibility." Mr. Williams added he never turns students down when they have a desire to be involved in his SBAE program. He holds "modified expectations" for his students with disabilities and strives to build a relationship with them to ensure their success.

Transferring of Responsibility for Provided Services: A theme that commonly emerged in many of the interviews with SBAE teachers was the transfer of responsibility as it related to determining the responsible party for providing services to students with disabilities. The aforementioned "passing of the buck" references how teachers personally feel and how or where they perceive their schools avoiding certain responsibilities related to special education. Of the nine teachers interviewed, six teachers indicated they did not make modifications or accommodations for students with disabilities unless the student personally asked.

Mr. Cohen stated, “I do not make adjustments for my students because in the workforce adjustments will not be made for them. If students feel they are unable to complete the assigned task they must ask the paraprofessionals for support.” Mr. Cohen expressed frustration with the lack of support he receives from his administration associated with providing services to his students with disabilities. However, he indicated some of his students have paraprofessionals who provide the modifications and accommodations, but he felt it was the students’ responsibility to request the support. Aligning with Mr. Cohen’s statement, Ms. Tucker said, “It is the responsibility of the special education support team to assist students with disabilities in my classroom.”

Mr. Williams and Mr. Hamilton provided many examples illustrating how they go above and beyond the mandated IEPs to help their students (e.g., developing a website to provide additional support for students with disabilities). However, both of these teachers noted their schools appointed a special education support person to assist each child with an IEP in their classes. Mr. Williams and Mr. Hamilton perceived the strong support from their schools’ special education departments took the burden of ensuring proper implementation of students’ IEPs off their plate. For example, Mr. Williams, a middle year teacher (Christensen, 1983) who had taught at his current school for the past 12 years, stated it’s the “school’s responsibility to provide a support person for each student with a disability in his classroom.”

Ms. Johnson explained she does all she can to help her students, but she does not have a supportive special education department. This lack of support forces her to rely on assistance from parents and guardians. She stated, “without a supportive and active special education department, the parent responsibility increases.”

In regard to having problems with her school administration shifting responsibility, Ms. Adams noted her administrators are not willing to offer any support for students with disabilities outside of school. She explained she had a student with a hearing impairment who was on a career development event (CDE) team and was planning on competing at an FFA competition. When she asked for an interpreter to assist the student at the competition, her administration said “if [Student] wants to participate in FFA events, the FFA chapter is responsible for paying for an interpreter.” Ms. Adams was in strong disagreement with this decision and believed the burden of providing this special education service was “on the shoulders of the administration as FFA is co-curricular, not extra-curricular.”

During the interviews we asked the SBAE teachers if they had any background knowledge of the special education mandates that guided the education of students with disabilities. The teachers seemed to struggle with concepts related to FAPE, as well as how the mandates impacted their responsibility in educating students with disabilities.

Conclusions / Recommendations / Implications

The purpose of this study was to explore the experiences SBAE teachers associated with the inclusiveness of students with disabilities in school-based agricultural education programs. Based on the experiences of nine SBAE teachers, three themes were identified for the need of the inclusions of students with disabilities: (1) importance of communication (2) inclusiveness for a complete program, and (3) transfer of responsibility for providing service. The study presented

the uniqueness of working with special education students. The intent was not to generalize the results to all special education students, but rather to the perceptions of the participants. It is important to note caution should be taken if generalizing the results to all students with disabilities participating in SBAE. The results this study presented support the notion that education is individualized and that the modifications and accommodations provided by students' IEPs are dependent on the students' educational needs.

The SBAE teachers interviewed in this study commonly discussed the importance of communication with parents, special education teachers, students, and administration when providing educational experiences for students with disabilities. The development and implementation of IEPs for students with disabilities requires effective communication and collaboration among the required and discretionary participants of the IEP team (e.g., parents, special education teacher, general education teacher, educational agency representative, interpreter of the instructional implications and evaluation results, and student) (34 C.F.R. § 300.321). According to Yell (2012), the IEP procedures serve to "help ensure that teams of individuals collaborate to create an individualized and meaningful IEP that provides a FAPE" (p. 239). The teachers' notion that parental involvement is critical in the development and implementation of IEPs is in line with the regulations of IDEA. Specifically, IDEA specifies schools must "take steps to ensure that one or both of the parents of a child with a disability are present at each IEP Team meeting or are afforded the opportunity to participate" (34 C.F.R. § 300.322).

The majority of the SBAE teachers discussed the importance of communication with special education teachers at their schools to understand how to properly implement IEPs. However, two teachers stated they were not given access to their students' IEPs and other teachers mentioned they did not review the IEPs of their students. Yell (2012) posited the release of IEP to general education teachers is required and is not a violation of FERPA Mandates. Moreover, Yell noted that "teachers working with a student who has an IEP are entitled to review the information contained in the document. Schools have an affirmative duty to inform these teachers of any requirements in the IEP" (p. 262). Based on the important role general education teachers play in providing special education and related services, the teachers should request access to review the IEPs of each of their students. We concluded some of the issues teachers faced with communication were through no fault of their own; rather, the SBAE teachers were following institutional norms within their districts.

The SBAE teachers indicated students with disabilities were involved in all three aspects of their SBAE program at some capacity (i.e., classroom / laboratory instruction, FFA, and SAE). Of the three components, the SBAE teachers noted they spent the most time and effort planning and providing special education and related services for students with disabilities in classroom and laboratory settings. The high rates of students with disabilities who enroll in career and technical education (CTE) courses have become commonplace over the past decades (Haber & Sutherland, 2008; Wagner, Newman, & Javitz; 2016). In fact, Wagner et al.'s (2016) National Longitudinal study reported 96% of students with learning disabilities took at least one secondary-level CTE course. In the context of SBAE, learning environments and activities commonly occur outside the confines of the traditional classroom (e.g., working with livestock at a school farm, working in an agricultural mechanics laboratory, traveling and competing in FFA

contest, etc.), which bolsters the need to ensure student safety and avoid eventualities which could lead to teacher liability (Hainline, Burris, Ulmer, & Ritz, 2019; Kessell, Scott, Lawver, & Fraze, 2005). Therefore, it is pertinent SBAE teachers are actively involved in IEP meetings and associated procedures to provide insight on all aspects of the SBAE program, including discussion of possible limitations for students with disabilities based on the uniqueness of SBAE courses and FFA activities. This dialogue between SBAE teachers and other members of the IEP team could serve to place students in appropriate SBAE coursework based on the students' needs.

Moreover, the SBAE teachers should discuss the three aspects of SBAE programs with the IEP team and explain the obligatory nature of SAE projects for all students enrolled in SBAE courses. They should also address expectations related to students' involvement in FFA. SBAE teachers need to inform administration and the IEP team of the co-curricular nature of FFA, the benefits of FFA membership for students with disabilities (LaVerge, Larke, Elbert, & Jones, 2011), and how participation in the co-curricular organization complements the regular SBAE curriculum (Iowa DOE, 2018). IDEA mandates schools provide supplementary aids and services that align with students' IEPs for "nonacademic and extracurricular services and activities in the manner necessary to afford children with disabilities an equal opportunity for participation in those services and activities" (34 C.F.R. §§ 300.42, 300.107, 300.320). With a full understanding of all three parts of the SBAE program, IEP teams will be able to make meaningful decisions on issues related to LRE and ensure the school is providing the student with a FAPE.

Special education-related litigation has drastically increased over the past forty years (Karanxha & Zirkel, 2014; Leonard, 2007; Walsh, Kemerer, & Maniotis, 2014; Yell, 2012). With the growth of special education litigation, there is a need for teachers to have a working knowledge of educational law to ensure students with disabilities are provided a FAPE. However, previous research has noted in-service teachers have little to no knowledge of educational law (Brookshire, 2002; Imber, 2008; Paul, 2001; Schimmel & Militello, 2007). Casale-Giannola (2011) reported CTE teachers have a dismal understanding of special education laws. Moreover, Casale-Giannola signified the need to enhance CTE teachers' understanding of special education law due to their required accountability based on federal mandates (e.g., IDEA and NCLB). We recommend teacher preparation programs and in-service professional development entities provide rigorous special education related law training for CTE teachers. Yell (2012) stated that "laws are in a constant state of development and refinement; therefore, we need to be able to locate the necessary information to keep abreast of these changes." (p. v). Based on the perpetual change of educational law, the special education law trainings should provide teachers with up-to-date information associated with special education laws and teach them how to access the federal regulations themselves.

Future research should take a deeper look into the issue of providing FAPE for students with disabilities in SBAE programs. These studies should seek to determine special education teachers' and administrators' perceptions and experiences with students with disabilities placed in SBAE settings. This inquiry will provide a broader lens of others who provide special education and related services for students in SBAE programs. Based on the important role parents play in the IEP development and implementation process, parents and guardians of students with disabilities in SBAE programs should be interviewed to better understand their

students' educational needs and how SBAE programs can provide training for their students to prepare them for life after high school.

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Examining the Effects of Reflection Type and Abstraction Order on Students' Scientific Reasoning Skills During Experiential Learning

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Abstract

Experiential learning is a foundational element to agricultural education. The purpose of this study was to examine the effects of reflection type and abstraction order on students' scientific reasoning skills when teaching experientially. Three major conclusions can be drawn from this study: (a) reflection type and abstraction order are independent of one another; (b) reflection-on-action, regardless of abstraction order, is more effective when developing students' scientific reasoning skills; and (c) pre-abstraction is more effective when developing students' scientific reasoning skills regardless of reflection type. It is recommended that future studies be replicated with a larger sample population, provide a longer duration of treatment, and consider individual learning styles as they pertain to reflection, abstraction, and other dependent variables not examined in this study. Regarding recommendations for practice, it is recommended that professional development opportunities exist for in-service teachers. The developers of professional development opportunities should focus on how to better develop students' scientific reasoning skills through experiential learning, reflection as a teaching strategy, and designing learning experiences. Finally, the results of this study should be shared with pre-service teachers in teaching methods and curriculum design courses to allow pre-service teachers to make informed decisions when designing learning experiences.

Introduction/Literature Review

Experiential learning is a frequently utilized pedagogical practice within agricultural education (Baker, Robinson, & Kolb, 2012; Barrick, 1989; Knobloch, 2003; Phipps, Osborne, Dyer, & Ball, 2008; Roberts, 2006; Roberts & Ball, 2009; Shoulders & Myers, 2013). Learning by experience has served as a foundational element to agricultural education since its development as a discipline (Barrick, 1989; Roberts, 2006). Baker et al. (2012) purported experiential learning is a crucial component when implementing the three-circle model used in agricultural education. Kolb's (1984) cycle of experiential learning is embedded into each of the three components of classroom/laboratory instruction, supervised agricultural experience (SAE) programs, and leadership/FFA (Baker et al., 2012). Knobloch (2003) suggested four pillars in which experiential leaning is utilized within agricultural education: (a) learning in real-life contexts, (b) learning by doing, (c) learning through projects, and (d) learning through problem-solving. Roberts and Ball (2009) noted experiential learning as an empirical and sound psychological framework for school-based agricultural education (SBAE).

In addition to experiential learning as a frequented pedagogical approach in agricultural education, inquiry-based approaches which link science concepts to agriculture are often implemented (Phipps et al., 2008). Scientific literacy is an important skillset for those entering

agriculturally related careers, and agriscience courses should teach science process skills as they pertain to agriculture (Myers, 2004). Thoron and Myers (2012) suggested agricultural educators should implement learning experiences which promote scientific reasoning and argumentation skills in the classroom. Zimmerman (2005) defined scientific reasoning as, "the thinking skills involved in inquiry, experimentation, evidence evaluation, inference and argumentation that are done in the service of *conceptual change* or scientific *understanding"* (p. 1).

Wiggins and McTighe (2004) argued learning experiences should be designed with the end in mind. It is not enough to implement hands-on activities for the sake of doing so; rather, one should first consider what the overall goal of the learning experience will be (Wiggins & McTighe, 2004). Therefore, while experiential learning is foundational to agricultural education, are there methods of implementing experiential learning which are more effective than others? Additionally, what value might experiential learning have as a pedagogical approach on students' scientific reasoning skills? Thoron and Myers (2012) claimed experiences in inquiry-based instruction strengthen students' argumentation skills. The development of argumentation and scientific reasoning skills can supply students who are equipped to enter the agricultural workforce better prepared to solve problems (Thoron & Myers, 2012).

In a study by Shoulders and Myers (2013), the authors explored how agriscience teachers implemented Kolb's model of experiential learning. It was noted that of teachers who utilized experiential learning, very few implemented the pedagogical approach holistically. Baker, Brown, Blackburn, and Robinson (2014) determined if the order of abstraction and type of reflection administered to college students affected their content knowledge when learning experientially. Baker et al. (2014) concluded abstraction order and reflection type were independent of one another. However, reflection-in-action was suggested to be a more effective strategy than reflection-on-action for college students' content knowledge gains. In a similar study by Blackburn, Robinson, and Kacal (2015), the authors determined if the method in which college students reflected when learning experientially effected their knowledge gained. While the type of reflection did not merit significant findings, the authors emphasized the importance of reflection, and suggested that students should be given multiple options for reflection to span across various learning styles. Replication by DiBenedetto, Blythe, and Myers (2017) detected no difference in abstraction order or reflection type on SBAE students' content knowledge or mathematical calculation scores. However, a significant interaction was detected when analyzing students' discussion question scores. In a larger part of this study, pre-abstraction and reflection-on-action were determined to be dependent upon one another when assessing SBAE students' content knowledge retention (Coleman et al., 2020).

The need of this study is warranted because of the initial significant findings in the aforementioned studies (Dooley, 2001). Baker et al. (2014) recommended replication of the initial study at the secondary school level and recommended the inclusion of additional dependent variables aside from content knowledge. Additionally, it was recommended to increase the number of participants to increase statistical power. Blackburn et al. (2015) echoed these recommendations stating increased participants and a secondary school setting would be ideal. DiBenedetto et al. (2017) recommended conducting such an experiment in a block-schedule setting to increase meaningful reflection time. Lastly, Thoron and Myers (2012) recommended conducting more experimental studies to identify the best methods in which to

teach agriscience, especially those related to experiences in scientific reasoning and argumentation. This study was implemented to address these recommendations and to determine if teaching experientially in SBAE has an effect on students' scientific reasoning skills.

Theoretical Framework

This study was primarily framed using the theory of experiential learning (Dewey, 1938; Kolb, 1984, 2015; Roberts, 2006). Kolb (2015) defined experiential learning as a process in which one's experiences are transformed into knowledge. In the experiential learning cycle, Kolb (2015) suggested four phases: (a) concrete experience, (b) reflective observation, (c) abstract conceptualization, and (d) active experimentation. Of these phases, there are two modes of grasping experiences, concrete experience and abstract conceptualization, and two modes of transforming experiences into knowledge, reflective observation and active experimentation (Kolb, 1984, 2015; Figure 1).

As this model is a cycle, it should be noted there is no specific start or end point. As such, there is no defined order in which a learner should participate in each of the four phases (Kolb, 2015; Roberts, 2006). Dewey (1938) posited while all learning stems from one's experiences, not every experience constitutes learning. Kolb (2015) purported each of the four phases are important in transforming experiences into knowledge.

Figure 1. Model of the Experiential Learning Cycle. Reprinted from *Experiential Learning: Experience as the Source of Learning and Development* (2nd ed.), by David A. Kolb, ©2015. Reprinted by permission of Pearson Education, Inc., New York, New York.

Reflective Observation

Reflection is a crucial component to experiential learning (Kolb, 2015), Reflection can be defined as the internal process in which an experience is transformed into learning. Kolb (2015) argued that reflection is often overlooked and as a result learning and development can be impeded or absent. Schön (1983) introduced the idea of reflection-in-action and reflection-on-action. Reflection-in-action occurs while learners are engaged in an experience and the internal process of reflection happens simultaneously. Contrary to reflection-in-action, reflection-on-action occurs after a learner has completed an experience (Schön, 1983). Schön (1983) compared reflection-in-action to the idea of knowledge-in-action. As such, Schön (1983) purported that reflection-*in*-action allows the learner to transform performance to knowledge. Conversely, reflection-*on*-action depends on perceptive knowledge which is created from an internal exemplification of the learner's experience (Schön, 1983).

Embedded in the literature, several studies have examined the overall concept of reflection, and specifically type of reflection (Andrysyszyn & Davie, 1997; Blackburn et al., 2015; Lamm et al. 2011; Phan, 2013). In earlier works, Andrusyszyn and Davie (1997) stated reflection and learning have an interdependent relationship. Thus, as the degree of student reflection increases, so does the degree of learning (Andrusyszyn & Davie, 1997). Lamm et al. (2011), espoused that reflection is vital to learning when teaching experientially, and learners prefer to reflect differently. Hence, it is imperative for instructors who teach experientially, to exert time and careful thought to types of reflection activities occurring in the teaching and learning process (Lamm et al., 2011). In support of the assertions made by Lamm et al. (2011), Phan (2013) found a statically significant relationship between higher-order reflection and positive student achievement. Ultimately, educators should consider the vital role reflection plays in the teaching and learning process, and provide learners with different opportunities to reflect throughout the process (Andrysyszyn & Davie, 1997; Blackburn et al., 2015; Lamm et al. 2011; Phan, 2013).

Abstract Conceptualization

Abstract conceptualization is a learner's ability to build knowledge based on evidence separate from a concrete experience (Kolb, 2015). Specifically, the learner creates theories or concepts to explain his or her observations (Kolb, 2015). When constructing knowledge through the process of abstract conceptualization, the learner's working memory becomes engaged and situates new knowledge with prior knowledge. This specific function, known as intelligence, compels emotional and mechanistic aspects of learning to occur (Kolb, 2015).

Prior knowledge and relevant information are foundational to new knowledge construction and the retention of knowledge (Ausubel, 2000; Dewey, 1916). Dewey (1916) suggested experiences should build upon one another over time to make meaning and create knowledge. Further stated, "The more that is taken in, the greater capacity there is for further assimilation" (Dewey 1916, p. 244). The *level* of abstraction impacts learning and the development of learners. For example, the more abstract, higher-order, and complex of topics being taught, the more impact the experience has on learners' intellectual ability. Thus, the level of abstraction influences thinking processes (i.e., scientific reasoning). To that point, learning is hierarchal, and the level of abstraction one

receives plays an important role in the hierarchy (Ausubel, 2000). This assertion supports Kolb's (2015) idea that the quality of an experience is more important than the order in which the learning process occurs.

Scientific Reasoning (Argumentation)

Argumentation skill is the development of logical explanations in consideration of opposing courses of action by weighing evidence, determine merit based upon evidence, and then forming a conclusion of answer to solving the problem (Kuhn, 1992, 1993; Thoron, 2010). Argumentation is the study of logic in a given context where individuals may work through experiential authentic-problems in order to consider all solutions then proceed to solving the problem with the best course of action (Driver, Newton, & Osborne, 2000; Thoron, 2010). Argumentative practices are utilized by real-world scientists. Students developing argumentation skill will lead to enhanced science and a public that has a better understanding of science (Driver, Newton, & Osborne, 2000).

Toulmin (1958) created Toulmin's Argumentation Pattern (TAP) which is the seminal work for argumentation skill development. Toulman (1958) identified four components: (a) *data*- where students are presented with data in order to form their claim/solution; (b) *claim*- established merit why utilizing data with explanations why the data is important or how it is useful; (c) *warrants*- reason that connect the data and claim; and finally, (d) *backing*- which provides assumptions and justifications for the warrants. The TAP provides a structure for learners to guide their reasoning and better describe their thoughts when solving problems/creating a solution (Thoron, 2010).

Purpose and Objectives

The purpose of this study was to examine the effects of reflection type and abstraction order on students' scientific reasoning skills when teaching experientially. This study aligned with research priority four of the *National Research Agenda* (Edgar, Retallick, & Jones, 2016) and included three research questions:

1. What effect does the interaction between abstraction order and reflection type have on scientific reasoning?
2. What is the variance in scientific reasoning attributed to abstraction order?
3. What is the variance in scientific reasoning attributed to reflection type?

The following null hypotheses were created for statistical analyses:

H_0 1: There is no variance in scientific reasoning scores due to the interaction of abstraction order and reflection type.
H_0 2: There is no difference in the overall mean scientific reasoning scores between reflection-in-action and reflection-on-action groups.
H_0 3: There is no difference in the overall mean scientific reasoning scores between pre-abstraction and post-abstraction groups.

Methods

Design

This study was part of a larger-scaled study (Coleman et al., 2020). According to the Publication Manual of the American Psychological Association (2020), multiple publications from a large-scale research project can have the same methods section (i.e., design, population/sampling, and procedures) with some uniqueness. As such, the way in which data were collected was the same (Coleman et al., 2020); however, this study focused on a different dependent variable than the larger study. This study was experimental in nature and employed a 2x2 completely randomized factorial (CRF-*pq*) design as prescribed by Kirk (1995). This design allows for random assignment of participants into one of four treatment groups. This 2x2 CRF design is used to test the effects of two independent variables and their interaction effect (Kirk, 1995; see Figure 2). The two independent variables included reflection type and abstraction order. The two methods of reflection tested included reflection-in-action and reflection-on-action. The two methods of abstraction tested were pre-abstraction and post-abstraction. The dependent variable of this study was students' scientific reasoning skills.

	Reflection-In-Action	Reflection-On-Action
Pre-Abstraction	Treatment Group A *n* = 13	Treatment Group B *n* = 14
Post-Abstraction	Treatment Group C *n* = 16	Treatment Group D *n* = 13

Figure 2. CRF-*pq* (2x2) design for random assignment of student participants.

Population

The population of interest were secondary school students in grade levels nine through twelve who were enrolled in agriscience courses. This experiment was conducted at a rural high school in Florida with a total school enrollment of approximately 800 students during the spring semester of 2019. There were approximately 140 students enrolled in the eight agriscience courses offered at the high school, of which 56 participated in this study. The agriscience teacher, school administration, and school board personnel provided prior approval to conduct this study. Additionally, Institutional Review Board and parental consent were obtained prior to student participation.

Sampling and Procedures

The selection of the school and participants was conducted via non-probability, convenience sampling. Participating students were randomly assigned to one of the four treatment groups. Random assignment is effective for minimizing threats to internal validity (Ary, Jacobs, & Sorensen, 2010). To randomly assign students, each student was assigned a number (one through four) to determine their treatment group. Therefore, the groups were deemed statistically normal due to this randomization of students. Threats to internal validity should be controlled for by a

well-designed experiment (Ary et al., 2010). There are 11 threats to internal validity as purported by Ary et al. (2010), all of which were controlled for by the design of this study.

Lab-Aids© Investigating Photovoltaic Cells laboratory kits were used to provide a formal learning experience in solar-powered energy. This lab kit provided an interactive, hands-on learning experience in which students investigated the transformation of sunlight energy into electrical energy. Students were given permission to participate in a three and a half-hour block class period in which the treatment was provided. There were four instructors who lead each of the four treatment groups in four separate classrooms, concurrently. The instructors included two faculty members and two graduate students of agricultural education, three of which were researchers of this study. For consistency of instructional delivery, the instructors met prior to the experiment to review (a) the PowerPoint© guided lecture/discussion, (b) the reflection guides, (c) the verbal reflection questions, (d) the laboratory kits, and (e) the assessment. Pre-abstraction treatment groups (A and B) received the 50-minute lecture/discussion lesson on solar-powered energy before conducting the 90-minute laboratory experience. Suitably, post-abstraction groups (C and D) were instructed to conduct the laboratory experience prior to receiving the lecture/discussion lesson. Reflection-in-action treatment groups (A and C) were issued a reflection guide which prompted students to pause and intentionally reflect on their experience. They were also asked pre-written, verbal reflection questions throughout the experience by the instructor. In the reflection-on-action treatment groups (B and D), students were issued a reflection guide which prompted them to complete the entire laboratory experience without interruption, and then respond to all reflection questions at the end. Instructors of these groups waited to ask the pre-written, verbal reflection questions until the end of the laboratory experience.

Scientific Reasoning Instrument

The instrument used to measure scientific reasoning scores was a researcher-developed argumentation assessment. Face and content validity of the assessment were evaluated by an expert panel composed of two faculty and three graduate students in agricultural education. Minimal grammar and punctuation edits were suggested by the panel. The assessment was administered in the agriscience classrooms where participants were accustomed to meeting. To ensure consistency, testing instructions were read aloud to participants from a pre-developed script. The assessment delivered a case study scenario related to solar energy. Following the scenario, participants responded to seven open-ended response questions which measured scientific reasoning skills. Some examples of assessment questions are as follows:

1. What is a conclusion that you can draw from the data regarding these relationships?
2. What data are you using to support this relationship?
3. What rationale links this data to your conclusion?

A 10-point rubric, originally developed by Schen (2007), was adapted and used for scoring purposes. Dooley (2001) recommended the practice of percent agreement to measure interrater equivalence. Agreement was defined as exact score agreement. However, in the case of a near miss or adjacency (i.e. off by one point), credit can be given (Dooley, 2001). First, one researcher used the rubric to score all of the assessments (n = 56). After all assessments were

scored, a second researcher randomly selected 12 of the assessments to be scored using the same rubric. An 83% (10) exact agreement reliability estimate was achieved by the two raters. In the 17% (2) of assessments that were not exact agreements, the cases were one-point adjacencies. As a result of strong agreement, the original researcher's scores were used for statistical analysis.

Data Analysis

Data were analyzed with IBM SPSS Statistics Version 26. A two-way independent analysis of variance (ANOVA) was used to calculate the two main effects and the interaction effect between these independent variables (Field, 2018). Field (2018) recommended the use of the two-way ANOVA for testing the effects of two independent variables (abstraction order and reflection type) on a dependent variable (scientific reasoning skills).

The assumptions regarding the use of ANOVA were examined and met before the use of the statistical tool. Homogeneity of variance was analyzed using Levene's test which yielded a result of $F(3, 52) = .78$, $p = .51$. Field (2018) expressed the use of caution when testing for homogeneity of variance using *Levene's test* for two reasons: (a) in large sample sizes, Levene's test may be over sensitive and detect significance for unimportant variables, and (b) in small samples, Levene's test often lacks enough power to detect violations of the assumption of normality. Caution should be exercised when using Levene's test by also analyzing other indicators of normality such as histograms and Q-Q plots (Field, 2018). Therefore, in addition to the Levene's Test, histograms and Q-Q plots were examined to ensure normality as recommended by Field (2018). Thus, the data were deemed statistically normal.

The statistical and practical effects were both reported for the findings. An *a priori* alpha level of .05 was set to determine statistical significance. The statistical significance was used to determine rejection or failure to reject the null hypotheses (Ary et al., 2010; Kirk, 1995). The practical significance of the effect should also be considered when conducting research (Ary et al., 2010). Partial eta squared was utilized to determine the practical effect size. Miles and Shevlin (2001) categorize partial eta squared effect sizes as follows: (a) 0.01 – small effect size, (b) 0.06 – medium effect size, and (c) 0.14 – large effect size.

Findings

When analyzing the scientific reasoning examination scores, the mean scores for reflection-in-action and reflection-on-action, were 2.41 ($SD = 2.04$) and 3.74 ($SD = 2.57$). The mean scores for pre-abstraction and post-abstraction were 4.04 ($SD = 2.55$) and 2.14 ($SD = 1.83$). A full report of these descriptive statistics is in Table 1.

Table 1
Mean Scientific Reasoning Test Scores for Treatment Conditions of Reflection Type and Abstraction Order

Type of Reflection	Order of Abstraction	*M*	*SD*	*n*
Reflection In	Pre-Abstraction	2.85	2.41	13

	Post-Abstraction	2.06	1.69	16
	Total	2.41	2.04	29
Reflection On	Pre-Abstraction	5.14	2.21	14
	Post-Abstraction	2.23	2.05	13
	Total	3.74	2.57	27
Total	Pre-Abstraction	4.04	2.55	27
	Post-Abstraction	2.14	1.83	29
	Total	3.05	2.38	56

The interaction effect of reflection type and abstraction order resulted in an $F(1,52) = 3.61$, $p = .063$, observed power = .462, and was statistically insignificant. As a result of this finding, the first null hypothesis failed to be rejected. The main effect of reflection type was deemed to be significant ($F(1,52) = 4.84$, $p = .032$, observed power = .579). Thus, the second null hypothesis was rejected. This finding resulted in an effect size of .09 which is defined as *medium* by Miles and Shevlin (2001). The main effect of abstraction order was also deemed significant ($F(1,52) = 10.89$, $p = .002$, observed power .899). As such, the third null hypothesis was rejected. The effect size of this finding was .17 which Miles and Shevlin (2001) defined as *large*. The entire ANOVA summary is presented in Table 2.

Table 2
Scientific Reasoning ANOVA Summary Table

Source	*SS*	*df*	*MS*	*F*	*p*
Reflection	21.11	1	21.11	4.84*	.032[a]
Abstraction	47.46	1	47.46	10.89*	.002[b]
Reflection* Abstraction	15.74	1	15.74	3.61	.063
Error	226.65	52	4.36		
Total	835.00	56			

[a]Effect size = .09 per η_p^2; [b]Effect size = .17 per η_p^2 (Miles & Shevlin, 2001); *p < .05.

Figure 3 displays a visual model with the treatment groups and their respective scientific reasoning mean scores. Treatment group A (reflection-in-action and pre-abstraction) had a mean score of 2.85 (*SD* = 2.41). Treatment group B (reflection-on-action and pre-abstraction) had a mean score of 5.14 (*SD* = 2.21). Treatment group C (reflection-in-action and post-abstraction) had a mean score of 2.06 (*SD* = 1.69). Treatment group D (reflection-on-action and post-abstraction) had a mean score of 2.23 (*SD* = 2.05).

	Reflection-In-Action	Reflection-On-Action
Pre-Abstraction	Treatment Group A *M* = 2.85 (*SD* = 2.41)	Treatment Group B *M* = 5.14 (*SD* = 2.21)
Post-Abstraction	Treatment Group C *M* = 2.06 (*SD* = 1.69)	Treatment Group D *M* = 2.23 (*SD* = 2.05)

Figure 3. Mean Scientific Reasoning Test Scores by Treatment Group
**p* < .05.

Conclusions

The lack of a statistically significant interaction effect indicates reflection type and abstraction order are independent of one another when analyzing students' scientific reasoning skills. This lack of interaction suggests reflection-on-action (*M* = 3.74, *SD* = 2.57, *p* = .03; see table 2 for main effects), regardless of abstraction order, is a more effective reflection strategy for developing students' scientific reasoning skills. While a different dependent variable was analyzed, this finding varies from Baker et al. (2014) who found reflection-in-action as more effective for students' content knowledge gain. This could be due to timeliness. In this study, those who reflected-on-action reflected at the end of the experience and then immediately took the scientific reasoning assessment. Therefore, they could have had a reflection of their experience readily available to transfer to the written assessment verses those who reflected-in-action. However, this finding is congruent with Coleman et al. (2020) who found reflection-on-action as a more effective approach for student content knowledge retention.

The results of this study also denote pre-abstraction (*M* = 4.04, *SD* = 2.55, *p* = .00; see table 2 for main effects) as a more effective strategy in relation to developing students' scientific reasoning skills regardless of reflection type. Interestingly, this finding differs from Kolb's (2015) suggestion that the order in which students receive the experiential learning cycle is of little importance. This also varies from the suggestion by Baker et al. (2014) who found abstraction order had no statistically significant effect on student's content knowledge. This study would suggest the order in which students receive abstract conceptualization of lesson content is important for scientific reasoning skills. This aligns with the assertions by Dewey (1916) and Ausubel (2000) that learning is hierarchal. Providing students abstract conceptualization provides a foundation in which to build further knowledge. Further, this finding supports Roberts' (2006) notion that experiential learning is an on-going, spiral-like process. The act of pre-abstraction could be considered a learning experience within itself in which to further build upon. It is possible those who received pre-abstraction were provided with an *initial focus* followed by an *initial experience* to advance their overall learning.

Recommendations for Research

Statistical power can be increased by having larger sample sizes (Kirk, 1995). This study had a sample population of 56, which is a limitation. It is recommended replications of this or similar

studies strive to attain a larger sample size of SBAE students. Further, this study was conducted over a three and a half-hour block course, but the treatment was administered for approximately 140 minutes. A longer duration of treatment is recommended to increase reflection and abstraction time. Conducting this study over the course of an entire unit of instruction, rather than a single-day lesson, could yield additional and different findings. Additionally, this study did not employ a pre-assessment instrument to determine students' prior knowledge of solar power. Thus, it can be recommended that future replication employ a pre-assessment instrument to determine students' prior knowledge before the treatment.

Literature suggested the level and quality of abstraction experience is important to learning (Ausubel, 2000; Kolb, 2015). Therefore, it is recommended a follow-up study be conducted to examine how the intensity or level of abstraction one receives, such as lower and higher order thinking experiences, affects student learning. Kolb (2015) noted it is important to consider various learning styles when teaching. All learners have a preferred style in which they wish to learn. Another follow-up study should consider individual learning styles as they pertain to the independent variables of this study (i.e., abstraction and reflection), and other dependent variables not examined in this study.

Recommendations for Practice

Agriscience programs should provide students with experiences to develop science process skills and scientific reasoning (Myers, 2004; Thoron & Myers, 2012). However, experiences alone are not enough to constitute learning (Dewey, 1938). As such, it is recommended those wishing to design learning experiences should be intentional in how they design curricula. This study supports the assertion that the way in which we design and implement learning experiences can have implications for student learning. This recommendation aligns with that of Wiggins and McTighe (2004) who suggested planning experiences to meet overall learning goals.

Further, it is recommended the findings of this study, and similar studies, should be shared with pre-service teachers in teaching methods and curriculum design courses. Doing so allows pre-service teachers to make informed decisions about developing learning experiences for agriscience students. Considering SBAE courses can often serve as a dual science course credit, professional development centered around the findings of this study should be offered to in-service agriscience teachers. Designing experiences and curricula to promote the development of scientific reasoning skills further supports agricultural education as an applied science.

Lastly, student reflection is crucial to learning, especially when implementing experiential learning as a pedagogical approach (Andrusyszyn & Davie, 1997; Baker et al. 2014; Blackburn et al., 2015; Knobloch, 2003; Kolb, 2015; Lamm et al. 2011; Phan, 2013; Roberts 2006; Schön, 1983). Educators who wish to see increased positive learning outcomes should implement reflection strategies which allow students to transform experiences into knowledge. It is recommended teacher professional development be offered to promote reflection as an important teaching tool.

Discussion

This study yielded two statistically significant main effects and no statistically significant interaction effect. This could likely be due to the relatively small sample (N = 56) which could impede the ability of the statistical test to detect differences. Additionally, the treatment duration in this study was somewhat short regarding student exposure. Even with these limitations in mind, this experimental study remains comparable to others in the profession. Colclasure and Thoron (2018) indicated most experimental studies in SBAE utilized short treatment durations and had populations between 50 and 200 participants. In total, between 2006 and 2016 only five percent of publications (35) in the *Journal of Agricultural Education* were experimental in nature (Colclasure & Thoron, 2018). As we know, experimental designs in natural settings can be difficult for numerous reasons. However, researchers should not shy away from the challenge of conducting rigorous experimental designs in natural settings. Researchers should continue to conduct experimental research with SBAE students and SBAE settings while working hard to control what we can. Echoing the sentiments of Thoron and Myers (2012) and Colclasure and Thoron (2018), the profession should continue the pursuit of publishing experimental research which will further shape agricultural education.

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SBAE Student Teachers' Sense of Importance and Competence per Selected National Quality Program Standard Indicators: A Then-Now Borich Needs Assessment

Abstract

The student teaching internship is a valuable time of professional growth for school-based agricultural education (SBAE) preservice teachers. Still, new teachers require more professional development than any other career phase. The National Quality Program Standards (NQPS) developed by The National Council for Agricultural Education provides a reliable and valid measuring stick to assess the professional development needs of newly qualified SBAE teachers. This study utilized a modified NQPS Borich needs assessment with a then-now design to analyze professional growth and continuing professional development needs of a student teacher cohort in the Agricultural Education Department at Oklahoma State University. The 13 participants showed positive change in both competency and perceived importance in all selected quality indicators. The ability to utilize equipment, tools, and technology for effective instruction was found to be the most impactful gain in competency and perceived importance. The greatest reported professional development needs included the evaluation and documentation of student Supervised Agricultural Experience (SAE) projects. Recommendations for teacher preparation courses and professional development as well as the greater utilization of NQPS is further discussed.

Introduction and Review of Literature

During the student teaching internship, preservice teachers begin the transition from student to professional teacher (Sorensen, Lawver, Hopkins, Jensen, Dutton, & Warnick, 2018). This internship has the potential to be the most impactful professional development experience for a novice school-based agricultural education (SBAE) teacher (McKim & Velez, 2017). It is a time for great change in teacher self-efficacy (McKim & Velez, 2017). Experience in instructional planning and presentation, teacher self-reflection, classroom management, and a variety of other professional development areas are reported by student teaching cohorts (Bartolome, 2017). This educational practice has the potential to shift instructional approaches and preferred teaching methods of preservice teachers (Smith & Rayfield, 2017).

Despite the immersive nature of student teaching, early career SBAE teachers require additional professional development reflective of the complete agricultural education model (Joerger, 2002; McKim & Velez, 2017). Induction-year teachers "are expected to perform the same jobs at the same level as veteran teachers" (Moore & Swan, 2008, p. 60). Therefore, these neophyte teachers enter the profession with the most pronounced professional development needs of any other teacher career stage (Katz, 1972). Sorensen, Lambert, and McKim (2014) identified professional development needs representing instruction, Supervised Agricultural Experience (SAE), and SBAE program management among the top needs for novice SBAE teachers. Another study of Iowa SBAE teachers found deficiencies in instruction, classroom management, and content knowledge that required professional development (Smalley, Hainline, & Sands, 2019).

According to Garton and Chung (1996), the needs of the intended audience should guide professional development. The Borich needs assessment model is designed to "(rank) in order of priority so that responses are linked to a practical decision framework for program improvement" (Borich, 1980, p. 39). This method considers discrepancies between perceived importance of and competence in selected criteria to identify needs and inform professional development delivery (Borich, 1980). Studies by Garton and Chung (1996), Hendon, Hainline, Burris, Ulmer, and Ritz (2019), Joerger (2002), Smalley et al. (2019), Sorensen, Tarpley, and Warnick (2010), Saucier, Vincent, and Anderson (2014), and Sorensen et al. (2014) are a few among the *Journal of Agricultural Education* that have utilized the Borich needs assessment to identify professional development needs of SBAE teachers.

Research has identified important competencies for novice SBAE teachers (Hainline & Wells, 2019; Roberts & Dyer, 2004; Rubenstein, Thoron, & Estepp, 2014; Stripling & Barrick, 2013). However, much of this research has been completed with a regional focus (DiBenedetto, Willis, & Barrick, 2018). With the variety of teacher certification standards (Greenblatt, 2016) and diverse SBAE teacher induction program (Moore & Swan, 2008) across state lines, a difficulty lies in designing and implementing an instrument to measure professional development needs of induction year teachers (DiBenedetto et al., 2018).

The National Quality Program Standards (NQPS) is an evaluation tool for SBAE teachers, stakeholders, administrators, and other interested parties to evaluate the complete SBAE program (The National Council for Agricultural Education, 2016). First developed in 2009, NQPS is intended for "local teacher(s) in cooperation with administrators, community partners, advisory committees, FFA support groups, and/or an external assessment team" to "analyze their program and develop clear goals and objectives for program growth" (The National Council for Agricultural Education, 2016, p. 3). The ten standards include (1) curriculum and program design, (2) instruction, (3) facilities and equipment, (4) assessment, (5) SAE, (6) FFA, (7) school and community partnerships, (8) marketing, (9) professional growth, and (10) program planning. Each standard contains a number of quality indicators. The assessor ranks each quality indicator on a scale from one to five. A score of three or above indicates the teacher or program has met the standard while a score of one or two fails to meet the expectation. The document also contains a list of suggested evidence for each quality indicator and suggestions for improving deficit quality indicators (The National Council for Agricultural Education, 2016). Quality standard assessments like the NQPS provide a valuable assessment of professional needs (Smith & Smalley, 2018; Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009).

Problem Statement

This study addresses the American Association for Agricultural Education National Research Agenda's third research priority identified to provide sufficient scientific and professional workforce that addresses the challenges of the 21st century (Roberts, Harder, & Brashears, 2016). In order to provide the most efficient professional development for teachers, their needs and competencies must be assessed (Garton & Chung, 1996). The results of this study will inform Oklahoma SBAE teacher educators and agricultural education staff to provide impactful professional development and inform teacher preparation practices. Peer institutions may be able to replicate the study methods within their own contexts.

Conceptual Framework

Katz's (1972) developmental stages of preschool teachers served as the conceptual framework for the study. Katz (1972) identifies four stages, (1) survival, (2) consolidation, (3) renewal, and (4) maturity, to roughly represent the first five years of a teacher's career (see Figure 1). The survival stage begins in the last phases of a preservice teacher's preparation, as the reality of their blossoming career takes focus. This phase typically lasts throughout the induction-year. During this phase, the novice teacher is focused on the present day and task at hand (Katz, 1972). Reality versus expectations can be sources of great stress in this stage (Shayshon & Popper-Giveon, 2017). Katz (1972) identified needs for each developmental stage. During the survival stage, novice teachers need "instruction in specific skills and insight" (Katz, 1972, p. 4). This instruction should occur in the local school district as well as with fellow colleagues in the survival phase. Mentoring is also an important support system in this phase (Katz, 1972). The individual needs of teachers in the survival stage should be identified and these individuals offered interventions by mentors, administrators, and teacher educators (Katz, 1972).

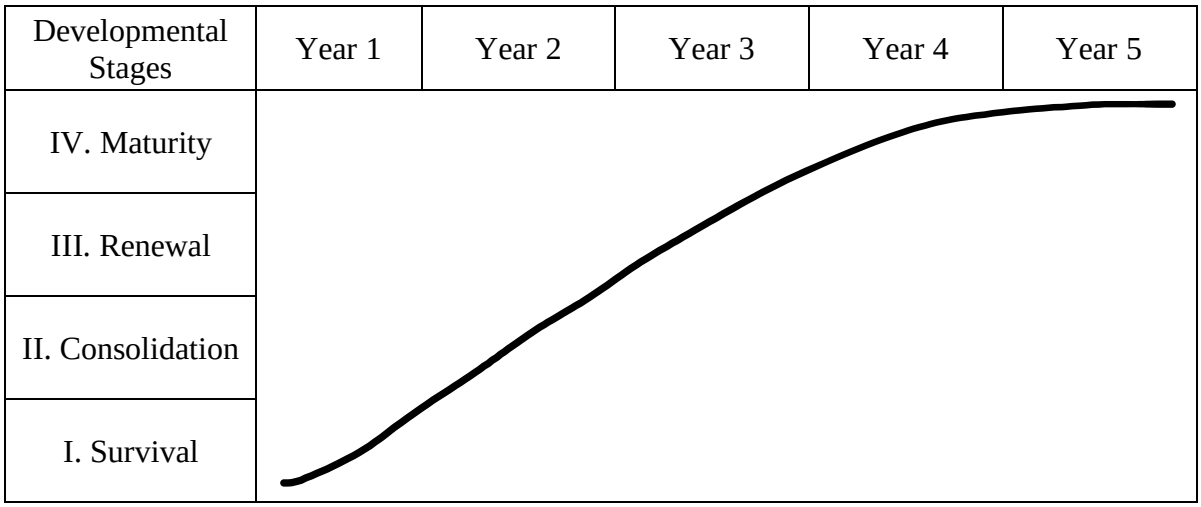


Figure 1. Typical novice teacher trajectory through Katz's (1972) stages of development in novice teachers

Purpose and Objectives

The purpose of this study was to assess Oklahoma State University (OSU) SBAE preservice teachers' competence in selected NQPS standards as a result of the student teaching experience. The following objectives guided the study.

1. Assess professional development growth of selected NQPS indicators during the student teaching internship.

2. Identify continual professional development needs in selected NQPS indicators.

Methodology

The target population of this study was the 2019 spring SBAE student teaching cohort from OSU. These 16 individuals had completed the necessary requirements for the student teaching internship set by the OSU College of Education and the Agricultural Education Department. The 12 females and four males spent 15 weeks with their cooperating SBAE teacher. All but one preservice student teacher completed their internship in Oklahoma. A census was conducted with these individuals.

Two common assessment procedures were combined in this study to produce a unique methodology. A Borich needs assessment was presented in a then-now design to assess preservice teachers' sense of importance and competence in selected NQPS quality indicators both before and after the student teaching internship.

A then-now design is intended to measure program impact (Rockwell & Kohn, 1989). Participants are assessed at the completion of the program and asked to reflect on their status before (then) and after (now) (Colosi & Dunifon, 2006). In many programs where participants are largely unfamiliar with the activities of the program, a then-now approach is more informative about program impact than a pre-post design (Rockwell & Kohn, 1989). The additional self-insight that is gained through the experiences of the student teaching internship may produce more reliable self-report data (John & Robins, 1994).

A Borich needs assessment analyzes participant responses in a way that allows researchers and professional development providers to rank instrument items by need, thus providing a priority list for professional development interventions (Borich, 1980). As previously stated, this is a popular method for identifying professional development needs.

The National Council for Agricultural Education's (2016) NQPS was narrowed from ten standards to six. These standards were chosen to represent the three-circle model of agricultural education; that is, classroom and laboratory instruction, experiential learning opportunities through SAE, and participation in student leadership within the National FFA Organization. These six areas represented curriculum and program design, instruction, facilities and equipment, assessment, SAE, and FFA. The reduction and selection of NQPS standards was purposeful to assess the SBAE teacher, not the overall local SBAE program. Quality indicators representing the six standards were chosen by an expert panel of SBAE teachers. Three past SBAE teachers who are currently employed by OSU's Agricultural Education Department served on the panel. Combined, these experts boasted 22.5 years of SBAE teaching experience. Experts individually chose the top indicators they believed most important for Oklahoma induction-year SBAE teachers included in the six NQPS standards. Their individual choices were tallied to select included quality indicators. The reduction of quality indicators per standard helped to prevent survey fatigue and focused the study. See Table 1 for a complete list of all NQPS standards and quality indicators included in the instrument.

For each quality indicator, participants were asked to reflect on their perceived importance and competence both before and after their student teaching internship. Each item was ranked on a five-point summated scale with higher numbers indicating a greater sense of importance or competence (see Figure 2). Four agricultural education faculty members provided content and face validity analysis of the instrument. With 12 demographic items, the instrument contained a

total of 25 items. The instrument, along with all study procedures, was approved by the OSU Institutional Review Board.

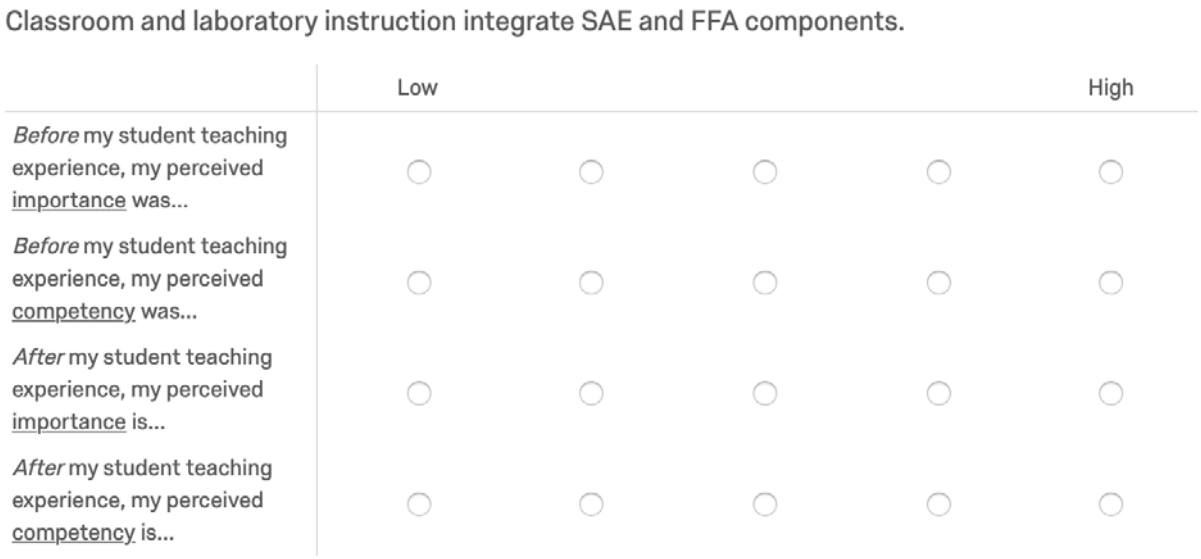
Table 1

NQPS Standards and Quality Indicators Included in This Study

Standard	Quality Indicators
Program Design and Instruction: Curriculum & Program Design	Courses offered reflect needs of the community. Courses offered contain a balance of all three components of the model.
Program Design and Instruction: Instruction	Classroom instruction incorporates SAE and FFA components. Learning environments are supportive and safe for all students.
Program Design and Instruction: Facilities & Equipment	Facilities are in compliance with safety and health standards. Equipment, tools, and technology are effectively used for instruction.
Program Design and Instruction: Assessment	Student growth in SAE project(s) is continually evaluated. Grading incorporates all three components of the model.
Experiential, Project, and Work-Based Learning Through SAE	All students maintain an SAE. Students maintain accurate SAE documentation. Teacher provides supervision and guidance for each SAE.
Leadership and Personal Development Through FFA	All students participant in leadership and personal development. The FFA chapter conducts regularly scheduled meetings.

The instrument was piloted to students in an agricultural education teaching methods course. Nine preservice SBAE teachers who had recently completed a pre-clinical teaching experience were given the instrument in its entirety and allowed to provide feedback as to the readability of the instrument. Minor changes to one demographic question was made after this round.

The instrument was administered during a debriefing session of the 15-week student teaching internship to OSU SBAE student teachers. The lead researcher presented the opportunity to participate. Sixteen student teachers were provided a link to the Qualtrics hosted instrument. By the end of the session, 13 usable responses were collected, resulting in a response rate of 81.25%.



Classroom and laboratory instruction integrate SAE and FFA components.

	Low				High
Before my student teaching experience, my perceived importance was...	○	○	○	○	○
Before my student teaching experience, my perceived competency was...	○	○	○	○	○
After my student teaching experience, my perceived importance is...	○	○	○	○	○
After my student teaching experience, my perceived competency is...	○	○	○	○	○

Figure 2. Sample item from study instrument

Descriptive statistics were utilized to analyze the data (Garton & Chung, 1996). The means of before importance (BI), before competency (BC), after importance (AI), and after competency (AC) were calculated and compared. To address objective one, discrepancy scores (DS) for each participant were analyzed by subtracting AC from BC. Then weighted discrepancy scores (WDS) were calculated by multiplying the individual discrepancy score (DS_i) by the average BC score. Importance differences were calculated similarly with AI and BI. Greater mean weighted discrepancy score (MWDS) indicates a larger reported gain in the quality indicator over the student teaching internship. Objective two followed similar computations but replaced BC with AI. A higher positive mean weighted discrepancy score (MWDS) indicates a greater need for professional development in that quality indicator (Borich, 1980). According to Garton and Chung (1996), a MWDS of 2 or greater indicates a need for professional development.

Equations for objective one:

$$DS_i = AC - BC$$
$$WDS_i = DS_i\left(\frac{\sum_i BC}{n}\right)$$

$$\mathrm{DS}_i = AI - BI$$
$$WDS_i = DS_i\left(\frac{\sum_i BI}{n}\right)$$

Equations for objective two:

$$DS_i = AC - AI$$
$$WDS_i = DS_i\left(\frac{\sum_i AI}{n}\right)$$

A Cronbach's *a* for competence mean weighted discrepancy scores (CMWDS), importance mean weighted discrepancy scores (IMWDS), and after student teaching mean weighted discrepancy scores (AMWDS) was calculated using IBM's SPSS Statistics Version 23 software (Warmbrod, 2014). Each summated subscale score reported an acceptable reliability with a Cronbach's *a* score for CMWDS of 0.88, IMWDS of 0.81, and AMWDS of 0.86 (Robinson, Shaver, & Wrightsman, 1991).

Findings

Nine participants (69.23%) were female. On average, participants were 21.77 years old with a reported grade point average of 3.38. All had at least four years of participation in agricultural education as a secondary student with experiences in each component of the three-circle model of agricultural education. Nine participants graduated high school within Oklahoma while four were out of state students. Twelve students were undergraduates with one fulfilling the requirements for master's degree in agricultural education. Eleven participants planned to teach SBAE, six of whom had accepted SBAE teaching positions at the time of data collection. The remaining two participants indicated they had alternative career plans in the agricultural industry.

Findings from this then-now Borich needs assessment both analyzed professional development gains during the student teaching experience and identified continuing professional development needs as these newly certified SBAE teachers enter the profession. Overall, this experience provided meaningful professional development for the cohort of SBAE student teachers. During the student teaching internship, participants reported spending the most time advising FFA chapters, followed closely by instructional activities, with SAE supervision consuming 33.54% of their time. The cohort recorded a total of 239 professional development hours during the student teaching internship with FFA consuming the largest proportion of those hours.

Objective One

Objective one described the change in perceived importance and competency in selected NQPS over the student teaching internship for the OSU SBAE Spring 2018 student teaching cohort. Participants reported positive MWDS for perceived importance and competence at the conclusion of their student teaching experience for each of the 13 NQPS indicators, indicating a beneficial professional development experience. Table 2 displays the competency gains by comparing perceived competency before and after the student teaching internship. Ten of the 13 quality indicators received a MWDS score above two, indicating a high rating of professional growth (Garton & Chung, 1996).

Perceived importance also showed gains for each quality indicators. Table 3 shows the MWDS of before and after student teaching perceived importance scores. The top six ranked quality indicators display a MWDS of two or higher.

Table 2

Competency Gains After Student Teaching: Mean Weighted Discrepancy Scores

Rank	Quality Indicator	CMWDS
1	Equipment, tools, and technology are effectively used for instruction.	3.34
2	Courses offered reflect needs of the community.	3.08
3	Classroom instruction incorporates SAE and FFA components.	2.93
4	Learning environments are supportive and safe for all students.	2.90
5	Grading incorporates all three components of the model.	2.77
6	Students maintain accurate SAE documentation.	2.61
7	All students maintain an SAE.	2.42
8	Student growth in SAE project(s) is continually evaluated.	2.19
9	Teacher provides supervision and guidance for each SAE.	2.08
10	All students participant in leadership and personal development.	2.04
11	Facilities are in compliance with safety and health standards.	1.78
12	Courses offered contain a balance of all three components of the model.	1.42
13	The FFA chapter conducts regularly scheduled meetings.	0.84

Table 3

Perceived Importance Gains After Student Teaching: Mean Weighted Discrepancy Scores

Rank	Quality Indicator	IMWDS
1	Equipment, tools, and technology are effectively used for instruction.	3.14
2	Student growth in SAE project(s) is continually evaluated.	2.66
3	Classroom instruction incorporates SAE and FFA components.	2.61
4	Students maintain accurate SAE documentation.	2.55
5	Courses offered reflect needs of the community.	2.51
6	Grading incorporates all three components of the model.	2.18
7	All students maintain an SAE.	1.99
8	Learning environments are supportive and safe for all students.	1.95
9	Courses offered contain a balance of all three components of the model.	1.48
10	The FFA chapter conducts regularly scheduled meetings.	1.48
11	Facilities are in compliance with safety and health standards.	1.33
12	Teacher provides supervision and guidance for each SAE.	1.21
13	All students participant in leadership and personal development.	0.75

Objective Two

Objective two sought to identify the perceived continuing professional development needs of the Spring 2108 cohort of OSU SBAE student teachers. *Student growth in SAE project(s) is continually evaluated* and *Students maintain accurate SAE documentation* were ranked as the highest needs after student teaching. Only these quality indicators reported a perceived professional development need greater than 2 AMWDS, as indicated in Table 4. Additional perceived needs for professional development focused on student engagement in SAE, facilities and equipment, and FFA meetings. Other quality indicators reported minimal need for professional development.

Table 4

Continuing Professional Development Needs: Mean Weighted Discrepancy Scores

Rank	Quality Indicator	AMWDS
1	Student growth in SAE project(s) is continually evaluated.	2.60
2	Students maintain accurate SAE documentation.	2.02
3	The FFA chapter conducts regularly scheduled meetings.	1.63
4	Equipment, tools, and technology are effectively used for instruction.	1.49
5	Facilities are in compliance with safety and health standards.	1.42
6	All students maintain an SAE.	1.30
7	Courses offered reflect needs of the community.	0.99
8	Teacher provides supervision and guidance for each SAE.	0.98
9	Grading incorporates all three components of the model.	0.96
10	Learning environments are supportive and safe for all students.	0.72
11	Classroom instruction incorporates SAE and FFA components.	0.67
12	Courses offered contain a balance of all three components of the model.	0.65
13	All students participant in leadership and personal development.	0.39

Conclusions and Recommendations

The 2018 Spring SBAE student teaching cohort from OSU appear to be representative of the nationwide license-eligible program completers (Smith, Lawver, & Foster, 2019). A large percentage, 84.62% indicate they planned to teach SBAE. Though a small sample size, this percentage is comparable to the 2018 national conversion rate (76.17%) of newly certified SBAE teachers employed in the profession (Smith et al., 2019). This cohort's 69.23% female composition is also similar to the 65.20% national supply of agricultural education teacher preparation program completers (Smith et al., 2019). The demographics of this population is indicative of typical recent college graduates in Katz's (1972) survival stage.

Objective One

This data sheds light on the perceived professional growth gained during student teaching and the continuing professional development needed for this student teaching cohort. Perhaps not surprising, student teachers reported the greatest gains in competency of quality indicators directly related to instruction. Bartolome (2017), Sorensen et al. (2018), and Smith and Rayfield (2017) also found improvement in instruction abilities over the student teaching experience. SAE documentation, evaluation, and supervision were the next greatest area of perceived growth in competency. These preservice teachers felt they did not gain as much competency in *Facilities are in compliance with safety and health standards* or *Courses offered contain a balance of all three components of the model* (see Table 2). Cooperating teachers may be encouraged to offer explicit instruction and reflection in these areas. Teacher educators could include these topics during weekly student teacher check-ins as well as supervisor visits held throughout the semester.

Perceived importance MWDS showed less gains in comparison to competency MWDS. However, Table 3's top six quality indicators, those scoring two or higher MWDS, reflected instruction, FFA, and SAE. This finding indicates a well-rounded student teaching experience. These six quality indicators also resulted in competency MWDS gains or two or greater. It is important to note Table 3 is not a ranking of the importance of quality indicators, but rather the change in perceived importance over the student teaching internship.

Interestingly, *Equipment, tools, and technology are effectively used for instruction* was the highest ranking MWDS for both competency and importance gains. During the student teaching internship, participants have daily utilized classroom technology in addition to equipment and tools common to agricultural education learning laboratories, such as the agricultural mechanics shop and greenhouse. The immersive experience with peer feedback from cooperating teachers likely increases teacher self-efficacy in using equipment, tools, and technology for instruction (Bandura, 1993). Additional research would be necessary to explain the experiences of student teachers as they build competency in this and other quality indicators.

The FFA quality indicators, *All student participate in leadership and personal development* and *The FFA chapter conducts regularly scheduled meetings*, both sorted to the lower third of Tables 2 and 3. After returning to the data, it was deemed these students held FFA quality indicators as both highly important and felt highly competent in these areas before their student teaching experience, leaving little room for improvement during the student teaching internship. All participants reported at least four years of experience in SBAE and a very active involvement in FFA chapters as a high school student. Additional research would answer why these student teachers chose to rank FFA quality indicators highly in both importance and personal competency. Does this sense of competency and importance stem from their personal experiences?

Objective Two

These neophyte teachers require additional professional development (see Table 4). The greatest perceived needs are related to student SAE assessment and documentation. The total of 82 hours dedicated to SAE related professional development reported by the SBAE student teaching cohort was not sufficient to meet their needs. SAEs seem to be a common topic of professional development needs (Garton & Chung, 1996; Hendon et al., 2019; Joerger, 2002; Rubenstein et al., 2014; Sorensen et al., 2010; & Sorensen et al., 2014).

The SAE experiences during their student teaching experience may have highlighted perceived deficiencies in these quality indicators. By observing others who are proficient in these arenas, such as their cooperating teacher and other inservice SBAE instructors, preservice teachers may have developed a lack of self-efficacy regarding SAE supervision activities including evaluation and documentation (Bandura, 1977). From the immersive experience of the student teaching internship (McKim & Velez, 2017), participants have developed a felt need towards the proper supervision of student SAE projects. These felt needs are likely to translate to help seeking behaviors such as professional development and mentoring participation (Wade, 1989).

It is recommended Oklahoma induction-year SBAE teachers be offered professional development in these SAE assessment and documentation. Perhaps a standardized grading rubric would assist novice teachers in grading student SAEs. The SAE for All curriculum may provide helpful tools for induction year teachers to assess and document student SAEs. Trainings from the state SBAE staff in the Agricultural Education Tracker (AET) system, Oklahoma's SAE recordkeeping platform, appear to be necessary for beginning teachers. In addition, the OSU SBAE teacher preparation program should incorporate more SAE instruction into preservice teacher coursework by utilizing inservice SBAE teachers who are proficient in SAE assessment and documentation as guest speakers on these topics. Providing this necessary support for novice SBAE teachers will assist early professionals through developmental phases (Katz, 1972).

No identifiable pattern emerged from the rankings of individual NQPS quality indicators nor their MWDS across gains in competency, perceived importance, or professional development needs. A high rate of variance occurred across Tables 2, 3, and 4 in the rankings of quality indicators by MWDS. The redundancy in some quality indicators, such as *Classroom instruction incorporates SAE and FFA components* and *Courses offered contain a balance of all three components of the model*, may attest to this fluency of quality indicator rankings. The instrument may be further developed by reducing the amount of overlap in quality indicators.

Additionally, the instrument created for this study should be re-administered to the participants who have entered the SBAE teaching profession to again track growth and further professional development needs in the selected quality indicators. This population could serve as a comparison group for future student teaching cohorts.

Discussion

The SBAE spring student teaching internship at OSU is unique in many ways to the fall semester. The spring months contain more frequent FFA activities such as Career and Leadership Development Events while fall student teaching internships contain two major state livestock shows as well as many local and county fairs. This disparity of FFA and SAE calendar events across semesters will impact the time and professional development focused on separate components of the three-circle model. Therefore, competency and importance gains as well as continuing professional development needs will show differences over fall and spring student teaching cohorts.

The National Quality Program Standards offer a bountiful area of assessment and research for agricultural education. However, this instrument appears to be an underutilized resource. After a thorough search of the *Journal of Agricultural Education*, only Smith and Smalley's (2018) study was found utilizing the NQPS instrument. To capitalize on this valuable document, teacher educators, state agricultural education staff, and professional development providers should adapt the NQPS to meet their unique contexts in assessing professional development needs. There is potential for the NQPS to fulfill the recommendation from DiBenedetto et al. (2018) to develop "a consistent instrument to assist teacher educators and national organizations with designing professional development opportunities to meet the current needs of agricultural education teachers" (p. 52).

NQPS also holds potential to inform SBAE teacher education curriculum. All ten standards of the NQPS should be incorporated in a preservice teacher's plan of study. To best prepare future SBAE teachers, teacher educators need to set high quality standards for their students. The National Council for Agricultural Education's NQPS may serve as the framework to set high expectations for SBAE teacher and program standards.

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Teacher Retention: A Relational Perspective

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Abstract

The sustained shortage of school-based agricultural educators necessitates novel research into variables impacting teacher career commitment. In the current study, a previously unexplored variable in the prediction of career commitment within school-based agricultural education was considered, teacher connectivity. Four elements of teacher connectivity (i.e., within school, other SBAE teachers, curricular, and community) were analyzed in relation to career commitment among a national sample of school-based agricultural educators. Findings revealed teachers perceived the highest levels of connectivity to their curriculum and other SBAE teachers with the lowest levels of connectivity being within their own school, to other content area teachers and administrators. Using multiple linear regression, the four elements of connectivity predicted 12% of the variance in career commitment. School connectivity and SBAE teacher connectivity were identified as statistically significant, positive predictors of career commitment. Findings are discussed using the Relational Theory of Working with recommendations emerging for structuring teacher onboarding programs, increasing teacher mentoring efforts, and empowering teachers to engage in interdisciplinary lesson planning. Further, authors provide recommendations for continued scholarship exploring teacher connectivity and career commitment within school-based agricultural education.

Introduction

Teacher retention is one of the most common, and important, topics of study within school-based agricultural education (SBAE). It is well known that a nationwide shortage of teachers has existed for some time, with various factors influencing teachers' decisions to leave or remain in the profession. Retaining effective teachers, however, is essential to the sustainability of the discipline; teachers exiting the profession results in instability, program closures, and reduced opportunities for students (Lawver, Foster, & Smith, 2018; Rinke, 2007).

Unfortunately, SBAE teachers leaving the profession is all too common. Existing research suggests between 30-50% of teachers will leave the profession within the first five years of employment (Blackburn, Bunch, & Haynes, 2017; Hong, 2010; Rinke, 2007). Additionally, in 2018 there were 1,594 open positions nationwide within school-based agricultural education (SBAE) due to teachers retiring, moving to new schools, or leaving the teaching profession entirely (Smith, Lawver, & Foster, 2019). Of these open positions, 576 were filled by alternatively certified individuals, non-licensed hires, or went unfilled (Smith et al., 2019).

Studies in SBAE seeking predictors of teacher retention have focused on common, overarching themes, such as self-efficacy (Blackburn et al., 2017; McKim & Velez, 2015, 2017). Research on professions outside SBAE, however, has explored a broader range of factors potentially influencing the retention of employees, with many studies citing workplace connections playing a critical role in the decision of employees to remain in their respective professions (Coldwell,

2017; Dutton & Heaphy, 2003; Hong, 2010; Hope, 1999; Rinke, 2007). A fresh perspective on teacher retention within SBAE, one that explores new predictors, could uncover promising avenues for research and practice. Informed by research on the importance of connectivity to professional resilience and retention, the current study provides a new approach by exploring the relationship between SBAE teacher connectivity and career commitment.

Literature Review

Our exploration of the relationship between connectivity and career commitment among SBAE teachers is informed by existing research on connectivity, career commitment, and the relationship between the two constructs. Therefore, the literature review is organized in alignment with the constructs and relationships of interest within the current study.

Connectivity

Social connections are an inherent part of human life (Stephens, Heaphy, & Dutton, 2011). Humans crave social interaction and belonging in both their personal and professional lives. Focusing on professional connectivity, Dutton and Heaphy (2003) explored the role of workplace connections and found the level (or degree) of connections workers perceived was directly related to job satisfaction and organizational success. Additionally, Dutton and Heaphy (2003) found the prevalence of high-quality connections as the most important variable in determining employee retention. In their study, high-quality connections were defined as having (a) higher emotional carrying capacity, (b) resilience, and (c) a high degree of connectivity (Dutton & Heaphy, 2003).

Existing research highlights the importance of connectivity to professional success; however, what areas of connectivity exist within SBAE? In the current study, we explore four unique areas of SBAE teacher connectivity to lay a foundation for understanding this important construct within the discipline. The first construct is school connectivity, the connections SBAE teachers perceive within their school district. School connectivity includes relationships with non-SBAE teachers and school administrators. Within education, the connections teachers develop create schoolwide support systems, improving school culture and emotional support (Rinke, 2007; Sass, Seal, & Martin, 2011). Professional development (Coldwell, 2017; Rodgers & Skelton, 2014) and teacher mentoring programs (Ingersoll & Kralik, 2004; Ingersoll & Strong, 2011; Hope, 1999) have been identified as methods for building school connectivity.

The second construct, SBAE teacher connectivity, includes connections with fellow SBAE teachers within their school (if applicable), state, or nationally. Similar to the importance of perceived support and social interaction teachers experience within their school, disciplinary-specific support systems are essential (Sass et al., 2010). Existing research has found high levels of SBAE teacher connectivity related to increased teacher self-efficacy (Korte & Simonsen, 2018).

The third construct, curricular connectivity, describes the level of connection SBAE teachers perceive to the curriculum they teach. Existing research suggests the importance of curricular connectivity, with higher teacher autonomy and knowledge of the curriculum relating to

increased job satisfaction (Kauffman, Moore Johnson, Kardos, Liu & Peske, 2002). Thus, teachers with more say in their curriculum, passion, and preparation will perceive higher levels of curricular connectivity.

The final construct, community connectivity, includes the level of connectedness SBAE teachers perceive with members of their community. Given the structure of the three-circle model for SBAE, there are numerous opportunities for community member engagement in SBAE programs (Croom, 2008). The use of Supervised Agricultural Experiences and the National FFA Organization allows for teachers to implement community service projects and include community partners (e.g., local businesses, community members, FFA alumni) to provide input and support (Croom, 2008; National FFA Organization, 2019a, 2019b).

Career Commitment

Given the continual demand for teachers, career commitment is a commonly studied construct throughout education. Hong (2010) identified numerous psychological factors relating to teacher career commitment, including: self-efficacy, knowledge, beliefs, and emotions. Within SBAE, self-efficacy is a frequently analyzed psychological element studied in relation to career commitment, with evidence suggesting increased self-efficacy relates to higher levels of career commitment (Blackburn & Robinson 2008; McKim & Velez, 2015, 2016). Self-efficacy refers to, "the teacher's belief in his or her own capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Blackburn & Robinson, 2008, p. 2). Among early career SBAE teachers, low self-efficacy has been identified as one of many factors leading to teachers leaving the profession (Blackburn & Robinson, 2008, McKim, 2016). Teacher turnover not only impacts the effectiveness of the school but can also have detrimental impacts on student development and school culture (Rinke, 2007).

Outside the context of self-efficacy, work-family balance is a growing area of study within research exploring SBAE teacher career commitment. Work-family balance refers to the ability of the teacher to manage time, energy, and resource allocation between their work and family domains. Research exploring the relationship between work-family balance and career commitment within SBAE suggests work-family balance is a significant, positive predictor of teacher retention (Blackburn et al., 2017; Sorensen & McKim, 2014). Just as emerging research on work-family balance has expanded our understanding of career commitment, we believe the introduction of connectivity as a predictor of career commitment will yield a more comprehensive understanding of career commitment within SBAE.

Relationship between Connectivity and Career Commitment

The research we reviewed identified high-quality connections, school culture, teacher self-efficacy, and work-family balance as important variables to understanding career commitment. A cross-cutting concept of the identified variables is connectivity. Connectivity is a critical component to social persuasion (i.e., feedback from others regarding abilities), which is a building block to self-efficacy (Bandura, 1986). Additionally, connectivity plays an essential role in creating a positive or negative culture within work or family domains, which directly relates to

spillover (i.e., work and family intersections, either positive or negative), an element of work-family balance (Sorensen & McKim, 2014). Given the intersection between connectivity and factors identified to influence teacher retention, it is reasonable to assume connectivity is an important element of career commitment within SBAE.

Research in other educational content areas has found an increase in the connections a teacher perceives within their school district improves school culture and perceived emotional support (Korte & Simonsen, 2018; Sass et al., 2010). SBAE research supports this finding; a study by Hasselquist, Herndon, and Kitchel (2017) found the amount of relationships and perceived support of novice SBAE teachers from peer teachers and administrators directly influenced their job satisfaction and self-efficacy. While studies allude to the importance of connectivity; existing research has not included an analysis of connectivity and career commitment. Further, reviewed research has not explored the various aspects of connectivity inherent in teaching SBAE (e.g., school, SBAE teacher, curricular, and community); therefore, exploring these four elements of connectivity within SBAE presents a literature-grounded, novel approach to understanding career commitment within the discipline.

Theoretical Framework

The current study, which attends to four relational elements among SBAE teachers (i.e., school, SBAE teacher, curricular, and community and career commitment), was informed by the Relational Theory of Working (RTW). The RTW "provides a framework for understanding ways in which working is embedded in external and internal relational contexts" (Blustein, 2011, p. 1). The RTW emerged in response to a growing body of vocational literature which viewed employees as completely independent - existing within a relationship vacuum. In contrast, relational theories identified relationships as an essential element of human life, noting individual growth occurs via connection (Jordan, 2008).

Expanding upon foundational relational theories, RTW posits work is a relational act and that all decisions and experiences within the work context are shaped by relationships. Further, the RTW links relationships within a work context to career commitment, or resilience, suggesting "relational influences...shape the resilience that is necessary for individuals to manage the ever-increasing complexity of work challenges" (Blustein, 2011, p. 2). The connection between relationships and career commitment suggested within RTW has been evaluated among teachers, with findings supporting relationships as essential to overcoming adversity and building career commitment (Doney, 2013; LeCornu, 2009).

While existing research within the field of education supports relationships being an important element of career commitment, this postulation has not been explicitly investigated in SBAE. Further, research associating relationships with career commitment among teachers has not analyzed the diversity of relationships managed by teachers. Therefore, the current study seeks to expand upon the RTW by analyzing four elements of relationships (i.e., community, curriculum, peer teachers, and school) and their association with teacher career commitment within SBAE.

Purpose and Objectives

The current study seeks to evaluate perceptions of four elements of connectivity and career commitment among a national sample of SBAE teachers as well as model the relationship between connectivity and career commitment. The knowledge gained through this work is expected to expand current understandings regarding the nature, scope, and value of connectivity within the SBAE teacher role. Furthermore, the findings from this study will illuminate the role connectivity plays in the career commitment of SBAE teachers. The current study was guided by three research objectives: (a) describe SBAE teachers' perceptions of connectivity within the areas of community, curriculum, school, and other SBAE teachers, (b) describe SBAE teachers' perceptions of career commitment, and (c) model the relationship between SBAE teachers' perceptions of connectivity and career commitment.

Methods

The current analysis of connectivity and career commitment among SBAE teachers was completed using survey research methods. An online survey was utilized to collect data from a national sample of teachers to provide a holistic view of teacher connectivity and commitment across the United States.

Population, Sample, and Data Collection

All SBAE teachers during the 2018-2019 school year served as the population for the study. The frame for this population was managed by the National FFA Organization, which collects teacher contact information through the chapter registration process. A simple random sample of 750 teachers was obtained from the National FFA Organization. Frame error reduced the sample by 45 respondents, resulting in a final frame of 705 teachers. Data collection, which included up to four email invitations to respond, aligned with Dillman's (2007) tailored design method and was conducted in March and April of 2019. In total, 237 responses were received; however, 24 surveys were unusable due to the scope of missing data, yielding a usable response rate of 30.21% (n = 213) which is consistent with response rates using the same frame (e.g., McKim, 2016; Sorensen, 2015). Non-response bias was analyzed by comparing on-time respondents (i.e., teachers responding within the first three points of contact; n = 207) to late-respondents (i.e., teachers responding after the final point of contact; n = 30) using an independent samples t-test for the four connectivity constructs and career commitment. No statistical differences were identified (p-values ranged from .381 to .778), suggesting non-response bias was not an issue (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983).

Instrumentation

The current study includes five constructs of interest, (a) community connectivity, (b) curricular connectivity, (c) school connectivity, (d) SBAE teacher connectivity, and (e) career commitment. Responses for each item within the five constructs was measured on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree)*. The researcher-developed, community connectivity construct was comprised of five questions (e.g., "I feel that I have many personal connections in the community") designed to measure connection between the teacher and the community in which their program resides. The research-developed, curricular connectivity construct was made up of seven questions (e.g., "I have full autonomy to decide what topics I

teach") measuring the connection respondents had to the curriculum they taught. The researcher-developed, school connectivity construct also included seven items (e.g., "I feel connected to the teachers at my school") designed to measure connection to fellow teachers and administrators within the school in which respondents taught. The researcher-developed, SBAE teacher connectivity construct included seven items (e.g., "I feel included when I am among fellow agriculture teachers") measuring connection to peer agriculture teachers among respondents. The career commitment scale (developed by Sorensen, 2015) included eight items (e.g., "I plan to remain teaching agriculture until I am eligible to retire") designed to measure commitment to remain as a SBAE teacher.

Validity and Reliability

A panel of experts, including four faculty in SBAE with expertise in social science research, were used to evaluate face and content validity. Feedback from the panel of experts was used to expand the content coverage of connectivity items, resulting in a more comprehensive assessment of connectivity constructs. Reliability of the five constructs was evaluated via a pilot test of 118 business teachers in Michigan. *Pilot test* reliability estimates suggested four of the five constructs were reliable (i.e., Cronbach's alpha for community connectivity = .88, school connectivity = .90, SBAE teacher connectivity = .88, and career commitment = .87). The one construct not reliable on the pilot test was the curriculum construct (i.e., Cronbach's alpha = .54). After consultation with the panel of experts, it was determined that differences in how business teachers and SBAE teachers relate to curriculum could have impacted the reliability of the construct; therefore, it was recommended to retain the construct within the data collection used in the current study. *Post hoc* reliability assessments suggested that each of the five constructs (i.e., Cronbach's alpha for community connectivity = .89, curricular connectivity= .72, school connectivity = .81, SBAE teacher connectivity = .89, and career commitment = .92) were reliable (Fraenkel & Wallen, 2000; Nunnally & Bernstein, 1994).

Data Analysis

The first research objective, in which perceptions of connectivity were sought, was accomplished by reverse coding appropriate items within the connectivity constructs and averaging responses to obtain a single construct score. Minimum, maximum, means and standard deviations for community, school, curricular, and SBAE teacher connectivity constructs are reported in the findings. Similarly, the second research objective, focusing on career commitment, was accomplished by reverse coding appropriate items and averaging responses to form a single career commitment score. As with connectivity scores, career commitment is reported using a minimum, maximum, mean, and standard deviation.

The third research objective, in which career commitment was modeled by perceptions of connectivity, a multiple linear regression was completed. To run this analysis, data were first checked for the assumptions of multiple linear regression (i.e., linearity, multivariate normality, absence of multicollinearity, homoscedasticity) with no violations found. Then, the four connectivity constructs were included in the model simultaneously as independent variables predicting career commitment, the dependent variable. Results from the model, including overall model statistics and statistics for individual predictors, are included in the findings.

Description of Respondents

Respondents to the survey were from 42 states and Puerto Rico with Texas (25), California (10), Georgia (10), and Kansas (10) being the most well-represented states. On average, respondents had 12.46 (*SD* = 10.51) years of teaching experience. The majority of respondents (75.10%) completed a traditional agriculture teacher education program (i.e., undergraduate or graduate degree in agriculture education). The largest proportion of respondents (50.80%) reported a Bachelor's Degree as their highest level of education, followed by Master's (47.70%), Associates (1.0%), and Ph.D. (0.50%). On average, respondents had 129.08 (*SD* = 123.38) non-duplicated students enrolled in their SBAE program during the 2018-2019 school year.

Findings

In research objective one, a description of four elements of connectivity was sought (see Table 1). The highest rated element of connectivity was within the curricular construct (*M* = 5.45, *SD* = 0.82) followed by connection to fellow SBAE teachers (*M* = 5.11, *SD* = 1.24) and the community in which the school was located (*M* = 5.06, *SD* = 1.30). The lowest perception of connectivity was identified among colleagues within the school (*M* = 4.50, *SD* = 1.21), which included teachers in other subject areas and administrators.

Table 1

Perceptions of Connectivity and Career Commitment

Constructs	*n*	Minimum	Maximum	Mean	Standard Deviation
Curricular Connectivity	205	2.71	7.00	5.45	0.82
SBAE Teacher Connectivity	208	1.43	7.00	5.11	1.24
Community Connectivity	198	1.00	7.00	5.06	1.30
Career Commitment	211	1.00	7.00	4.61	1.52
School Connectivity	179	1.17	7.00	4.50	1.21

Note. Responses for each item within the five constructs was measured on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Number of responses for each construct varies due to missing data.

Research objective two shifts focus from connectivity to career commitment (also see Table 1). On average, respondents rated their career commitment a 4.61 (*SD* = 1.52), which placed the average response between the "Neither Agree nor Disagree" and "Somewhat Agree" on statements associated with career commitment.

In research objective three, the relationship between the four elements of connectivity and career commitment were modeled (see Table 2). Results indicated the model, which included community connectivity, curricular connectivity, school connectivity, and SBAE teacher connectivity as independent variables and career commitment as dependent variables, was statistically significant (*F*-value = 5.65; *p*-value = <.001). In total, the four independent variables predicted 12% of the variance in career commitment (R = .34; R^2 = .12).

Table 2

Model of Career Commitment

	Dependent Variable: Career Commitment					
Predictors	Zero-order correlation (*r*)	*p*-value	*B*	*SEB*	β	*p*-value
Community Connectivity	.21	.004	0.06	0.09	.06	.501
Curricular Connectivity	.20	.005	0.15	0.15	.07	.351
School Connectivity	.28	<.001	0.23	0.10	.19	.022
SBAE Teacher Connectivity	.24	<.001	0.19	0.09	.16	.046

Note. R = .34, R^2 = .12, *F*-value = 5.65, *p*-value = <.001. Items scaled from 1 (*strongly disagree*) to 7 (*strongly agree*).

Within the final model, two of the predictors were statistically significant. The strongest predictor of career commitment was school connectivity (β = .19; *p*-value = .022) followed by SBAE teacher connectivity (β = .16; *p*-value = .046). Both community connectivity (β = .06; *p*-value = .501) and curricular connectivity (β = .07; *p*-value = .351) were statistically insignificant predictors of career commitment.

Discussion and Conclusions

The essential nature of connections to life as an SBAE teacher encourages explorations into the influence of connections on teacher career commitment. As an exploratory investigation, four elements of connectivity were considered, including school, SBAE teacher, curricular, and community connectivity in relation to career commitment. The findings of this study highlight the importance of connectivity to the career commitment of SBAE teachers. Findings support the theoretical framework for this study, the Relational Theory of Working (Blustein, 2011), as well as related studies on high-quality connections (Dutton & Heaphy, 2003), suggesting connections and relationships are critical variables needing consideration in efforts to study and/or support SBAE teacher career commitment.

Some limitations were identified in this study while analyzing data. This study used self-perceived responses and the perceptions of respondents regarding their career commitment. Data could be more generalizable and supported by conducting a longitudinal analysis of the career decisions of SBAE teachers. Additionally, one could argue other areas of connectivity could have been evaluated (e.g., connections to students, FFA) that could provide a more

comprehensive analysis of connectivity among SBAE teachers. While these are certainly limitations of the current study, they are also opportunities for future research on this important topic. Acknowledging the identified limitations, the findings from the current study are discussed henceforth.

School connectivity was found to be the strongest predictor of career commitment; however, respondents felt the least connected in this area. The importance of connections within a school district is supported by the theoretical framework, which identified relationships in the workplace as essential (Jordan, 2008). The lower perceived connectedness between SBAE teachers and other school employees should yield concern as numerous educational studies have identified that lack of connections within a school district increases teacher turnover (Hong, 2010; Hope, 1999; Rinke, 2007; Sass, et al. 2011). A lack of connectedness can create feelings of isolation within the teacher's own school district, which can lead to a relational gap between teachers and administrators (Sass et al., 2011). Weak peer and administrative support have been found to have a large influence on the decision of teachers to leave the profession as it decreases school culture and perceived emotional support (Hong, 2010; Hope, 1999; Sass et al., 2011). A study by Ingersoll and Strong (2011) found feelings of isolation and relational gaps between administrators and teachers within a school district accounted for nearly one-third of teacher dissatisfaction with their career.

In addition to school connectivity, connections with other SBAE teachers was found to be a significant predictor of career commitment. Conversely to school connectivity, respondents reported having a relatively strong connection with other SBAE teachers. The findings support existing research in SBAE suggesting social relationships and connections with other SBAE teachers increase career commitment, with self-efficacy acting as a mediating variable (Korte & Simonsen, 2018). Importantly, however, the high average SBAE teacher connectivity perceived among respondents does not mean all respondents felt connected to their SBAE teaching peers. In fact, 22.10% of respondents rated their average SBAE teacher connectivity a four (out of seven) or lower. This "deeper dive" into the data suggests while many teachers felt connected, there are certainly SBAE teachers who lack connections among their SBAE teaching peers, potentially contributing to the teacher shortage.

In total, the findings both support and add to the Relational Theory of Working. The theory suggests connections within the workplace are essential to satisfaction, resilience, and overcoming obstacles (Blustein, 2011; Jordan, 2008). The statistically significant model of connectivity and career commitment adds evidence supporting the relationships posited within the theory. In addition, the current study expands the reach of the Relational Theory of Working into SBAE literature. However, the most important contribution to the theory might be the operationalization of multiple facets of connectivity. By expanding connectivity beyond a single concept (i.e., relationship with workplace colleagues) to include community, curriculum, and fellow SBAE teachers, this study offers an exciting new approach for scholars using the Relational Theory of Working. Research in other areas (e.g., other content area teachers, nurses, computer scientists) may benefit from a more comprehensive understanding of employee connectedness to include areas of their work beyond connections to workplace colleagues.

Recommendations

As the lowest rated element of connectivity and strongest predictor of career commitment, there is a clear need to help SBAE teachers develop connections within their schools. Educational research has identified ways to increase the connections and support teachers' experience within their school through mentoring programs and interdisciplinary lesson planning (Ingersoll & Kralik, 2004; Ingersoll & Strong, 2011). Mentoring programs allow for novice teachers to gain confidence in their teaching abilities and connect with other teachers by providing a mentor to help guide and support their work in the classroom (Ingersoll & Kralik, 2004; Ingersoll & Strong, 2011). Teacher mentoring programs have been found to simultaneously increase novice teacher performance in the classroom and intentions to remain in the profession (Ingersoll & Strong, 2011). These mentoring programs allow for novice teachers to gain confidence in their teaching abilities and connect with other teachers by providing an in-school mentor to help guide and support their work (Ingersoll & Strong, 2011). Interdisciplinary lesson planning, in which an SBAE teacher works with other academic area teachers to develop and/or teach a lesson, is another opportunity to forge connections within the school. Through participating in interdisciplinary lesson planning, SBAE teachers build relationships with other content area teachers in their school district in hopes of improving their perceived emotional support and school culture (Rodgers & Skelton, 2014).

SBAE teacher connections were also found to be statistically significant in the prediction of career commitment; therefore, authors recommend new and beginning teachers be given an onboarding experience focused on SBAE cultural awareness and targeted relationship building. The Relational Theory of Working identified having cultural awareness of the workplace and targeted relationship building as the building blocks for strong relationships (Jordan, 2008). An onboarding experience focused on SBAE cultural awareness would seek to introduce new and beginning teachers to district, state, regional, and national norms and unwritten rules of teaching SBAE. Topics could include common attire during professional development experiences, teacher roles during leadership contests, expected attendance at unscheduled social gatherings, and a variety of other norms. Targeted relationship building among new and beginning teachers should focus on fostering mutual empathy and empowerment among participants, which the theoretical framework identifies as the two characteristics of growth-fostering relationships (Jordan, 2008).

Research modeling mentoring participation, interdisciplinary collaborations, and career commitment is needed as a next step to inform interventions attending to the connectedness and career commitment of SBAE teachers. Although the averages found for each construct were relatively high, the findings of this study suggest there are outliers who are not feeling as connected as others in the SBAE community. Future research is needed to identify factors that impact connectivity in SBAE, as well as identify how sub-populations (e.g., alternatively certified teachers, novice teachers, etc.) vary in their levels of connectivity.

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A Longitudinal Study on the Impact of Time Spent Student Teaching on the Decision to Enter the Field

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Abstract

Due to the lack of qualified agricultural education teachers needed to fill yearly vacancies on the secondary level, educators at Texas Tech University conducted a longitudinal study concerning how student teachers spend their time during their student teaching experience in an attempt to identify if this time spent has an impact on the decision to enter the field. Findings showed student teachers were engaged for a total of 713.83 to 931.23 hours on average during their student teaching experience. Longitudinally, time spent in the classroom, in FFA activities, and in SAE observations varied at different points in the semester. 18-28% of the variance in the decision to student teach may be explained by the amount of time grading student work and with laboratory preparation and maintenance. Recommendations for practice include encouraging student teachers to participate in as many activities as possible. Further research should be conducted to identify more factors influencing the decision of student teachers to enter the field.

Introduction

The supply gap of agricultural education teachers has been identified as one of the most important and pressing issues in the profession (Myers, Dyer, &Washburn, 2005). In fact, in more than 50 years, there has not been a time where there was an adequate supply to fill the available positions and vacancies (Kantrovich, 2007). In 2009 the supply and demand data indicated a 26% shortage of qualified graduates needed to fill available positions across the nation (Kantrovich, 2010).

Some of the chronic shortage is a result of the high demand to fill attrition-based vacancies. In the most recent supply and demand report published by the American Association for Agricultural Education (AAAE), over 500 vacancies were created by individuals leaving the profession completely rather than moving laterally between states or retirement (Smith, Lawver, & Foster, 2018). Stress, burnout, and conflicts caused by the struggle to balance work and life expectations are some of the causes leading to the decision for teachers to choose another career (Ingersoll & Smith, 2003). Workload and finding a balance in workload expectations have been the subjects of multiple studies and have helped generate a better perspective on what is creating attrition based vacancies (Sorenson, McKim, & Velez, 2016; Hainline, Ulmer, Ritz, Burris, & Gibson, 2015; Murray, Flowers, Croom, & Wilson, 2011).

Investigating the causes for the high demand of agricultural education teachers is only part of the solution for addressing the shortage. A look at the supply side is needed as well. Camp, Broyles, and Skelton (2002) suggested the shortage of qualified agricultural education teachers was a result of agricultural teacher preparation programs not graduating enough newly certified

candidates. To combat this issue, recruitment campaigns like the national “Teach Ag” program have been created to help increase the number of students entering teacher certification.

Low collegiate level enrollment numbers are only part of the problem associated with the short supply of agricultural education teachers. Parmly, Bowen, and Warmbrod (1979) suggested the problem with filling vacancies was not a function of too few students graduating, but rather from a low percentage of newly certified teachers entering the field. This position was supported by Kantrovich (2007) who found only 53% of new graduates in agricultural education teacher certification programs entered the profession. This was followed with another study showing only 70% of new teachers entering the field (Roberts, Greiman, Murphy, Ricketts, & Harlin, 2009) and further supported by Lawver and Torres (2011) who concluded the number of vacant positions was smaller than the number of graduates available to fill the positions.

Theoretical Framework

The theoretical underpinning of this study is the connection between student teaching experiences and Bandura’s theory of self-efficacy. Bandura (1986) described self-efficacy as a person’s perceptions toward their ability to plan and execute actions in a specific area and identified mastery experiences, vicarious experiences, social persuasion, and emotional/physical states as key developmental influencers of self-efficacy.

Within this study we primarily focused on mastery and vicarious experiences. Mastery experiences are activities engaged directly by the individual. Bandura (1986) concluded the more positive experiences one has in completing a task, the more self-efficacy one will have in that area. The connection between time engaged in an activity and increased confidence in the activity was supported by McKim and Velez (2017) who noted a connection between time spent in leadership activities and leadership self-efficacy.

Vicarious experiences are those events in which an individual observes another engaged in an area of interest. Within the context of student teaching, these activities could be observing a cooperating teacher, watching other student teachers or teachers in a different field, and reflecting on shared experiences with peers. Aside from mastery experiences, vicarious experiences are the second greatest influencer on self-efficacy development (Bandura, 1977).

Social persuasion is the feedback one receives prior to or after engaging in an activity. In a student teaching experience, this is most often in the form of feedback from university supervisors and cooperating teachers but may also come from peers or family members. Physiological and emotional states are the physical and emotional feelings one is experiencing before, during, and after completing a task. Although studies have linked social persuasion and physical/emotional states to self-efficacy beyond Bandura’s writings (Clark, Byrnes, & Sudweeks, 2015), the literature is limited regarding their influence on self-efficacy development contributing to the difficulty in measuring the constructs (Wolf, Foster, & Birkenholz, 2010).

This study adopted the conceptual model presented in Figure 1 which depicts the relationships between the elements of social persuasion and student teaching experiences. It is based on the idea that a student enters the student teaching experience with certain levels of self-efficacy

driven by past experiences and social persuasion factors. During student teaching, individuals have extended opportunities for mastery and vicarious experiences that, when coupled with social persuasion factors following student teaching, lead to a career decision regarding entering the classroom (Frost, Rayfield, Lawver, & Ritz, 2018).

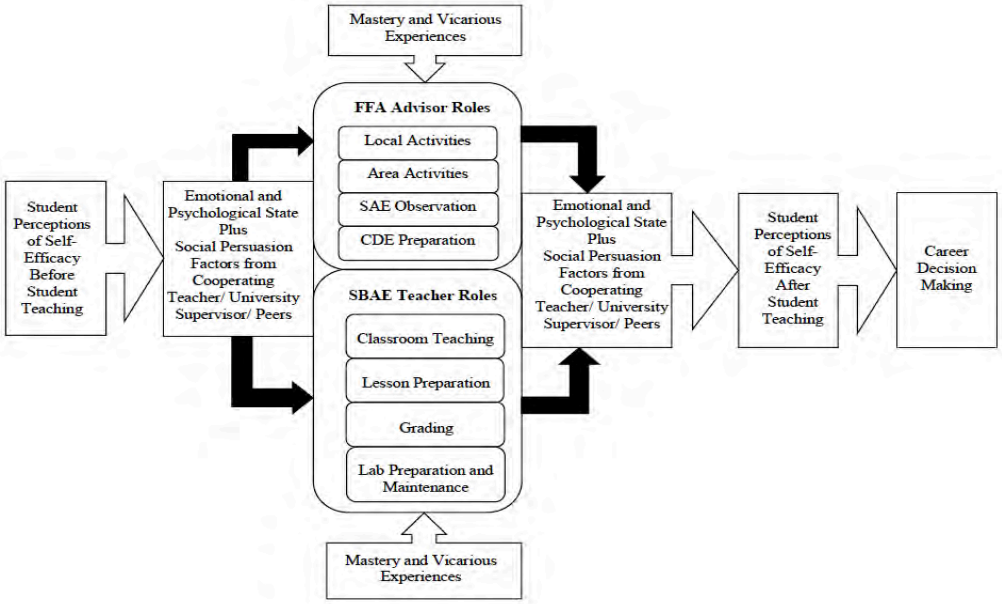

Figure 1. Conceptual model of self-efficacy development routes during the student teaching process (Frost et al., 2018).

Purpose and Objectives

Because of the shortage of teachers choosing to enter the profession and the reported connection between heavy student teaching workload and early burnout (Fives, Hamman, & Olivarez, 2007), the teacher educators at Texas Tech University sought to critically examine the practices associated with its teacher certification program in agricultural education. The purpose of this longitudinal study was to quantify how student teachers spend their time during their student teaching experience at Texas Tech University and determine the impact this time spent has on the decision to teach over a three-year period. The following research objectives were established to guide this study:

1. Compare the time devoted to the student teaching experience of students in the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University.
2. Compare the progression of time spent during the 15-week student teaching experience longitudinally between the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University.
3. Identify members of the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University who entered the field of secondary agricultural education.
4. Determine the relationship between time spent during student teaching and the decision to enter the field of agricultural education as a secondary agricultural education teacher.
5. Determine if there are significant predictors for the decision to teach agricultural education after student teaching based on time spent in student teaching activities.

Methods

This descriptive, longitudinal study was conducted over three years to quantify how agricultural education student teachers at Texas Tech University were spending their time during their experience and to determine the impact this time had on their decision to teach secondary agricultural education. Programmatic data were collected from the spring student teaching cohorts from 2017 (n = 15), 2018 (n = 21), and 2019 (n = 22) for a total of N = 58. As part of their course requirements, student teachers submitted weekly reports documenting hours worked. Student teachers classified their time in categories based on the work of Torres and Ulmer (2007). The categories were the following: 1) Observing Cooperating Teacher, 2) Conferencing with Cooperating Teacher, 3) Preparation for Instruction, 4) Classroom/Laboratory Teaching, 5) Laboratory Preparation and/or Maintenance, 6) Grading/Scoring Students' Work, 7) Administrative Duties (Program Management), 8) Professional Activities (Meetings, In-service), 9) SAE Observations and Livestock Shows, 10) Local FFA Activities, 11) District, Area, and State FFA Activities, 12) CDE Preparation, and 13) Adult Education.

Students in the 2017 and 2018 cohorts submitted reports using a Microsoft Word template that was completed and emailed to their university supervisor at the end of each week. The 2019 cohort used a Qualtrics instrument that was developed, identical in content to the original Microsoft Word template. The electronic survey was distributed every Monday morning and was submitted by the end of the week. Weekly data were collected and entered into Microsoft Excel spreadsheets, organized, and checked for missing or incomplete data. Any student reporting data sets with missing or abnormal values were contacted and the issues were corrected.

Data from the included years were combined into a single set and exported to IBM SPSS v 25.0 for analysis. Means, standard deviations, minimums, maximums, frequencies and percentages were calculated for descriptive data. A Pearson point-biserial correlation was calculated to determine the relationship with time spent student teaching and the decision to teach. This study met the requirements of Fraenkel, Wallen, and Hyun (2012) in that correlational research should be conducted with a minimum sample size of 30. Statistical significance was established a priori at a p-value of .05. To determine how much variance in the decision to teach that could be predicted by time spent engaged in student teaching activities, a logistic regression was calculated. All assumptions described by Field (2018) were met since the model was linear, constant, normally distributed and the variables were all the appropriate type for the model.

Findings

The first objective of this study was to compare the time devoted to the student teaching experience by students in the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University. To accomplish this objective, hourly information reported by student teachers was compiled and analyzed by cohort for the different areas identified by Torres and Ulmer (2007). During the 2017 student teaching cohort, the average greatest amount of time over the 15-week period was spent in classroom/laboratory teaching (M = 154.03, SD = 80.20). Closely behind was district, area, and state FFA activities with an average of (M = 114.60, SD = 132.44) total hours dedicated to the activity over the semester. A minimum of 0.0 hours and a maximum of

535.0 hours was reported for time in district, area, and state FFA activities. The lowest level of student teacher engagement was in professional activities (*M* = 8.37, *SD* = 7.67). Finally, the 2017 student teaching cohort averaged a total of (*M* = 713.83, SD = 155.37) hours of engagement in the student teaching process over 15 weeks. For a complete summary of the 2017 cohort student teaching hours, refer to Table 1.

Table 1

Average Hours Spent Student Teaching for the 2017 Cohort Over a 15 Week Period (n = 15)

Time Category	*M*	*SD*	Min.	Max.
Observing Coop. Teacher	87.10	60.77	12.0	212.0
Conference with Coop. Teacher	43.39	30.06	0.0	113.0
Preparation for Instruction	60.27	40.04	15.5	156.0
Classroom/Laboratory Teaching	154.03	80.20	43.0	291.5
Laboratory Prep/Maintenance	21.50	29.23	0.0	113.0
Grading/Scoring Students' Work	35.33	17.40	9.0	72.0
Administrative Duties	13.30	32.70	0.0	131.0
Professional Activities	8.37	7.67	0.0	30.5
SAE Observations and Shows	66.67	101.00	0.0	413.5
Local FFA Activities	51.80	55.89	4.5	196.0
District, Area, State FFA Act.	114.60	132.44	0.0	535.0
CDE Preparation	48.67	22.09	10.0	78.5
Adult Education	8.80	17.84	0.0	70.0
Total Student Teaching Hours	713.83	155.37	385.0	1,079.0

In the 2018 student teaching cohort, there is a slight increase from the 2017 cohort in average total hours reported for the semester (*M* = 762.54, *SD* = 186.66). Hours spent in classroom/ laboratory teaching were similar at (*M* = 165.43, *SD* = 65.08). There was a decrease in hours devoted to district, area, and state FFA activities with the 2018 cohort (*M* = 71.56, *SD* = 52.97). Time spent on SAE observations and attending livestock shows (*M* = 149.05, *SD* = 167.53) was higher than that of the 2017 cohort. The minimum time reported for SAE observation and livestock show attendance was 0.0 hours while the maximum reported was 668.0 hours. Engagement in adult education was the lowest area reported with an average of (*M* = 0.48, *SD* = 1.36). A summary of the hours spent student teaching for the 2018 cohort is presented in Table 2.

Table 2

Average Hours Spent Student Teaching for the 2018 Cohort Over a 15 Week Period (n = 21)

Time Category	*M*	*SD*	Min.	Max.
Observing Coop. Teacher	88.31	62.53	2.0	229.5
Conference with Coop. Teacher	30.98	19.70	0.0	56.5
Preparation for Instruction	72.65	47.00	0.0	178.0
Classroom/Laboratory Teaching	165.43	65.08	38.0	272.0
Laboratory Prep/Maintenance	24.69	19.37	0.0	63.5
Grading/Scoring Students' Work	29.75	18.13	6.0	60.5
Administrative Duties	9.90	15.75	0.0	67.5

Professional Activities	14.61	14.08	0.0	48.0
SAE Observations and Shows	149.05	167.53	0.0	668.0
Local FFA Activities	43.39	48.32	2.0	180.0
District, Area, State FFA Act.	71.56	52.97	0.0	217.0
CDE Preparation	61.74	48.35	0.0	217.0
Adult Education	0.48	1.36	0.0	5.0
Total Student Teaching Hours	762.54	186.66	475.25	1,128.5

On average student teachers from the 2019 student teaching cohort were engaged in more total hours of experience for the entire semester (*M* = 931.23, *SD* = 161.11) than the students in the 2017 and 2018 cohorts. There was also an increase in time spent on classroom/laboratory teaching (*M* = 246.00, *SD* = 62.36) and SAE observations and livestock show attendance (*M* = 208.27, *SD* = 108.15). The area of lowest participation reported for the 2019 cohort was administrative duties (*M* = 7.77, *SD* = 10.65). The complete breakdown for the average time spent student teaching for the 2019 cohort over a 15-week period is presented in Table 3.

Table 3

Average Hours Spent Student Teaching for the 2019 Cohort Over a 15 Week Period (n = 22)

Time Category	*M*	*SD*	Min.	Max.
Observing Coop. Teacher	62.05	38.89	0.0	162.0
Conference with Coop. Teacher	39.32	30.94	3.0	121.0
Preparation for Instruction	115.05	68.05	20.0	245.0
Classroom/Laboratory Teaching	246.00	62.36	109.0	354.0
Laboratory Prep/Maintenance	19.86	23.06	0.0	74.0
Grading/Scoring Students' Work	32.18	26.72	1.0	86.0
Administrative Duties	7.77	10.65	0.0	38.0
Professional Activities	16.95	14.63	1.0	55.0
SAE Observations and Shows	208.27	108.15	47.0	480.0
Local FFA Activities	30.55	34.71	0.0	144.0
District, Area, State FFA Act.	55.14	41.10	0.0	144.0
CDE Preparation	81.36	81.99	0.0	296.0
Adult Education	16.73	47.98	0.0	227.0
Total Student Teaching Hours	931.23	161.11	579.0	1,268.0

The second objective of this study was to compare the progression of time spent during the 15-week student teaching experience longitudinally between the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University. For total hours spent student teaching, students reported a generally low number of hours for Week 1 (*M* = 36.17, SD = 16.89) in 2017, (*M* = 49.48, SD = 17.69) in 2018, and (*M* = 62.55, SD = 17.96) in 2019. A general increase in hours was observed through Week 5, where there begins to be some variability between cohorts. The last third of the semester, there was a general gradual decrease in total hours reported, ending with (*M* = 34.70, *SD* = 16.89) in 2017, (*M* = 45.38, *SD* = 15.16) in 2018, and (*M* = 53.09, *SD* = 12.79) in 2019 for Week 15. A comparison of total hours for all 15 weeks for the 2017, 2018, and 2019 cohorts is presented in Figure 2.

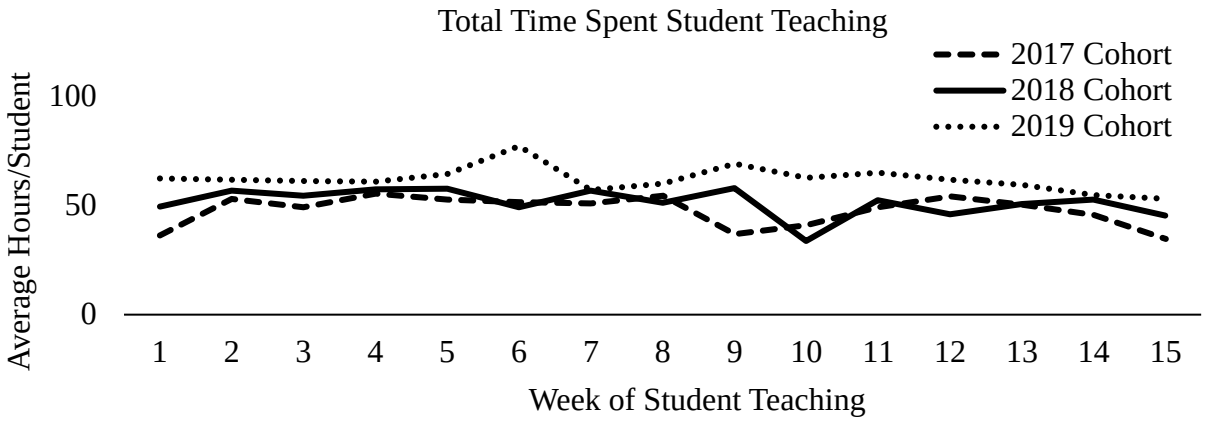

Figure 2. Comparison of the weekly progression of total hours student teachers were engaged in the student teaching process for 2017, 2018, and 2019 cohorts.

To compare the progression of instructor activities throughout the semester, hours were summed for preparation for instruction, classroom/laboratory teaching, laboratory preparation and/or maintenance, and grading/scoring students' work. A general increase was reported from the beginning of the semester until about Week 5 in instructor activities. There was a consistent decline in instruction for Week 7 across all three cohorts with (M = 10.77, SD = 7.56) in 2017, (M = 13.04, SD = 14.63) in 2018, and (M = 8.14, SD = 7.44) in 2019. Student teachers finished the semester with instructor hours greater than Week 1 across all three cohorts. A comparison of instructor hours reported for the 15 weeks of the three cohorts is presented in Figure 3.

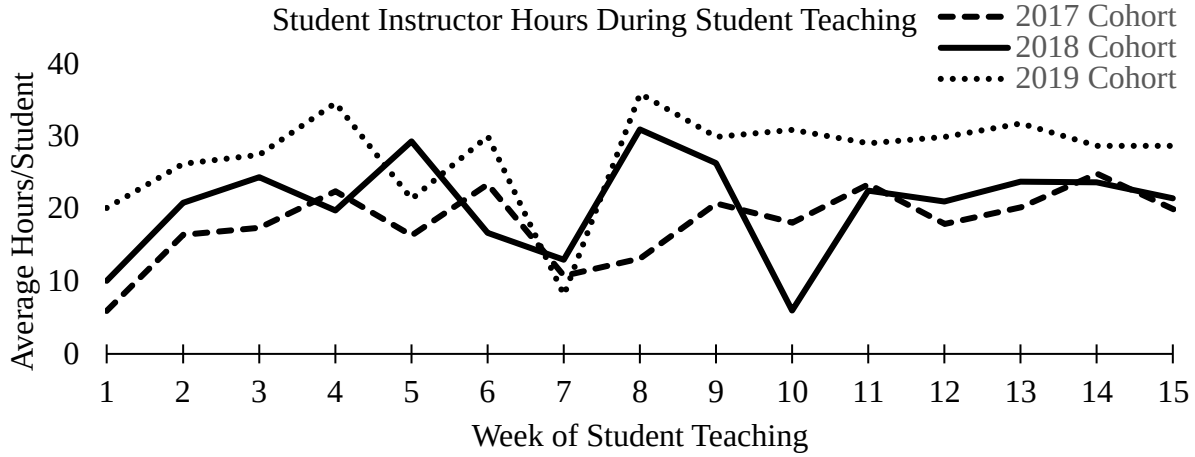

Figure 3. Comparison of the weekly progression of instructor hours student teachers were engaged in during the student teaching process for 2017, 2018, and 2019 cohorts.

A comparison of total FFA hours was conducted by summing the hours reported for local FFA activities, district, area, and state FFA activities, and CDE preparation. The greatest amount of time reported for FFA activities was generally reported in the second half of the semester. In 2017 this occurred in Week 8 (M = 31.03, SD = 30.54), in 2018 it occurred in Week 13 (M =

23.88, SD = 16.27) and in 2019 it occurred in Week 11 (*M* = 30.73, *SD* = 17.53). The 15-week comparison for FFA hours during student teaching for all three cohorts is presented in Figure 4.

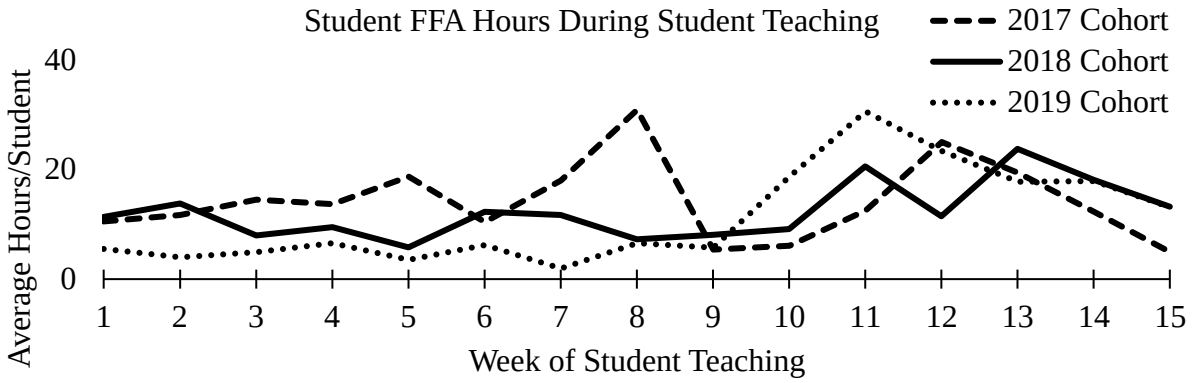

Figure 4. Comparison of the weekly progression of FFA hours student teachers were engaged in during the student teaching process for 2017, 2018, and 2019 cohorts.

Finally, a comparison was conducted of SAE observation and livestock show attendance hours reported by student teachers in the 2017, 2018, and 2019 student teaching cohorts. There are two points in the semester when SAE hours for student teachers peak; during the late first half of the semester and early in the second half of the semester. For all three cohorts, the maximum average hours reported for SAE observation and livestock show attendance occurs during the first half of the semester. The 2017 cohort peaked at (*M* = 11.70, *SD* = 22.34) in Week 5 and the 2018 and 2019 cohorts peaked at (*M* = 27.12, *SD* = 34.44) and (*M* = 33.59, *SD* = 29.05) respectively in Week 7. A complete comparison of average SAE hours reported by student teachers over 15 weeks is presented in Figure 5.

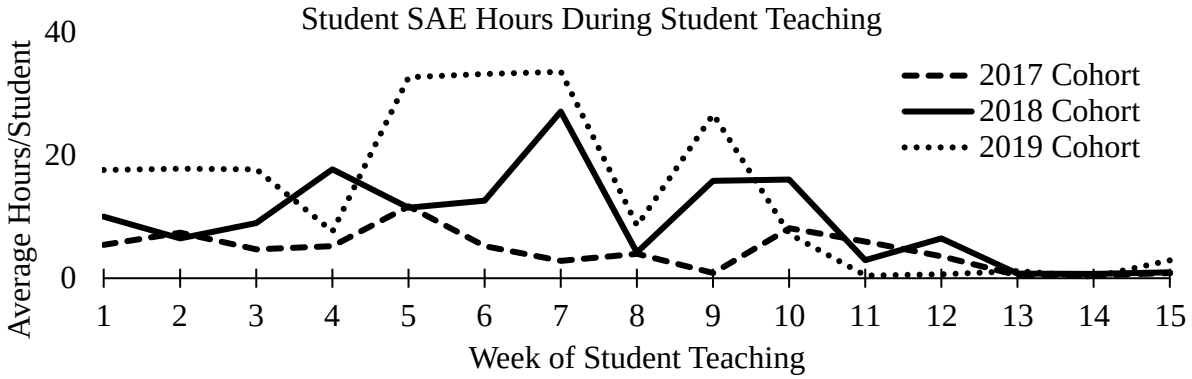

Figure 5. Comparison of the weekly progression of SAE hours student teachers were engaged in during the student teaching process for 2017, 2018, and 2019 cohorts.

The third objective of this study sought to identify members of the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University who entered the field of secondary agricultural education. In the 2017 cohort (*f* = 13, 86.7%) entered the field, resulting in the greatest percentage teaching high school agricultural education. The 2019 student teaching cohort had the

lowest percentage of students entering the field (*f* = 16, 72.7%) with the 2018 student teaching cohort slightly above (*f* = 16, 76.2%). A summary of those choosing to teach secondary agricultural education is presented in Table 4.

Table 4

Decision to Enter the Field of Secondary Agricultural Education (N = 58)

	Teaching		Not Teaching	
Cohort	*f*	%	*f*	%
2017 (*n=15)*	13	86.7	2	13.3
2018 (*n=21)*	16	76.2	5	23.8
2019 (*n=22)*	16	72.7	6	27.3
Totals	45	77.6	13	22.4

The fourth objective of this study was to determine the relationship between time spent during student teaching and the decision to enter the field of agricultural education as a secondary agricultural education teacher. Grading/scoring students' work (r_{pb} = -.32, p = .02) was the only category with a moderate relationship (Davis, 1971). The remaining categories were either low or negligible relationships. A complete list of correlation coefficients for time spent student teaching and the decision to teach is presented in Table 5.

Table 5

Relationships Between Time Spent Student Teaching and Decision to Teach (N = 58)

Student Teaching Time Category	Teaching Decision (r_{pb})
Grading/Scoring Students' Work	-.32*
Laboratory Preparation and/or Maintenance	.19
Overall Total Hours Spent Student Teaching	.18
FFA Activities – Local Level	.18
Professional Activities (Meetings, In-Service)	.16
Conference Time with Cooperating Teacher	.10
SAE Observations and Recording (Including Livestock Shows)	.09
CDE Preparation	.08
Adult Education	.08
Administrative Duties – Program Management	.08
FFA Activities – District, Area, and/or State Level	.08
Preparation for Instruction	-.07
Classroom/Laboratory Teaching	.04
Observing Cooperating Teacher	-.06

Note. Decision to teach coding: Decision not to teach = 0, Decision to teach = 1; *p < .05.

The final objective of this study sought to determine if there were any significant predictors for the decision to teach agricultural education after student teaching based on time spent engaged in student teaching activities. Since the decision to teach is a binary variable, a logistic regression was calculated. Before results of the logistic regression can be interpreted, a goodness of fit must be examined for the model. According to the Hosmer and Lemeshow Test, χ^2 = 3.48 and p = .45,

therefore it is not statistically significant ($\alpha > .05$) indicating an acceptable fit of the model. Results for the Hosmer and Lemeshow Goodness of Fit Test are presented in Table 6.

Table 6

Hosmer and Lemeshow Goodness of Fit Test

	χ^2	*df*	*p*
Step 1	3.48	8	.45

The initial regression model predicted 77.6% of the cases correctly. The final regression model improved to 81.0% of the cases predicted correctly. Nagelkerke's R^2 (0.285) and Cox & Snell R^2 (0.186) were calculated to determine practical significance of the regression model indicating between 18.6% and 28.5% of the variability in the decision to teach secondary agricultural education after student teaching was explained by the variables in the model. Grading student work and laboratory preparation and maintenance were the only two predictors that were statistically significant at the $\alpha = .05$ level and so were included in the model. Overall model results for the two predictors are presented in Table 7.

Table 7

Summary of Logistic Regression Analysis Predicting Decision to Teach

Predictor	*B*	*SE*	*OR*	95% CI	Wald	*p*
Grading Student Work	-0.05	0.02	0.95	[0.92, 0.99]	7.85	.01
Lab Preparation and Maintenance	0.04	0.02	1.04	[1.00, 1.08]	4.58	.03

Note. Alpha level for significant *p*-value established at .05 *a priori*.

Conclusions, Implications, and Recommendations

From the findings of this study, conclusions can be drawn about time spent in the student teaching experience and the decision to enter the field. Concerning total student teaching hours completed by each cohort, the 2019 cohort averaged over 150 hours more than cohorts of the previous two years. As with the previous two cohorts, the 2019 group spent the greatest portion of their student teaching experience engaging in classroom/laboratory instruction. The extended practice with classroom/laboratory instruction should theoretically improve their self-efficacy in teaching ability according to Bandura's self-efficacy theory. In the area of SAE observations and livestock show attendance, the 2018 and 2019 student teaching cohorts had substantially higher participation rates than the 2017 student teaching cohort, while at the same time the 2017 student teaching cohort reported higher district, area, and state FFA time than in 2018 and 2019. This may in part be due to the location of student teacher placements. In Texas some programs have a higher emphasis on attending major livestock shows, while other programs have a higher emphasis on FFA CDE participation or classroom teaching during the spring semester.

Typically, at the beginning of the semester, student teachers are instructed to spend more time observing their cooperating teacher. The 2019 student teaching cohort averaged approximately 100 hours more in classroom/laboratory instruction than the previous two cohorts. The 2019

cohort also reported approximately 25 hours less in cooperating teacher observation, indicating they may have been able to start teaching earlier in the semester or they may have been allowed to teach a greater number of classes earlier in the semester. From the weekly longitudinal data, it can be seen that student teachers in the 2019 student teaching cohort started the semester teaching more hours weekly than in 2017 and 2018. With the exception of a few weeks, the 2019 cohort remained above the other two cohorts in terms of instruction time, supporting the possibility that the student teachers may have been assigned to teach more class periods per day.

By examining the weekly longitudinal data, a few trends emerged. The 2019 student teaching cohort consistently reported a higher total average in time spent engaged in the student teaching process compared to the 2017 and 2018 student teaching cohorts. This indicates these student teachers were more involved in the process on average than those of the previous two years. Concerning hours dedicated to instruction and preparation for instruction, all three cohorts reported a decline in time spent in this area during Week 7. This aligns with a major livestock show frequently attended by most schools in the state, the San Antonio Livestock Show. There is also some variability between the three cohorts between weeks four and 10. This likely can be explained by other major livestock shows in the state such as the Houston Livestock Show and Rodeo. Depending on which species of livestock a program emphasizes will determine when and where the program attends a livestock show, resulting in less classroom/laboratory instruction.

Aligning with the same period of time, weeks four through 10, the number of hours reported for observing SAE projects and attending livestock shows is the greatest. After week 10 there is a sharp decline to nearly no time dedicated to SAE observations. This is likely due to the end of livestock showing and sale of animals. While there are still a few SAEs to observe at the end of the school year that are not livestock projects, the greatest number of SAEs are animal related and therefore will be sold at that time.

In the last five weeks of the semester, there is an increase in reported student teacher hours dedicated to FFA activities. In Texas most FFA CDEs occur in April and early May, aligning with this increase in time spent. Some schools will attend invitational competitions, while most will attend area and advance to state level competitions. Advancement of teams and attendance of invitational CDEs likely contribute to the variability of the time spent between cohorts. Many district and area level FFA conventions take place during this time period too. At conventions FFA award and degree checks occur, requiring more time to help with these activities.

From the longitudinal data, it can be concluded student teachers are engaged in all three areas of agricultural education: classroom instruction, FFA, and SAE. These occur at various times in the semester, however the quantity of time dedicated to each area is similar. Student teachers that participate in all three areas of an agricultural program during their experience should in theory be exposed to many different activities to help them become more efficacious in directing a well-balanced program of their own in the future. However, according to Fives, Hamman, and Olivarez (2007), high workloads placed on student teachers may create early burnout, impacting their decision to enter the field. Is this the case with agricultural education student teachers?

To answer the early burnout question, the number of student teachers who chose to enter the field must be determined. This study found an overall average of 77.6% chose to teach secondary

agricultural courses after student teaching. When this decision is correlated with the different categories of time measured during their experience, only grading student work had a significant, moderate correlation. This indicates the amount of time spent student teaching likely is not related to whether or not a student teacher decides to enter the field. Concerning grading student work, the negative correlation indicates the more time a student teacher spends grading student work, the less likely he or she will decide to teach. According to the regression analysis from this study, roughly 18-28% of the decision to teach can be predicted by combining time spent grading and the amount of time a student teacher works on laboratory preparation and maintenance. Even with this information, there is still roughly 72-82% unknown for what affects the decision.

An implication of this study is the contradiction of the work of Fives, Hamman, and Olivarez (2007). The number of hours agricultural education student teachers are engaged in the student teaching process does not seem to create early burnout or prevent them from choosing to enter the field. Another area of interest was the percentage of students deciding to teach in the student teaching program at Texas Tech University was slightly higher compared to results reported in previous studies (Kantrovich, 2007; Roberts et al., 2009). Furthermore, the conclusions from the regression analysis of this study may indicate student teachers do not enjoy grading papers but may enjoy time in the laboratory. This information could be valuable for teacher education programs interested in improving student teaching experiences.

Several recommendations for practice emerged from this study. Teacher educators should encourage their students to engage in as many activities as possible during their student teaching experience so the students will have the opportunity to gain the most knowledge and experience. The allocated time for student teaching is limited at most institutions, therefore student teachers should be encouraged to participate in as many experiences related to secondary agricultural education teaching roles as possible, even if it is outside of the allocated student teaching time. Experiences such as attending district, area, and state meetings or conventions, degree checks, leadership and career development events, and livestock validations are all events that can reap additional benefits for a student teacher by increasing their awareness of their future obligations. However, caution should be exercised when recommending student teachers do as much as possible during the semester in order to prevent early burnout as identified by Fives, Hamman, and Olivarez (2007). Since there was a negative correlation with decision to enter the field of teaching and the amount of time spent grading student work, teacher educators should instruct their students in ways to grade or evaluate students more efficiently.

Further research should be conducted to identify what amount of time spent student teaching causes early burnout. Additional research should also be conducted at other institutions across the country to see if there are similar results on the decision to enter the field and to compare how student teachers are spending their time during the experience. Another area of research that should be conducted is gathering self-efficacy information from student teachers during their student teaching experience to determine if there is a relationship with time spent in student teaching activities and levels of self-efficacy. With little evidence pointing to time spent student teaching influencing the decision to enter the field, additional efforts should be made to identify reasons why pre-service teachers decide against entering the field to combat the problem of reoccurring teacher shortages.

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Then What? Quantifying SBAE Teacher Career-Decisions Post-Migration

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Abstract

Complex career decisions, such as teacher mobility, are often reduced to stigmatizing labels that do little to account for the state of teaching as a profession or credit those engaging in migratory decisions as making healthy career choices. Through our study, we focus on understanding workforce mobility, teaching as an unstaged profession, and the current quantifications existing around SBAE teacher migration. We draw on over 100 years of data from California as we quantitatively explore and synthesize the career decisions of migrating SBAE teachers. This snapshot offers a means of understanding the Teacher Career Cycle (Fessler & Christensen, 1992) in light of the implications for the teaching career as a series of choices rather than a stretch of time at an individual school. Implications of this conceptualization of migration stretch beyond SBAE to administration and those tasked with supporting the career trajectory of SBAE teachers across the United States.

Introduction

Job-hoppers is the popular term used to describe Millennials' habits in the workforce (Premack, 2018). However, little data exists, to understand this stigma as a beneficial series of choices over a career. Within School Based Agricultural Education (SBAE), the emerging study of teacher migration focuses on teachers' bettering their careers through horizontal moves between school districts (Haddad, Velez, & Stewart, 2019). Based on current research, *teacher migration* describes the phenomenon of complex career decisions yielding a more desirable teaching situation (Haddad et al., 2019). Migration focuses on the teacher where mobility focuses on the school district vacated. Given the emerging nature of this research focus, the purpose of this study is to provide historical-statistical context relative to the ways teachers move within SBAE by identifying the career decisions SBAE migrators make following their first program move.

Perhaps more challenging than understanding migrating teachers' experience is getting a pulse of teacher migration for SBAE as a holistic approach to a career. Considering agricultural education broadly, little research exists to quantify the career decisions SBAE teachers make as they move within the profession. We know they move, but we rarely explore why they are moving or the contextual elements associated with both leaving and joining schools. While we estimate approximately 30% of vacancies are filled by migrating teachers annually (Foster, Lawver, & Smith, 2015; Foster, Lawver, & Smith, 2016; Smith, Lawver, & Foster, 2017, Smith, Lawver, Foster, 2018), the focus is often on the position vacated rather than the position filled. This, understandably, puts SBAE teachers in a difficult situation as they work to change something about their teaching practice. We have previously identified the ways teachers learn and grow through changing the geography of their practice (Haddad et al., 2019). In addition, research in the broader education literature suggests migrators remain consistently less geographically stable than their non-migrating peers (Ingersoll & Smith, 2003). However, little research exists to understand *migration* as a series of complex career decisions rather than simply

a named category that defines a state of being. As we seek to enhance teacher retention, it is vital we explore career choices as a means of supporting multifaceted career processes.

Much of the education literature suggests teachers who move are more likely to move again (Ingersoll & Smith, 2003). In addition, these teachers are identified as less effective than their geographically stable peers (Keesler & Schneider, 2010; Ross, Wang, Sanders, Wright, & Stringfield, 1999; West & Chingos, 2009). From an organizational perspective, it makes sense that schools would seek to retain their top teachers and encourage career longevity in a single location (Ingersoll, 2001). However, when we consider teachers within the system of the school, we see teaching is socialized as a relatively *unstaged* profession (Lortie, 1975). By *unstaged*, we mean teaching as a profession, does not offer vertical mobility options toward career improvement that facilitate keeping teachers in the classroom (Lortie, 1975). While organizational approaches are quick to make connections between public school teachers and other degree seeking professions, teaching does not have the ladder, or stages, of promotion that the staged professions (e.g. medicine, law, etc.) offer, making it difficult to parallel the organizational conditions of schools to the broader workforce (Lortie, 1975). In addition, this *unstagedness* requires teachers seek promotion outside the classroom by becoming an administrator or moving to post-secondary teaching (Lortie, 1975). In this way, the language around migration (i.e. *attrition* and *turnover*) fails to capture the complexity of career decisions employed in SBAE and education more broadly. In other words, since teachers are unable to advance within teaching, it is unfair to label their move as turnover, when in reality the teacher may be making a move toward greater professional growth (Haddad et al., 2019). Highlighting the relatively unstaged profession that is teaching is the Teacher Career Cycle model (TCC) (Fessler & Christensen, 1992). Ironically, this model uses the term *stages* to recognize how teachers move through the emotional phases associated with a career, relative to a teacher's environment (Fessler & Christensen, 1992).

The problem, then, is a lack of accounting for teacher career decisions relative to recognizing teaching as an unstaged profession. Indeed, little is known about SBAE teacher migration in the first place. Our study largely seeks to address this problem through quantifying teacher mobility. The value of this increased understanding lies in helping administrators, researchers, and state FFA staff understand the likelihood of various types of career decisions relative to retaining experienced teachers. In addition to a lack of accounting for the unstagedness of the teaching career, is a lack of terminology describing the complexity of career decisions teachers make. When referenced, migrating teachers generally receive acknowledgement as *movers*, implying mobility is a state of being rather than a complex, one-time choice. In this way, conceptualizing teacher mobility seems to be on a spectrum from researchers identifying mobility as a state of being to mobility as engaging in complex career decisions. We argue, however, while *mover* aptly describes a current position, it is a narrow definition that does not capture the professional choices and career decisions SBAE teachers face. We address this here through identifying *programmatic choices*, including *stay*, *retire*, *move*, and *leave* as subsequent choices teachers may make after a programmatic transition. It bears reminding, these terms do not capture the full complexity of career decisions; rather, they lend a starting point based on the available data, to tease out future direction in better

understanding workforce development at the professional level. The purpose of this study is to provide context relative to the ways teachers move within SBAE by identifying the career decisions SBAE migrators make following their first move.

Review of Literature

Understanding migration within SBAE may best be understood by taking a broader approach to workforce mobility as it relates to the larger education profession. It is against this backdrop we explore the body of research relative to teacher migration through these investigative themes: workforce mobility trends, the socialization of teaching as unstaged, and the status of teacher migration in education and SBAE.

Workforce Mobility

The United States workforce currently maintains a six to eight percent mobility rate across professions (Bureau of Labor Statistics, 2019). The average worker in the United States moves eleven times over the course of a career (Bureau of Labor Statistics, 2019). However, the longer a person is on the job, the more knowledge they gain relative to performing that job well. This often translates to better job performance and attempts to retain knowledgeable individuals in a given profession.

Several educational researchers also point to location stability as a factor in effectiveness (Harris & Sass, 2007; Kraft & Papay, 2014; & Wiswall, 2013). Within education, it is essential to consider experience broadly; cumulative experience is not lost when a teacher enters a new program despite the current reflection in available data. This is reflected in the common phrase, "I'm a first-year teacher with [x] years' experience." Harris and Sass (2007) and Wiswall (2013) support this claim through explorations of the returns to experience of later-career teachers. These researchers define *returns to experience* as effectiveness gained through time in the classroom. Together, these findings suggest professional value placed on teacher experience as an attractive match for vacant programs, despite the challenge of teacher mobility on vacated positions.

We remind the reader, however, the teacher supply data within SBAE reveal only 30% of program vacancies benefit from a migrating teachers' accumulation of experience (Foster et al., 2015; Foster et al., 2016; Smith et al., 2017; Smith et al., 2018). Quite often, in SBAE and the broader education profession, less experienced teachers take the place of a more experienced migrator (Feng & Sass, 2012; Ingersoll & Smith, 2003). While we do not want to diminish the value of migrating teachers in filling vacancies, we also recognize the organizational challenge, and perhaps compounding problems, this can pose for districts and programs not attracting experienced teachers to fill vacant positions.

Teaching as an Unstaged Profession

Teachers' career patterns receive attention within the education literature as an approach to understanding the ways teachers move. This body of work focuses on teacher satisfaction (Chapman & Lowther, 2014), differences in career patterns for male and female teachers (Murnane, Singer & Willett, 1989; Whitcombe, 1979; & Whitmarsh, Brown, Cooper, Hawkins-

Rodger), and the intention involved with patterns over the course of a teaching career (Burden, 1982; Draper, Fraser, & Taylor, 1998; Peterson, 1978). Particularly relevant to the current study are those studies highlighting teachers' choices and intentions.

The early examination of career patterns of teachers focused on retired secondary school teachers (Peterson, 1978). Peterson (1978) noted challenges that persist in understanding teachers' careers, namely definition of the teaching career, bias in available data, and methodology; challenges that arguably remain today. Little exists, particularly in light of recent workforce trends, to define the career of a teacher, and bias is still present in the focus on organizational approaches. In recognizing these challenges, Peterson (1978) echoes Lortie's (1975) claim that teaching is not, in fact, a true career with a progression of sequenced steps toward *upward mobility*, but is rather *unstaged*. Specifically important to this study is the claim that *upward mobility* in teaching involves *leaving* the classroom (Peterson, 1978). This is an area where organizational approaches to teacher mobility fall short. Necessarily, for a teacher to improve their position, they must progressively engage in *horizontal mobility* if they are to experience some semblance of promotion while remaining a classroom teacher (Peterson, 1978). Peterson (1978) recognizes the various improvements gained through *horizontal mobility* to be significant victories that necessitate acknowledgement as part of a career pattern within the social world of a school.

To consider teaching organizationally implies retention is based on a system of upward mobility with career incentives that are simply unavailable to the classroom teacher (Peterson, 1978); an organizational approach is inherently at odds with the actual state of the profession. In addition, she provides an extensive review of internal teacher career patterns accounting for job morale, affective changes associated with aging, perceived changes in school environment, shifting commitment from teaching, personal revitalization, and attitudes toward teaching at retirement (Peterson, 1978). A notable time of personal revitalization occurred for teachers following a move to a new school, a change in the subject being taught, a reassignment of duty, opportunity to take additional coursework, and the challenge of meeting the needs of new students (Peterson, 1978). Ultimately, Peterson (1978) concludes by indicating success for the individual teacher is partially measured by teaching circumstance. Moves to more desirable teaching positions, in effect, are the mark of a *successful teacher* (Peterson, 1978).

Burden (1982) and Draper, Fraser, & Taylor (1998) noticed distinct delineations between those ready to apply for promotion as a career developmental process and the low level of appeal classroom teaching seemed to hold for those traditionally prepared in education. They broadly note two types of teachers who remain in classroom teaching: those who enjoy their jobs in the classroom and those who feel unempowered toward other career outcomes (Draper et al., 1998). Typically, the route of promotion for teachers takes teachers out of the classroom (Draper et al., 1998). Thus far, we have considered the unstagedness of the teaching career, current organizational approaches, and teacher uptake of career outcomes. These concepts guide our professional imperative on the necessity of quantifying career decisions toward supporting retentive outcomes.

Quantifying Teacher Migration

The recognition of workforce mobility issues, paired with the unstaged nature of teaching, encourages us to view migration as a way teachers may seek promotional routes and look to develop their careers. Before we examine the career decisions of teachers, we want to outline the current state of teacher migration both in education and in SBAE.

The most recent census of teacher mobility occurred in 2012-2013 through the National Teacher Attrition and Mobility Survey. Goldring, Taie, and Riddles (2014) identified eight percent of public school teachers nationally as *movers.* This is a subset of the 16% of teachers categorized as both turnover and attrition (Goldring et al., 2014). However, nationally and across disciplines, mobility rates are much higher among less experienced teachers. In 2008-2009 and 2011-2012 respectively, 16% and 10% of first through fifth year teachers changed schools (respectively) (Goldring et al., 2014). While SBAE recognizes a higher population of less experienced teachers (25% compared with 12% of the teaching force) (Haddad, Knight, Velez, & Stewart, 2019), studies, to date, have not examined differences in mobility based on teaching experience.

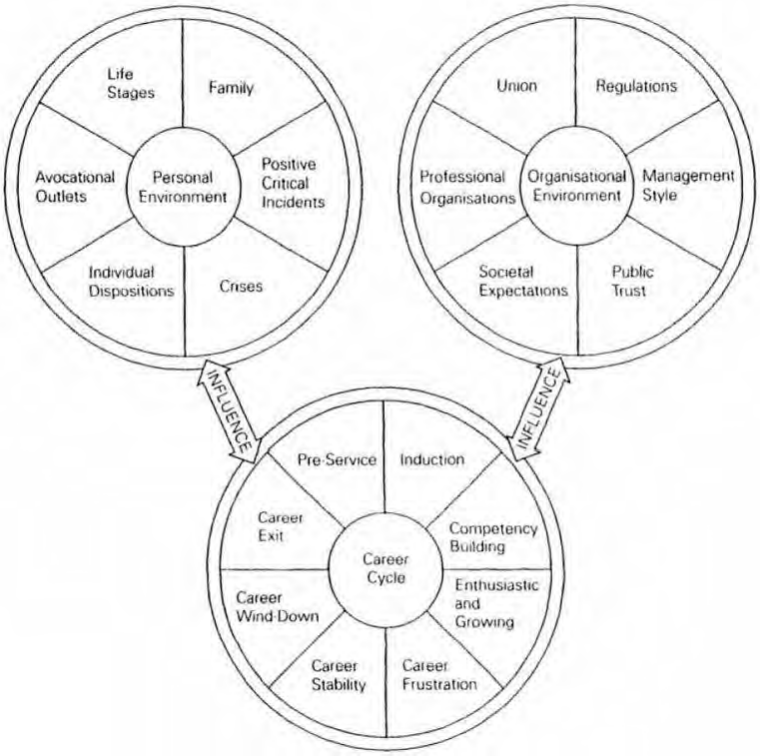
Within SBAE, four to six percent of the total teaching force migrates annually. However, migrating teachers outrank any other supply line for filling program vacancies by over ten percent (Smith, Lawver, & Foster, 2017). Since 2015, the National Agricultural Education Supply and Demand study places average hire rates of migrating SBAE teachers at 34% (Foster et al., 2015; Foster et al., 2016; Smith et al., 2017; Smith et al., 2018;).

Theoretical Framework

In light of our consideration of teaching as an unstaged profession, we employ a theoretical framework focusing on how teachers move through their career as a classroom teacher. In unpacking the TCC, Fessler and Christensen (1992) make the case for the dynamic nature of the model and its need for continued consideration in light of the teaching climate. This bears particular relevance to the current study as the TCC (Fessler & Christensen, 1992) accounts for the educational landscape of over twenty-five years ago when teacher turnover was decreasing and mobility was stagnant (Fessler & Christensen, 1992). Indeed, since the model was proposed, the teaching force in the United States has become larger, older, less experienced, more female, more diverse, more consistent in academic ability, and less geographically stable (Ingersoll, Merrill & Stuckey, 2014). Our research is particularly concerned with the less geographically stable teacher of the present day. Therefore, we consider SBAE teacher mobility in light of its potential implications for the ways teachers may move through their career and the subsequent implications for teacher professional development (Figure 1).

Figure 1.

The Teacher Career Cycle (Fessler & Christensen, 1992)



Note. The TCC (Fessler & Christensen, 1992) identifies the various stages of the teaching career in relation to various influences, particularly relative to conceptualizing the in-career support necessary for teachers at each stage.

The dynamic nature of the model proposed by Fessler and Christensen (1992) encourages consideration of the events that may precipitate a teacher moving forward *and* backward through the cycle. Several studies deal with teachers advancing through the career cycle (Easterly & Myers, 2017; Greiman, Walker, & Birkenholz, 2005), but very little research directs attention to the potential of moving *backwards* in the cycle (e.g. from career stability to enthusiastic and growing). Given our consideration for teacher mobility, we offer trends in migration allowing the consideration of how teachers may cycle from career frustration or career stability back to induction and competency building as they move schools. A move to a new school necessitates a certain induction and competency building that allows a teacher to reinvigorate their practice (Haddad et al., 2019). Before we can change the migratory landscape, we must understand the landscape within the current terminology and approach. Therefore, we identify the historical frequencies and likelihoods with which SBAE migrators move relative to their years of experience in a particular school in California.

Research Questions

The purpose of this study is to provide context relative to the ways teachers move within SBAE by identifying the career decisions SBAE migrators make following their first move. This is the first study of its kind within SBAE to tackle this question, thus we sought to present a broad picture of the historical migration context of a single state in the Western United States.

The broader picture, presented through the available teacher mobility data, offers greater clarity regarding the career stages of SBAE teachers. Three primary research questions guided our study:

1. What are the odds of a migrating SBAE teacher remaining in the teaching profession?
2. What subsequent career decisions do migrating SBAE teachers make?
3. Are there differences in mobility frequency based on time-in-program?

The purpose and questions guiding this study align with AAAE Research Priority 3, Question 2: "What methods, models, and practices are effective in recruiting agricultural leadership, education, and communication practitioners and supporting their success at all stages of their careers?" (Roberts, Harder, & Brashears, 2016).

Methods

Sample & Data Reduction

Our study utilized the California agriculture teacher history from 1900-2018 (n = 16,600). This comprehensive dataset provided a historical record of SBAE teachers identifying name, year, university of credential, internship site, school employed, years at school, and FFA region. These data are compiled as a comprehensive, historical accounting of "Team Ag Ed" (including university faculty, community college faculty, and FFA staff, along with SBAE teachers). We reduced the data to include only secondary SBAE teachers. The original dataset also included duplicate data points for individuals for their year of attrition; these data points were removed from the set used for analysis. Any teachers who made a program move within SBAE over the 118-year span were retained for the final sample (n = 4,519). Criteria for inclusion focused on secondary SBAE teachers who made at least one program move within SBAE, without leaving teaching between moves. As this study specifically sought to quantify functions of migration, teachers who only taught at one school before their year of attrition were removed from the sample. Three data points did not provide enough information to meet the sample parameters, yielding a final sample (n) of 4,516 program moves.

In the final sample of migrating teachers, no individual teacher made up more than 0.2% of the sample (three teachers with 6-9 program moves). This may be indicative that the anecdotal *chronic migrators* are few and far between, and that mobility is an inherently complex component of a career. Most teachers in the sample had 2-5 program moves. Years of experience in individual programs ranged from 1-45 years, with the majority of the sample (59%) having three or fewer years of experience at an individual school. No region skewed the sample; however, the one region had about half the frequency of program transition compared to other regions in the state. In all, 616 schools experienced program migrations over the last 118 years, with 39 schools (6%) accounting for 1,090 migrations (24%). This equates to more than 20 migrations at an individual program or one migration at least every five and a half years. Of these 39 schools, twelve had 30 or more migrations (one migration every 3.9 years), and five schools had 39 or more migrations (a new teacher every 1-3 years). Keep in mind, this may be as much a function of size of the program, or growth within the program, as it is a function of other

factors of migration. Potential additional functions and factors are outside the scope of our current research, but warrant future investigation.

Data Categorization

Our analysis explored historical SBAE program migration trends for 4,516 data points. We categorized the teachers by their school and years' experience into *career decisions*. We identified four career decisions based on the current literature: retention (stay), attrition (leave), retirement (stay), or subsequent migration (move) (Figure 2). We later identify retirement as a *stay* career decision, considering the remainder of an individual's career spent in one program. Consideration must be given to the fact that migration is the only "non-terminal" programmatic choice identified in the breakdown of the data set. In other words, teachers could make multiple program *migrations* over a career, but can only leave, stay, or retire once.

Figure 2.

Definitions of Data Categorization

Term	Category	Definition
Retention	Stay	Continuation of teaching at a given school
Attrition	Leave	Career exit from SBAE teaching
Retirement	Stay	Remained teaching through retirement
Subsequent Migration	Move	Changed schools as a component of a teaching career

Note. A shift in terminology helps us reconsider the career decisions of SBAE teachers

Program migrators were identified from the initial dataset based on consecutive career moves within secondary SBAE. This reduction yielded 4,519 career decisions from 1900-2018. These career decisions included an initial move and the subsequent decisions that followed. By this reduction, migration made up 27% of the initial data set across 616 programs and 1,865 individual teachers. The vast majority of migrations resulted in subsequent secondary SBAE program migrations (n = 2,683, 60%). Twenty-eight percent of migrations were followed with leaving SBAE teaching (attrition, n = 1,256). The attrition sequence, in this case, denotes a move, teaching within the new school, and then leaving, rather than retiring from or still maintaining employment within, SBAE teaching. This dataset also defined attrition as moving within the Agricultural Education profession (administration, post-secondary, FFA staff, etc.). We note the limits of such a definition while recognizing the scope of our study to focus on SBAE teachers. Only 12.4% (n = 565) of program migrations resulted in career stability (a composite of both those who remained teaching at the school to which they migrated and retention through retirement).

Data Analysis & Interpretation

Our first question identified the odds of a migrating SBAE teacher remaining in the teaching profession. From the compiled data focusing on retention and attrition by early experience in-program (first three years at a new school) and beyond early experience in-program, we first compared the odds of programmatic choices for migrating teachers, focusing

on years in individual schools. Namely, what are the odds a migrating teacher, who is new to a school, will be retained through a program migration? We employed a one-sample and three-sample proportions test to determine odds of retention through migration against the sample and odds of retention versus attrition for the sample. To confirm programmatic choice as a function of experience rather than chance, we employed a Fisher's Exact test.

Our analysis further used descriptive statistics to identify frequencies of categorical career decisions (stay, leave, retire, move). This attempted to answer our second research question, seeking to identify subsequent career decisions made by migrating SBAE teachers. To evaluate decisions by years of experience, we employed cross-tabulations to identify any relationship of navigation function (nominal, categorical) by years of experience within a program (interval, continuous). Finally, and particularly in reference to our theoretical framework, we used a logistic regression to identify any effect years of teaching experience in a program had on the choice to leave teaching or stay teaching. (Cohen, 1988; Vaske, 2008).

Findings

Research Question 1: Odds of Subsequent Migration

From the one sample proportions test, we have convincing evidence ($p < 0.01$) the proportion of migrators remaining teaching is greater than those leaving with a 95% confidence interval (0.82, 0.57) and a point-estimate of 0.84. We define *remaining teaching* as a continued professional engagement as a secondary agricultural educator, even if subsequent migrations occur at the school level. We further evaluated each programmatic choice (retention vs. attrition). The three-sample test for equality of proportions yielded convincing evidence ($p < 0.01$) the proportion of migrators retained is greater than the proportion of migrators lost to attrition. To confirm these results, we employed a Fishers-Exact Test yielding substantial evidence that the retention rate for migrators is 1.5 times greater than the attrition rate of migrators.

Research Question 2: Migrators' Subsequent Decisions

From 1900-2018, 4,519 actionable career decisions occurred (27% of the original data comprised migrations) across 616 programs and 1,865 individual teachers. Table 1 outlines the frequencies of programmatic results of migrators. The vast majority of migrations resulted in subsequent secondary SBAE program migrations (n = 2,683; 60%). Twenty-eight percent of migrations resulted in leaving SBAE teaching (attrition, n = 1,256). Only 12.4% (n = 565) of program migrations resulted in career stability (a composite of both current teachers and retention through retirement).

Table 1.

Frequencies of programmatic results for migrators[1]

Programmatic Result	Frequency (n)	Percentage (%)
Migration (move)	2693	59.6
Attrition (leave)	1258	27.8
Retention (stay)	355	7.8

Retirement (stay)	210	4.6

[1] Frequencies based on sample (*n*=4,516)

Research Question 3: Migration & Time-in-Program

Table 2 provides an overview of the percent breakdown of programmatic result by National Center for Educational Statistics (NCES) groupings for years of teaching experience.

Table 2.

Programmatic result of migrators for NCES groupings

	Years of Programmatic Experience [1]						
Career Decision	1-3	4-9	10-19	20+	Total	*p*-value	Effect Size (η)
Migration	69.4	24.6	5.3	0.6	59.6	0.000	0.52
Attrition	51.0	31.9	13.9	3.2	27.8		
Retention	39.4	27.6	22.5	10.4	7.8		
Retired	6.7	9.5	25.7	58.1	4.6		

[1] Cell entries are percentages (%) of migrators (*n*=4,516) who engaged in each career decision by NCES breakdown for years teaching

Among teachers who previously migrated, subsequent migrations are the most common avenue for teachers in their first through third year in a program. Data show 69.4% of subsequent migrations occur during the first three years in a program. While providing validating context for anecdotal evidence, consideration of the teaching career requires additional examination. We consider the first year of programmatic experience as denoting a migratory choice. Migrating teachers move an average of 2-5 times over their time in SBAE. We suggest therefore, 14-35% may be a more accurate representation of the actual historical teacher migration rate. Among migrators with fewer than three years' experience in a program, 51% left SBAE teaching after one program move.

To determine the difference in career choice based on years of experience in a program, we employed a binomial regression model using years of programmatic experience to determine career choice (retention or attrition). We do not have substantial evidence to conclude time in a program as a significant predictor of leaving after a program migration ($p = 0.059$). This corroborates the historical odds of retention post-programmatic migration. In other words, the longer an individual teaches in a single program, the more likely they are to stay.

Table 3.

Model summary for attrition/retention on experience[1]

	Estimate	Standard Error	z-value	*p*-value
Intercept	1.003	0.043	23.24	$< 2 * 10^{-16}$

Experience	-0.010	0.005	-1.889	0.059

[1] Reference level for programmatic choice was attrition

Conclusions & Implications

The purpose of this study was to provide context relative to the ways teachers move within SBAE by identifying the career decisions SBAE migrators make following their first move. While the categories in this study retain the traditional view of mobility as attrition, our study applies the current organizational framework to available data in SBAE to work towards better understanding the complexity and intricacies of workforce mobility in SBAE. We argue, however, this definition of mobility as attrition fails to account for the ways many, particularly those engaged with reading and writing such as this, are still serving the profession and engaged in the SBAE migratory context.

Implications for Future Research

The complexity of migration is underscored, first, by the consideration of mobility as a *state of being* as called into question by the data. Only three teachers, in the 118-year data set, had more than six program moves over the course of a career. While the stigma of mobility may linger with a migrating teacher, this data does not present evidence of migration as chronic a problem for the individual teachers in this state as anecdotally suspected. In addition, our results support a view of migration as a complex career process, highlighted by how seldom high migration frequencies occur within this data set.

As researchers, several questions arise exceeding the scope of our current data. As it relates to the TCC (Fessler & Christensen, 1992), how does the presented approach to migration affect a teacher's movement through the TCC? In what ways does the TCC (Fessler & Christensen, 1992) repeat itself upon a teacher moving to a new program? Reciprocally, how do the influences of personal and organization environment change the ways teachers consider their own mobility in light of the TCC (Fessler & Christensen, 1992)?

Implications for Career Advice

It is important to reiterate the vast majority of migrations are followed with subsequent secondary SBAE program migrations (n = 2,683; 60%). Relative to the TCC, this may have several implications relevant to the personal and career cycle components (Fessler & Christensen, 1992). Several factors may incite a decision to change schools. In connecting to the TCC (Fessler & Christensen, 1992), we specifically draw attention to the personal and organizational components as unexplored means of understanding the nuanced decisions teachers make. Given the likelihood of these migrators to move again, it bears considering how a migration may not relieve *career frustration*, especially since twenty-eight percent of migrations followed with leaving SBAE teaching (attrition, n = 1,256). If these teachers brought unresolved career frustration to a new teaching site, there is little the organizational component could do to impact the teacher's stage in the career component and also relieve dissonance in the personal component. With only 12.4% (n = 565) of program migrations resulting in career stability (staying in a program through retirement), those in positions to influence new teachers may want to rethink career advice. It is not atypical, anecdotally, for new teachers to receive the advice:

“take the first job, as you need work, and then you can choose your second job.” However, if this state is reflective of others, those who move initially may continue to move.

Implications for Teacher Support

Among migrators with less than three years of experience in their current program, 51% left SBAE teaching after one program move. This result makes it difficult to continue arguing against the consideration of mobility as attrition, but it is closely linked in implications to the frequencies of programmatic choices. As we consider time in school, teachers enthusiastically nod and share stories of the difficulty of the first three years in a program. This challenges those of us offering teacher professional development to consider the difficulties across the teaching career, not just in the traditional considerations of early, middle, and late career. Overwhelming anecdotal evidence denotes program migration as a restart with new relationships, students, content, and expectations, among other things. Those first three years in a program may be as challenging (or even more challenging) than their first three years teaching, given the expectations, resources, and networks that need to be established (Haddad et al., 2019). These challenges are often compounded by personal stressors, such as moving a family, which accompany the migration patterns of experienced teachers. We must account for teacher support, in their first three years in a new program, toward greater retention profession wide.

The longer an individual taught in a single program, the more likely they were to stay. This offers an approach to the TCC as initially conceptualized (Fessler & Christensen, 1992). Namely, teachers progress through a career without the “confounding” variable of mobility. The challenge remains to consider how the personal and organizational components of the TCC impact mobility (Fessler & Christensen 1992). This holds particular relevance in reconsidering mobility as part of the career rather than the end of a career. The likelihood to stay corroborates how teachers talked about their experience with migration in other studies of SBAE teacher migration (Haddad et al., 2019). This likeliness to stay, however, only holds to a point. There is an unexplored tipping point at which teachers (particularly migrators) are no longer satisfied with career-stability, and seek to reinvigorate their practice through migration (Haddad et al., 2019; Ingersoll et al., 2014). Certainly, this area warrants further study as we consider how different perspectives on mobility influence progression through the TCC (Fessler & Christensen, 1992).

Our research offers a new way to consider SBAE teacher migration in light of the available data and current ways of accounting for and considering a teaching career. In light of the evidence presented here, we conclude by challenging the profession to consider migrating teachers from an asset-oriented perspective, recognizing they are essential assets to the programs they fill. In order to treat these teachers as assets, additional work is needed at the post-secondary level, to help pre-service teachers understand the ebbs and flows of a career as a cycle and ways we should consider development over the course of a career. Further work must engage administrators in the task of onboarding staff well past their first year in a school, and, for those of us as teacher educators, we need to consider the ways we mentor and support throughout all career stages, particularly within three years after a migration.

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Mentoring Impacts on Oklahoma Induction-Year School-Based Agricultural Education Teachers: A Delphi study

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Abstract

Literature supports multiple benefits of mentoring for induction-year school-based agricultural education (SBAE) teachers (Moore & Swan, 2008; Rayfield, McKim, Lawrence, & Stair, 2014; Solomonson, Korte, Thieman, Retallick, & Keating, 2018). Yet for the past 15 years, no structured mentoring program has been offered for Oklahoma SBAE induction-year teachers. This study sought to find consensus among an expert panel representing Oklahoma SBAE regarding the impact on induction-year SBAE teachers without a structured mentoring program. Panel members were asked to respond to three open-ended questions representing goals, outcomes, and impacts of a mentoring program. Sixty-two unique statements representing eight themes met consensus among the panel. Themes included building mentoring relationships, effective emotional management, effective SBAE program management, impact to the profession, student learning, teacher retention, introduction to school climate, and reinforcing effective teaching behaviors. Oklahoma SBAE induction-year teachers and their programs are negatively impacted from the lack of a structured mentoring program. The planning, funding, and implementation of a mentoring program for Oklahoma SBAE induction-year teachers should be a focus of professional development.

Introduction and Review of Literature

School-based agricultural education (SBAE) has experienced teacher shortages since the implementation of the Smith-Hughes Act in 1917 (Hillison, 1987; Solomonson, Korte, Thieman, Retallick, & Keating, 2018). Recruitment programs, such as the National Association of Agricultural Educators' (NAAE) Teach Ag initiative, have been implemented to attract individuals to the profession (Ingram, Sorenson, Warnick, & Lawver, 2018). However, high attrition rates continue to plague SBAE programs nationwide (Crutchfield, Ritz, & Burris, 2013). Low teacher retention and high teacher turnover have been correlated with lower student achievement and negative impacts to school culture (Ronfeldt, Loeb, & Wyckoff, 2013). Research reports anywhere from 30% to 50% of teachers leave the classroom in the first five years (Blackburn, Bunch, & Haynes, 2017). This history of high teacher turnover rates supports an ongoing SBAE teacher shortage (Solomonson et al., 2018). At the beginning of the 2018-2019 school year, 71 SBAE teaching positions remained unfilled and 45 SBAE programs closed their doors (Smith, Lawver, & Foster, 2019).

Ultimately, and perhaps most important, the lack of highly qualified and effective SBAE teachers has a negative influence on students (Mishel, Allegretto, & Corcoran, 2008). An estimated 48,000 students did not have access to a highly qualified local agricultural educator in the 2016-2017 school year (NAAE, 2018). Local communities (Martin & Henry, 2012) and the larger agricultural sector (Goecker, Smith, Fernandez, Ali, & Theller, 2015) are impacted when these students have little to no exposure to potential careers in agriculture, often the largest

employing industry in rural communities (Huffman & Orazem, 2007). SBAE programs have been shown to invest in local communities by providing opportunities for students to practice interpersonal skills while working with community leaders (Martin & Henry, 2012). In the 2018-2019 school year, approximately 30,000 Oklahoma SBAE student Supervised Agricultural Experience (SAE) projects generated a $63 million economic impact in state economy and included over 300,000 hours in community service activities (K. Murray, personal communication, January 17, 2020). Each year, 22,500 jobs in the agriculture industry are unfilled by agriculturally competent workers nationwide. SBAE students are needed to help these positions (Goecker et al., 2015).

A teacher's induction-year career stage requires the greatest support to provide proper education for students (Greiman, Walker, & Birkenholz, 2005; Katz, 1972). This support may come in the form of written materials, instructional planning time, training sessions, orientation programing, and mentorship opportunities (Joerger, 2003). According to Smith and Ingersoll (2004), mentoring involves the "personal guidance provided, usually by seasoned veterans, to beginning teachers in schools" (p. 683). Mentoring has the potential to "improve retention rates for new teachers along with their attitudes, feelings of efficacy, and instructional skills" (Darling-Hammond, 2010, p. 24). Many variables influence the effectiveness of the mentoring activities (Smith & Ingersoll, 2004). The relationship between the mentor and protégé is one of the largest factors of an effective professional relationship for both parties (Hudson & Hudson, 2017). Still, mentoring programs can serve to increase teacher retention (Foor & Cano, 2012).

Solomonson et al. (2018) included teacher preparation and development as a contributing factor to the retention or attrition of a SBAE teacher. The induction-year requires the most intensive professional development of any career stage (Katz, 1972). According to Moir (2003), "quality induction programs promote greater teacher retention, breaking the cycle of attrition, which saves money for school districts and ensures that teacher shortages do not dictate hiring policy" (p. 1). Peiter, Terry, and Cartmell (2005) suggested mentoring, or the professional development relationship formed between experienced and novice colleagues, as an effective and efficient method to assist SBAE teachers in navigating the many challenges they encounter during their induction-year. According to Joerger (2002), professional development for induction-year SBAE teachers may "ensure elevated levels of personal satisfaction, student achievement scores and success" (p. 11). The induction-year can have lasting impacts throughout a teacher's novice years (Katz, 1972).

Requirements for induction-year and mentoring activities for SBAE teachers differ across state lines (Franklin & Molina, 2012). Beginning in 1980, Oklahoma induction-year teachers were supported by a cohort of university faculty, school administration, and veteran teachers (House Bill 1706, 1980). This program was widely welcomed by Oklahoma teachers (Simms, 1983). However, the structured mentoring program for induction-year teachers was defunded through state budget cuts in 2004 (McKean, 2013). In subsequent years, no structured mentoring has been offered to induction-year SBAE teachers.

Theoretical Framework

Katz's (1972) stages of development and training needs of preschool novice teachers served as the theoretical foundation for this study. Katz (1972) described the professional development of novice teachers in four stages, including survival, consolidation, renewal, and maturity. These stages begin in the preservice teaching phase and continue into the fifth year of professional teaching experience. Most induction-year teachers are categorized in the survival stage. In this stage, as the name implies, novice teachers are concerned with persevering through the day, week, and semester. They are most occupied with the current task at hand. Katz (1972) writes of theses teachers, "The discrepancy between anticipated successes and classroom realities intensifies feelings of inadequacy and unpreparedness" (p. 4).

Mentoring is a vital training need throughout the survival and consolidation developmental stages. According to Katz (1972), "exchanges of information and ideas with more experienced colleagues may help teachers master the developmental tasks" (p. 6). Training should be personalized to the individual novice teacher and their classroom. Katz (1972) recommends continuous training past intermittent prearranged classroom observations. Veteran teachers and consultants may provide professional development to teachers in the survival stage.

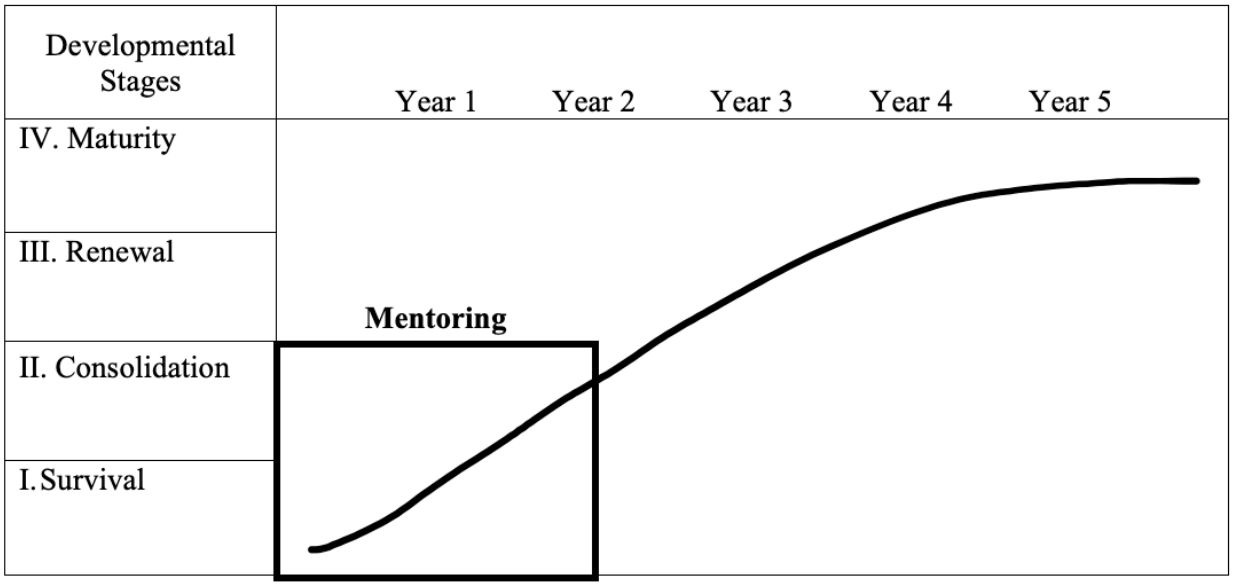

Figure 1. Katz's (1972) stages of development and training needs for novice teachers

Purpose and Objectives

This study was grounded in the third research priority identified by the American Association for Agricultural Education (Stripling & Ricketts, 2016). The purpose of this research was to describe the expert panels perceptions regarding a lack of structured mentoring for Oklahoma induction-year SBAE teachers. The objectives were to:

1. Identify goals of a workplace-mentoring program for Oklahoma induction-year SBAE teachers via a panel of experts.
2. Describe an expert panel's opinion on outcomes of a mentoring program for Oklahoma induction-year SBAE teachers.

3. Determine the impact of mentoring on SBAE induction-year teachers in Oklahoma as determined by a panel of experts.

Methods

The modified-Delphi method was selected to achieve the purpose and objectives. As described by Hsu and Sandford (2007), the Delphi is "a widely used and accepted method for achieving convergence of opinion concerning real-world knowledge solicited from experts within certain topic areas" (p.1). It has been widely implemented in the field of agricultural education, especially in the area of curriculum planning (Martin & Frick, 1998). Dalkey (1969) identified three components of a reliable Delphi study: that is, anonymous response, iteration, controlled feedback, and statistical group response. Studies by Conner and Roberts (2013), Howerton, Clemons, and Linder (2019), and Saucier, McKim, and Tummons (2012) established the use of Delphi in assessing needs of preservice and beginning SBAE teachers.

An expert panel (N = 42) was identified from Oklahoma SBAE personnel. Twelve experienced SBAE teachers were chosen for their involvement in the previous mentoring program. Seven Oklahoma Department of Career and Technology Education (XDCTE) staff were identified based on their daily interactions with novice and experienced Oklahoma SBAE teachers. Seven teacher educators from three Oklahoma post-secondary institutions were included for their role in developing future agricultural educators. Second-year Oklahoma SBAE teachers (n = 9) were included on the panel to give voice to novice teachers' concerns. School administrators familiar with SBAE programs (n = 7) added administration viewpoints to the panel. To modify the Delphi method, participants were contacted through email and provided a link to complete the instrument electronically. Demographic data revealed round one respondents were 86.36% male. SBAE teachers composed 45.45% of the sample with 22.73% XDCTE staff, 18.18% university professors, and 13.64% school administrators. These individuals have an average of 10.90 years of experience in their current position and 15.10 years of teaching experience. Traditional certification represented 88.57% of participants. Finally, 68.18% had experience in structured mentoring programs, either as a mentor, protégé, or both and 86.36% participate in professional development activities at least once every few months.

Participants were contacted through email and directed to an instrument hosted through Qualtrics services. In round one, panelists were asked three open-ended questions to address the objectives of the study. Panelists also responded to seven demographic questions. Panelists provided comments to the following questions.

1. What are the overarching goals of a workplace-mentoring program?
2. What are three major outcomes of a mentoring program that are beneficial to a first-year teacher?
3. How does the absence of a structured mentoring program impact a first-year agricultural education teacher?

Responses were narrowed to unique statements and grouped into like themes (Diaz, Warner, & Webb, 2018). Responses from 25 panel members were collected in this round for a response rate of 59.52%. Only those who responded to the previous round were invited to participate in the subsequent round (Mantooth & Fritz, 2006).

Round two sought to collect the panel's level of agreement on a six-point, summated scale to the 67 statements generated as a result of round one. Panelists were also given the opportunity to provide additional feedback on each of the eight themes identified from the round one responses (Roberts, 2006). Regarding consensus, *a priori* levels of 80% (Roberts & Dyer, 2004) and 90% (Easterly & Myers, 2017) were averaged for a consensus level of 85%. Items that at least 85% of the expert panel marked as somewhat agree, agree, or strongly agree were considered as meeting consensus. Items receiving less than 50% agreement were dropped from the study (Easterly & Meyers, 2017). Items scoring 51% to 85% were included in the round three instrument that was distributed to 21 (50% response rate) round two participants.

Round three sought to reach consensus or reject the remaining 14 statements. Panelists were asked to agree or disagree with each item (Easterly & Meyers, 2017). Comments for each of the eight themes were collected. Sixteen respondents (38% response rate) participated throughout the three rounds. Panels greater than 13 members are considered reliable (Dalkey, 1969).

Results

Demographic data revealed round one respondents were 86.36% male. SBAE teachers composed 45.45% of the sample with 22.73% state XDCTE staff, 18.18% university professors, and 13.64% school administrators. These individuals have an average of 10.90 years of experience in their current position and 15.10 years of teaching experience. All but four were traditionally certified. Concomitantly, 68.18% had experience in structured mentoring programs, either as a mentor, protégé, or both and 86.36% participate in professional development activities at least once every few months.

Round one produced 73 unique statements. The first question produced 11 statements, question two produced 30 statements, and the third question produced 32 statements. Statements were grouped into eight emerging themes. Emerging themes from these statements were *building mentoring relationships, effective emotional management, effective SBAE program management, impact to agricultural education profession, improving student learning, increasing teacher retention, introduction to school climate,* and *reinforcing effective teaching behaviors.*

In round two, each of the 73 responses from round one's three open ended questions was subjected to a six-point summated scale to assess the panel's level of agreement. Of these statements, 55 reached the consensus requirement of 85% agreement (see Table 1), four failed to be agreed upon by half the respondents and were dropped, and 14 were included in round three for final approval or rejection from the panel.

Table 1

Items Meeting Consensus Following Round Two

Item	*M* (1-6)	*SD*	Agreement (%)
Question 1: What are the overarching goals of a workplace-mentoring program?			

Enhance classroom instruction skills	4.88	0.68	100.00
Increase retention rates	4.88	0.76	100.00
Increase teacher success	5.00	0.69	100.00
Inform new and returning teachers about school procedures	4.94	0.78	94.44
Extend professional networks	5.00	0.77	94.12
Gain insight to teaching abilities	4.88	0.76	94.12
Gain meaningful professional relationships	5.29	0.82	94.12
Pair experienced and novice teachers	4.88	0.90	88.24
Support new teachers	5.18	0.98	88.24

Question 2: What are three major outcomes of a mentoring program that are beneficial to a first-year teacher?

Active partnerships for periodic feedback	4.88	0.58	100.00
Assist new teachers set goals	4.76	0.64	100.00
Build lasting professional relationships	5.12	0.76	100.00
Clarify expectations	5.18	0.78	100.00
Deliver effective and enthusiastic lessons	4.76	0.73	100.00
Improve communication with stakeholders	5.06	0.70	100.00
Improve self-awareness of teaching performance	4.94	0.73	100.00
Improved student engagement	4.88	0.68	100.00
Improved time management	4.81	0.63	100.00
Improving student learning	4.71	0.46	100.00
Increase teacher collaboration	5.18	0.71	100.00
Provide knowledge of how a school functions	4.88	0.83	100.00
Readily available advice and opinions	5.18	0.71	100.00
Ability to teach students from diverse backgrounds	4.47	0.78	94.12
Accountability to instructional goals	4.47	0.61	94.12
Collegiality with fellow teachers	4.88	0.58	94.12
Effective classroom management	4.88	0.68	94.12
Greater general program knowledge	5.00	0.71	94.12
Improve abilities to mentor in the future	4.82	0.71	94.12
Improve self-efficacy	4.76	0.81	94.12
Improve teacher morale	4.82	0.86	94.12
Improve teacher satisfaction	4.59	0.84	94.12
Increase new teacher retention into the second year of teaching	4.88	0.83	94.12
Strengthen community connections	4.81	0.88	94.12
Understand allocation of money	4.87	0.88	94.12
Additional organization	4.94	0.66	93.75
Increase student achievement	4.56	0.93	93.75

Continue education in content area	4.35	0.76	88.24
Encourage a healthy work-life balance	4.59	0.91	88.24
Question 3: How does the absence of a structured mentoring program impact a first-year agricultural education teacher?			
Become overwhelmed with job related activities	5.00	0.77	100.00
Feelings of helplessness	5.06	0.73	100.00
Time management for effective teaching	4.94	0.73	100.00
Hasten job-related apathy	4.59	0.69	94.12
Assessment of teaching	4.71	0.89	88.24
Erode self-confidence	4.44	0.79	88.24
Foment feelings of burnout	4.59	0.77	88.24
Lack of support	4.59	0.97	88.24
Professional isolation	4.76	0.94	88.24
Affects student success	4.69	0.98	87.50
Creates an attitude of unimportance of new teachers' success	4.50	0.87	87.50
Greatly enhances the responsibility of others to provide training	4.38	0.99	87.50
Limits teachers' start in the profession	4.50	0.79	87.50
Miss deadlines	4.38	0.99	87.50
Negative community impacts	4.25	0.97	87.50
Negative impact on the profession	4.31	0.77	87.50
Informal mentoring already in place	4.13	1.09	86.67

Of the 14 statements included in round three, seven met final consensus (see Table 2). Combined with the 55 consensus reaching statements from round two, the final list of statements reaching consensus includes 62 statements that 85% of the panel agree are true of mentoring SBAE teachers. All eight themes from round one met consensus. See Table 3 for a full list of items organized by theme and question.

Table 2

Items Meeting Consensus Following Round Three

Question	Item	Agreement (%)
3	Time consuming	100.00
3	Lack of clarity regarding school functions	93.75
1	Observe master teachers	87.50
2	Develop new and returning teachers	87.50
3	Contribute to program failure	87.50
3	May contribute to poor or under performance	87.50
3	More likely to make uninformed decisions	87.50

Table 3

Final Consensus List in Themes and Questions

Theme	Question	Item
Building Mentoring Relationships	1	-Develop new and returning teachers
		-Extend professional networks
		-Gain meaningful professional relationships
		-Observe master teachers
		-Pair experienced and novice teachers
		-Support new teachers
	2	-Active partnerships for periodic feedback
		-Assist new teachers set goals
		-Build lasting professional relationships
		-Collegiality with fellow teachers
		-Improve abilities to mentor in the future
		-Increase teacher collaboration
		-Readily available advice and opinions
	3	-Informal mentoring already in place
		-Lack of support
		-More likely to make uninformed decisions
		-Professional isolation
		-Time Consuming
Effective Emotional Management	2	-Encourage a healthy work-life balance
		-Improve self-efficacy
		-Improve teacher morale
		-Improve teacher satisfaction
	3	-Become overwhelmed with job related activities
		-Erode self-confidence
		-Feelings of helplessness
		-Foment feelings of burnout
		-Hasten job-related apathy
Effective SBAE Program Management	2	-Additional organization
		-Improved time management
		-Greater general program knowledge
		-Strengthen community connections
		-Understand allocation of money
	3	-Contribute to program failure

		-Miss deadlines
		-Negative community impacts
Impact to Agricultural Education Profession	3	-Creates an attitude of unimportance of new teachers' success
		-Greatly enhances the responsibility of others to provide training
		-Limits teachers' start in the profession
		-Negative impact on the profession
Improving Student Learning	2	-Ability to teach students from diverse backgrounds
		-Effective classroom management
		-Improved student engagement
		-Improving student learning
		-Increase student achievement
	3	-Affects student success
Increasing Teacher Retention	1	-Increase retention rates
	2	-Increase teacher retention into the second year of teaching
Introduction to School Climate	1	-Inform new and returning teachers about school procedures
	2	-Clarify expectations
		-Improve communication with stake holders
		-Provide knowledge of how a school functions
	3	-Lack of clarity regarding school functions
Reinforcing Effective Teaching Behaviors	1	-Enhance classroom instruction skills
		-Gain insight to teaching abilities
		-Increase teacher success
	2	-Accountability to instructional goals
		-Deliver effective and enthusiastic lessons
		-Continue education in content area
		-Improve self-awareness of teaching performance
	3	-Assessment of teaching
		-May contribute to poor or under performance
		-Time management for effective teaching

Eleven items failed to meet consensus (*a priori* of 85% agreement) among the expert panel. See Table 4 for a list of those items. Agreement on these items ranged from 12.50% to 81.25%. It is important to note the items of *Experience barriers to seeking help* and *Hasten the loss of new teachers* to the third question narrowly missed consensus. Voices from the panel stated a lack of mentoring held no negative consequences for induction-year SBAE teachers and costs of structured mentoring outweighed benefits. However, the remaining members quickly drowned out this opinion. Each statement failed to reach 50% agreement in round two. Other detractions

to structured mentoring programs for induction-year SBAE teachers included potential personality conflicts between mentors and protégés and a belief mentoring may be more beneficial to SBAE teachers in the second year of their career.

Table 4

Items Failing to Meet Consensus

Question	Item	Agreement (%)
3	Experience barriers to seeking help	81.25
3	Hasten the loss of new teachers	81.25
2	Team decision making	68.75
3	Decrease community connections	68.75
3	Sets a bad example for the profession	68.75
3	Personality conflicts between mentoring pairs	50.00
3	Pursue unhealthy forms of self-medication	50.00
3	More impactful in second year of teaching	46.67
3	Teachers need to find their own mentors	40.00
3	No impact from lack of mentoring	20.00
3	Creates additional tasks for participants without additional benefits	12.50

Panel members provided open-ended responses in relation to each theme following rounds two and three. A total of 18 comments were collected from these questionnaire items. Selected those responses are included in Table 5. Other comments were used to clarify statements or themes.

Table 5

Selected Comments from Panel Members

Theme	Comment
Building Mentoring Relationships	-There may be some additional time commitment, but more for the mentor than the new or returning teachers. The added benefit is a successful teacher.
Effective Emotional Management	-I may “strongly agree” for one of the new teachers, and “strongly disagree” for another example. -New teachers seek advice from those who’s advice is not always sound or valuable.
Introduction to School Climate	-School climate, almost by definition, is likely to be very idiosyncratic or unique. So, the value of the experiences and advice from a mentor teaching in a school with a very different climate may have rather limited application. -Finance and policies regarding student overnight trips/chaperones are areas that often times get young teachers in a bind when there is not a

	structured mentoring program. -It is hard for beginning teachers to comprehend all that the profession entails, especially if they have been through an alternative pathway f or their teaching certification.
Impact to Agricultural Education Profession	-Ag-Ed Staff does first year new teacher orientation. Very beneficial.

Conclusions

Objective one sought to identify consensus regarding goals of a workplace-mentoring program for SBAE teachers in Oklahoma. The first question provided the most agreement from the panel in round two (M = 4.92, SD = 0.83). All statements met consensus. Therefore, panelists concur mentoring program goals reflect school climate, teaching behaviors, building mentoring relationships, and teacher retention.

The second objective described the expert panel's opinion of the outcomes of a mentoring program for SBAE teachers. The second question generated the smallest average standard deviation (M = 4.82, SD = 0.74), indicating close agreement among the panel. All but one statement met consensus. Panelists agreed there is a wide range of mentoring outcomes for induction-year SBAE teachers, mirroring findings from Katz (1972) and Darling-Hammond (2010). This variety highlights the wide-ranging impacts for induction-year teachers. They believe all areas of an SBAE program may benefit from a structured mentoring program.

Objective three describes the panel's opinion on the impact of mentoring for Oklahoma SBAE teachers. The panel had the most disagreement on the third question. Of the 32 unique statements generated, 22 met consensus. This expert panel believes a lack of mentoring negatively impacts Oklahoma induction-year SBAE teachers. This lack of support may impact a teacher's trajectory through Katz's (1972) stages of development for novice teachers.

While the panel recognized Oklahoma's induction-year SBAE teachers commonly utilized informal mentorship, they also identified the shortcomings of current induction orientation practices. One member noted "new teachers seek advice from those who's advice is not always sound or valuable" while another wrote "first year teachers get a lot of advice from different points of view. The message is not consistent." One panel expert summed up the importance of building mentoring relationships with "new teachers don't know what they don't know. Sometimes they don't know to ask or even what to ask."

Recommendations

There is some disagreement over specific concerns stemming from a lack of mentoring for induction-year SBAE teachers, providing a line of inquiry for future research. Qualitative methods would explore the challenges faced by induction-year SBAE teachers. The experiences of Oklahoma induction-year SBAE teachers should be compared to their counterparts in other states that employ a structured mentoring program.

It is recommended that the implementation of a structured mentoring program be further investigated for Oklahoma SBAE induction-year teachers with the goal of reflecting all themes expressed in the experts' responses. Katz (1972) proposes induction-year teachers require "support, understanding, reassurance, comfort and guidance" (p. 4) through mentorship. A SBAE colleague would provide content specific guidance and program management advice as well as assist the induction-year teacher with incorporating him or herself into the profession (Kram & Bragar, 1992). Induction-year SBAE teachers should also be supported within their school buildings and districts (Katz, 1972). A district mentor would guide induction-year teachers as they navigate school climate, procedures, finances, and cultures. In a similar approach to the now discontinued induction program in Oklahoma, teacher educators could act as instructional coaches to induction-year SBAE teachers as they navigate the challenges of classroom teaching (House Bill 1706, 1980).

This structured mentoring could occur through several platforms. Face-to-face sessions could be combined with both asynchronous and synchronous online communication as individual circumstances dictate (Cinkara & Arslan, 2017). Both Oklahoma SBAE staff and teacher educators should invest resources to connect qualified veteran SBAE teachers to their induction-year colleagues. State funding as well as private and corporate donations should be explored to support this vital teacher professional development. Most importantly, a structured mentoring program shaped by mentoring research and the interests of SBAE teachers (Moore & Swan, 2008) is needed to address the retention challenge facing the Oklahoma SBAE profession.

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Agriscience Teacher Professional Development Focused on Teaching STEM Principles in the Floriculture Curriculum

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Curricula related to ornamental horticulture is being taught in school-based agricultural education (SBAE) programs where agriscience teachers help support the mission of the American Floral Endowment to inspire people to pursue careers working with plants. Nevertheless, an overall understanding of how the horticulture industry is connected to the studies of science, technology, engineering, and mathematics (STEM) has left a shortage of skilled professionals. A professional development program was designed to provide agriscience teachers with experiences focused on STEM concepts taught in horticulture and floriculture curricula. The Science Teaching Efficacy Belief Instrument was used to determine participants' perceptions of their performance pre, post, and post-post in the three days of content specific inquiry-based instruction. While teachers showed growth in their mean scores for the Science Teaching Outcome Expectancy (STOE) and Personal Science Teaching Efficacy Beliefs (PSTEB) constructs between all three testing periods, no significant difference was not found across the period of time. Significant differences were observed in teachers' efficacy beliefs to teach the steps of science in the horticulture/floriculture curricula, understanding of science concepts, and ability to engage students. It is recommended that teacher educators consider how to create professional development experiences for agriscience teachers that target specific content to impact teacher self-efficacy. Further, it is recommended that professional development opportunities contain follow-up communication to determine whether teachers utilize curricular resources and how the teacher's new knowledge is transferred to inform instructional change. The final recommendation is to measure student learning outcomes as a result of content-specific teacher professional development.

Introduction

For over fifty years the central mission of the American Floral Endowment (AFE) has been to fund research and scholarships in floriculture and environmental horticulture to the benefit of growers, wholesalers, retailers, allied industry organizations and the general public ("About the American Floral Endowment," 2019). There are many benefits to the floriculture industry from both the environmental and psychological perspectives. Lack of overall understanding of horticulture and awareness of the related industries impacts perceived importance and value of how ornamentals are deeply rooted in our lives, culture, and society. Consequently, the horticulture industry faces continued shortages of skilled professionals (Shepherd, 2011), as well as those with adequate knowledge and capacity to teach the science, technology, engineering, and mathematics (STEM) principles to prepare students for careers in this field. In 2017, AFE supported Seed your Future™ and established a strategic plan to help combat these deficits. The mission is to promote horticulture and inspire people to pursue careers

working with plants. The strategic plan included five goals: awareness, education, workforce development, partnerships, and resource development ("Seed your future," 2019).

Numerous reports throughout the past decade indicated a need to focus on developing skills for careers closely related to STEM (Carnevale et al., 2014; Honey et al., 2014; National Academies Press, 2000; National Academies Press, 2011). Further, research has indicated that time spent teaching specific content areas directly correlates to the teacher's perceived self-efficacy in that field, meaning if a teacher is not efficacious in a specific area, students will receive less instruction related to that topic. A low level of background knowledge in a topic, specifically science, has been reported as a primary reason for avoiding the content area, such as the science of agriculture (Ramey-Gassert & Shroyer, 1992). Starting with the preamble of the Hatch Act of 1887, which enacted scientific investigation in the name of agricultural advancement, science and agriculture are indelibly linked (Hatch Act of 1887). Chambers and Chambers Encyclopedia (1897) defined agriculture as the application of scientific principles and reasoning related to the *art* of agriculture. Despite this clear connection, some students fail to link the science within agriculture and ornamental horticulture when they consider careers. Exposure to topics related to the ornamental horticulture industry may assist students in associating their experiences with the science interconnected in horticulture careers (Marsh et al., 2011) and thus help increase the supply of skilled professionals needed throughout the industry. More recently, research priority area three of the American Association for Agricultural Education's National Research Agenda called for a sufficient scientific and professional workforce that addresses the challenges of the 21st century (Stripling & Ricketts, 2016).

School-based Agricultural Education (SBAE) programs provide direct paths to career development for students in secondary schools. Agriscience teachers serve as mentors to their students (Roberts et al., 2006) and can encourage students to enter agriculturally related careers. Through active engagement in professional development, agriscience teachers may better understand the STEM principles that are interconnected between science and horticulture/floriculture concepts in the curricula.

Teacher professional development is an intentional and purposeful process that can be considered fundamental to improving professional skills and is extremely important for one's advancement as an educator (Guskey & Huberman, 1995). The goal of professional development for teachers is to improve their professional knowledge, skills, and attitudes to enhance student learning (Guskey & Sparks, 2000). According to Guskey and Sparks (2000), professional development involves three defining characteristics that include intentional, ongoing, and systematic processes. Programs should be intentionally planned with clarity and include an intended purpose and worthwhile goals that can be evaluated. Professional development should be ongoing and embedded in the daily process of teaching (Guskey & Sparks, 2000).

It is important to create opportunities for teachers to experience similar types of scientific inquiry as is expected of their students. Given the relationship between teacher and student learning, professional development must be grounded in academic content to affect instructional practices and student outcomes. The program should also include structured time for discussion

and planning, which can assist with the teachers' change in instructional practices (Jeanpierre et al., 2005).

Based upon the research around quality teacher professional development and the need to better prepare teachers to instruct students on STEM concepts, the STEM-it Up: Everything You Need to Know to Get Your Floriculture Curriculum In Bloom (STEM-it Up) was designed to deliver an intentional, systematic, and high-quality professional development with embedded experiential learning opportunities focused on promoting exposure to horticulture/floriculture curricula. Aligned with the mission of AFE, and to address industry needs, the content focus included: laboratory investigations, unit plans, and curricular resources specifically related to the STEM concepts present in the floriculture industry. An established criterion for selection was determined to target a very specific group of agriscience teachers from around the United States who were invited to apply and participate. STEM-it Up was supported by grant funds from AFE.

Literature Review

STEM and Curriculum

The topic of STEM integration related to SBAE has been a common line of research in recent years (Rice & Kitchel, 2018; Smith et al., 2015; Stubbs & Myers, 2015; Stubbs & Myers, 2016). In a qualitative study aimed to investigate teachers' views of STEM and its integration in SBAE courses, Stubbs and Myers (2016) noted that teachers considered agriculture a scientific discipline with STEM consistently being integrated into agriculture before a name was devised. STEM professional development and education allowed the teachers to successfully highlight the STEM concepts naturally found in agriculture in their classes. However, the teachers' use of and understanding of engineering and math concepts varied more when compared to science. This was attributed to the teachers' level of personal experience with engineering, as well as their personal feelings toward math (Stubbs & Myers, 2016). While teachers' experiences with, and feeling towards, the science of agriculture are varied, teachers' past educational experiences in all areas or STEM influenced their perceptions of STEM, consistent with Ramey-Gassert and Shroyer (1992).

Smith et al. (2015) reported that teachers indicated high importance to integrate all four STEM areas, with science being ranked the highest in importance, followed by technology, mathematics, then engineering. While the authors found significant differences in perceptions of the importance of integrating STEM by gender, there was no identified difference between genders for confidence to embed STEM concepts. Further, the authors noted there were no differences discovered for either importance or confidence in integrating STEM concepts between traditionally and alternatively certified teachers, as well as when compared by the length of the teaching career. Results indicated that science and agriculture remain tightly connected ideas (Smith et al., 2015).

Specific to plant sciences, Rice and Kitchel (2018) indicated that plant science was an outlet for practical application of scientific ideas. The notion of complementing core science courses, such as biology, instead of replicating the content, was also seen as a common theme. Additionally, the concepts in plant science are seen as more conventional in regard to many concepts students have been familiar with for many years. Rice and Kitchel (2018) suggested a

focus in the classroom on scientific careers within plant sciences to complement the current emphasis placed on the integration of STEM concepts.

Faculty in higher education also recognized the importance of relaying STEM concepts to preservice agriscience teachers. Swafford (2018) remarked that faculty in agricultural education believe students in preservice teacher programs should be instructed on how to utilize experiential teaching, as well as how to highlight STEM concepts in their own classroom. A large majority of faculty reported modeling inquiry-based teaching methods in their classes, in addition to integrating STEM into their courses. However, even if these methods and concepts are being reported as taught in teacher education programs, teacher efficacy in teaching STEM areas should still be an area of concern and investigation (Swafford, 2018).

Teacher Self-Efficacy

Hasselquist, Herndon, and Kitchel (2017) explored how the combination of factors influenced the self-efficacy and job satisfaction of beginning teachers. Overall, the teachers included in the study reported moderate levels of support and teacher efficacy, with a high level of job satisfaction. Further analysis found collegial support was a significant factor in teacher self-efficacy, while teaching and personal efficacy did not indicate significance in the model. Additionally, district, administration, colleagues, and program financial support were also found to be significant factors in the teacher job satisfaction model (Hasselquist et al., 2017). The authors opined the value of teachers forming relationships within their administration and school district. These types of relationships were found to not only directly influence teacher efficacy, but also create an opportunity for peer support, also mentioned by (Wolf, Foster, & Birkenholz, 2010), and can be provided through professional development conferences where teachers are brought together to collaborate.

Through examining teacher candidates' professional development experiences, Wolf et al. (2010) sought to explore the impact of such experiences on self-efficacy and perceived level of preparedness to be an agriscience teacher. Using the *Teacher Sense of Efficacy Scale* (Tschannen-Moran et al., 1998), the authors analyzed efficacy and preparedness in three domains of classroom management, instructional strategies, and student engagement. The authors concluded that due to the similarities between self-efficacy and preparedness beliefs, the two areas coincide. Furthermore, while observations of teachers of similar skill level were found to have a positive relationship with self-efficacy, this was not true when observing more experienced teachers. The authors suggested that viewing teachers with greater skill sets might prove intimidating; therefore, limiting self-efficacy. Feedback was also found to be a significant factor in preservice teacher self-efficacy. Written feedback was found not to impact self-efficacy, while verbal feedback indicated a moderate, positive influence on self-efficacy (Wolf et al., 2010). These results are similar to recommendations by Ulmer et al. (2013) for continued peer support and feedback. Ulmer et al. (2013) sought to explore the impact of the Curriculum for Agricultural Science Education (CASE) Institute and provided curriculum on teachers' science teaching efficacy. It was suggested that seeing peer teachers succeed in teaching as well as interaction with other teachers, who attended the same professional development workshop, successfully implement lessons into their curriculum increased self-efficacy.

McKim and Velez (2015) further considered self-efficacy among early career teachers. Teachers indicated mid-levels of science teaching self-efficacy; however, no significant difference in science teaching efficacy was found due to the number of years teaching. Science teaching efficacy was found to be a significant variable in career commitment indicating teachers may expect challenges related to teaching science concepts, which outweighs their perceived self-efficacy (McKim & Velez, 2015). Additionally, STEM learning opportunities have been credited for successful career preparation with interdisciplinary curricula, development of critical thinking, and enhancement of problem-solving skills for students. Assisting agriscience teachers to understand the rationale for emphasizing STEM in the Agriculture, Food and Natural Resource curricula could provide occasions for improved teacher quality, career readiness, and increase student motivation and learning outcomes supportive of student success (Scherer et al., 2019).

Teacher self-efficacy in both STEM concepts, particularly science and mathematics, as well as teacher personal efficacy in these subjects presented varied findings (Graves et al., 2016; Hasselquist et al., 2017; Haynes & Stripling, 2014; McKim & Velez, 2015; Stripling & Roberts, 2013; Ulmer et al., 2013; Wolf, 2011; Wolf et al., 2010). This can be aligned with the findings of Ramey-Gassert and Shroyer (1992) which indicated an inadequate foundational understanding of science could lead to varying levels of teaching. Thus, high quality, content-focused professional development is needed for teachers to obtain adequate amounts of scientific knowledge in order to implement science into their curriculum.

Theoretical Framework and Conceptual Model

A positive relationship exists between self-efficacy and achievement (Bandura & Schunk, 1981; Schunk, 2012). Self-efficacy is defined as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura, 1986, p.361). When teachers experience occasions to become aware of their self-efficacy and are encouraged to set goals, they become more intrinsically motivated to change their instructional practices. Personal performance, observations of models (vicarious experiences), forms of social persuasion, and physiological indexes have been found to be the four main areas in which people develop information about their self-efficacy (Schunk, 2012). Beliefs related to personal mastery and perceived competence can be determined when investigating self-efficacy (Maddux, 2016). Directly related to Ramey-Gassert and Shroyer (1992), people engage in activities they believe they can do, such as teaching content of which they are more familiar (Maddux, 2016). Therefore, it was theorized that self-efficacy would determine our participants’ perceptions of their own performance before and after engaging in the STEM-it Up professional development program.

The impacts of teacher learning and professional development that have been identified as significant indicators to improve the quality of schools in the United States are well documented (Borko & Putnam 1996; Darling-Hammond & McLaughlin 2011; Desimone, 2011). Schools are merely as proficient as the teachers and administrators who work within them (Guskey, 2002). As teachers work on the frontline of education, their roles increasingly become more difficult as they are challenged with numerous responsibilities that require continual

support to meet the demands of the 21st century. Differentiating instruction for diverse student populations, teaching curriculum standards, preparing students for state testing procedures, regulating behavioral issues, adhering to evaluation procedures, allocating classroom resources, and advancing knowledge of content and pedagogy are only a few of the obligations teachers face.

Desimone (2009) posited the successes and failures of educational reform could be measured by the effectiveness of teacher professional development. Research has indicated that high-quality teacher professional development has the following factors: (a) content focus, (b) active learning, (c) coherence, (d) duration, and (e) collective participation (Desimone, 2009). Therefore, the following conceptual model was used to guide the STEM-it Up professional development program and research.

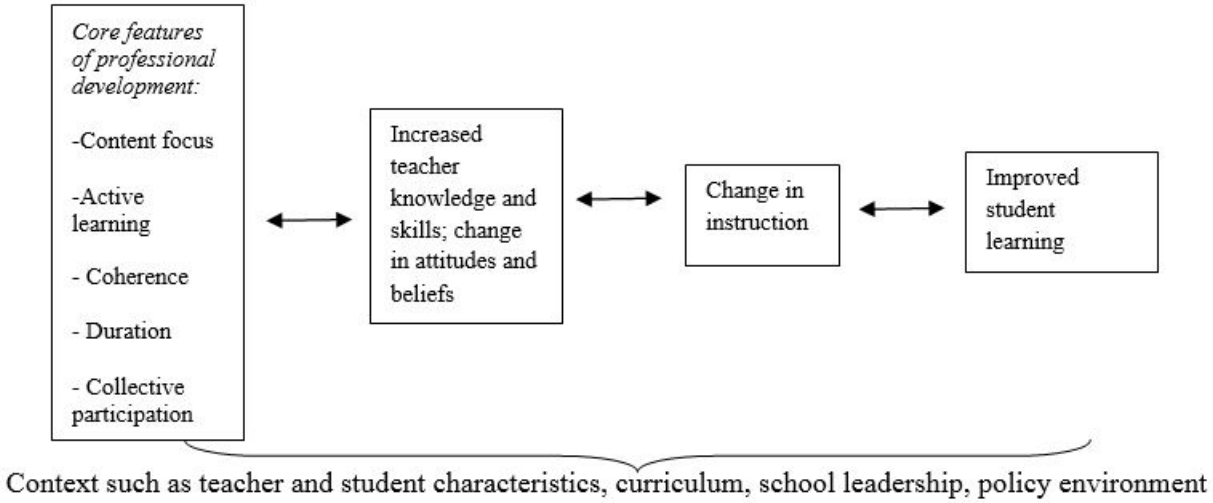

Figure 1. Proposed core conceptual framework for studying the effects of professional development on teachers and students (Desimone, 2009, p. 185).

In addition to the five core features that Desimone (2009) provided, professional development should also be intensive and sustained over time (Hawley & Valli, 1999). Bybee (1993) suggested that participants must be engaged in inquiry, questioning, and experimentation through modeling. Since the mid-1990s emphasis of essential science content has been called for through the National Science Education Standards (NRC, 2000) and "programs that focus on subject matter knowledge and on student learning of particular subject matter are likely to have larger positive effects on student learning than are programs that focus on teaching behaviors" (Kennedy, 1998, p.11). Finally, the purpose of professional development is to generate exceptional teaching intended to render better student achievement (Supovitz & Turner, 2000). Policy, school environment, and the type of professional development all drive the overall success (Figure 2). Darling-Hammond and McLaughlin (2011) asserted:

> Teachers learn by doing, reading, and reflecting (just as students do); by collaborating with other teachers; by looking closely at students and their work, and by sharing what

they see.... To understand deeply, teachers must learn about, see, and experience successful learning-centered and learner-centered teaching practices. (p. 83)

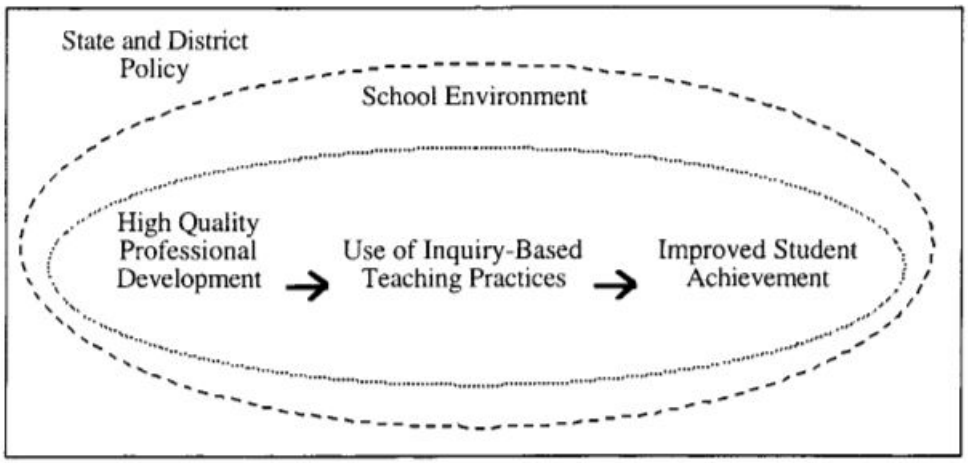

Figure 2. Model depicting the theoretical relationship between professional development and student achievement. (Supovitz & Turner, 2000).

Consideration of the conceptual model by Desimone (2009) and the theoretical model of professional development, inquiry-based teaching practices, and student achievement (Supovitz & Turner, 2000) led to the design and delivery of the STEM-it Up program.

Purpose and Objectives

The purpose of this study was to determine our participants' perceptions of self-efficacy in teaching the science of agriculture immediately before and after, as well as months after engaging in the STEM-it Up professional development program. Specific objectives of this study were to:

1. Describe the mean levels of teacher efficacy in Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy for pre, post, and post-post test assessments.
2. Describe differences, if any, in mean levels of teacher efficacy in Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy for both pre, post, and post-post test assessments.
3. Determine the significant difference between pre, post, and post-post test efficacy beliefs by individual instrument items.

Methods

Program Description

Agriscience teachers (N = 14) from around the nation were selected through a nomination and application process to participate in a professional development program focused on applying STEM concepts within the horticulture/floriculture curricula. Topics of focus included greenhouse electrical controls, microgreens propagation, STEM laboratory investigations in

floriculture and floral design techniques, and plant and environmental science research laboratory and industry tours. The STEM-it Up professional development program was designed to help agriscience teachers learn and think about teaching STEM concepts related to the Horticulture/Floriculture industry in a new way, by highlighting the science that is embedded into the curricula. Curricula were delivered through an inquiry-based, hands-on approach and modeled by the instructors as recommended by Bybee (1993), to allow participants to gain full knowledge and complete the lessons as a student and thus have a deeper understanding of the content, context, and pedagogy.

Population and Sampling

The target population for this study was all agriscience teachers (N = 14) registered for STEM-it Up held at Clemson University in June 2019. Participants were selected through an application process. In order to disseminate the application, state leaders in agricultural education were contacted in 20 states and were asked to nominate outstanding agriscience teachers who taught curricula in the horticulture and floriculture pathways. The nominated teachers were then contacted and invited to complete an application. Twenty-four applications were received. Participants were selected based on the curricula taught, level of self-perceived experience teaching floriculture and horticulture, and depth of interest in learning about inquiry-based instruction and STEM concepts.

Data for the pre and post tests were collected during the first and last sessions of the three-day program to obtain pre and post test scores. A hardcopy questionnaire was utilized and was collected face-to-face. A 100% response rate was achieved as all 14 teachers completed the pre and post questionnaires, and a 93% (n = 13) response rate was achieved for the post-post survey. Qualtrics online survey software was utilized for the post-post test. A prenotice, cover letter, and two follow-up emails for the post-post-test were distributed via email. A final contact and reminder were made by phone.

Most of the agriscience teachers who participated in this study had been teaching one to three years (f = 7; 46.7%), with 33.3% teaching for four to eight years (f = 5), and 20% for nine to fifteen years (f = 3). All teachers reported having only taught agricultural subjects during their teaching career (f = 15; 100%). Nearly half of the teachers reported teaching 50 – 99 unduplicated students (f = 7, 46.7%), with 100 – 150 students being the second largest group (f = 5; 33.3%). Horticulture was the most frequently reported course taught (f = 9; 60.0%), while introductory agriculture (f = 7; 46.7%), and advanced horticulture were the next frequently reported (f = 5; 33.3%). Some teachers reported teaching floral design (f = 3; 20%) and advanced floral design and others reported teaching floriculture (f = 4, 26.7%). It should be noted that the results of this study are limited to those teachers who attended and participated in teacher professional development.

Instrumentation

Riggs and Enochs' (1989) Science Teaching Efficacy Belief Instrument was adapted for use in this study according to the authors' suggestion to align measurement to specific situations. Modifications included slight changes in language to tailor the instrument for high school

teaching and the science of agriculture. The purpose of this instrument was to measure the self-efficacy of agriscience teachers towards teaching the science of agriculture. The instrument consisted of 25 items with response categories of “strongly disagree,” “disagree,” “uncertain,” “agree,” and “strongly agree.” Each of the five categories was scored one to five, with “strongly disagree” receiving 1 and “strongly agree,” receiving a score of 5.

The instrument encompassed two constructs. The first construct, Science Teaching Outcome Expectancy (STOE), targeted teacher beliefs connected to inabilities to produce specific outcomes and consisted of 12 questions (Enochs & Riggs, 1990). Example questions included, “The teacher is generally responsible for the achievement of students” and “The inadequacy of a student’s background in the science of agriculture can be overcome by good teaching.” Personal Science Teaching Efficacy Beliefs (PSTEB) composed the second construct which focused on behaviors specifically related to science teaching in order to be a more accurate predictor of distinct teaching behaviors (Riggs & Enochs, 1989). Example questions from the PSTEB construct included “I am continually finding better ways to teach the science of agriculture” and “I am typically able to answer students’ questions on the science of agriculture.” Cronbach’s alpha reliability coefficients from Riggs and Enochs' (1989) original instrument were .92 for PSTEB and .76 for STOE.

Data Analysis

Data were analyzed using SPSS version 26 for PC and Microsoft Excel. Descriptive statistics, which included frequency, mean, standard deviation, and percentage, were utilized to describe the population, as well as summarize data by item and construct. For objective one, a repeated measures ANOVA was utilized in conjunction with summated mean scores for each construct. A one-way ANOVA was used for objective two. Negatively worded items (3, 6, 8, 10, 13, 17, 19, 20, 21, 22, 24, and 25) were reverse coded prior to any analysis, according to Riggs and Enochs (1989).

Post-hoc analysis was utilized in order to determine internal reliability using Cronbach’s alpha coefficients. Pre, post and post-post test reliabilities for PSTEB were .80, .64, and .88 respectively, while STOE pre, post, and post-post test reliabilities were .63, .69, and .69. A lower reliability score for the STOE construct is consistent with Riggs and Enochs (1989) who noted there are complexities in measuring outcome expectancy due to the large possible variations in teacher background, students’ background, and student motivation. An alpha level of .05 was set *a priori*.

Results

The first objective of this study was to describe the mean level of teacher efficacy in Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy for the pre, post, and post-post test assessments (Table 1). Teachers reported a mean PSTEB pretest score of 3.44 (SD = 0.49) and mean STOE score of 3.31 (SD = 0.41). At the conclusion of the program, teachers reported a slight increase in both post-test mean PSTEB score of 3.79 (SD = 0.34) and STOE score of 3.48 (SD = 0.41). Finally, during the last phase of the study, a mean PSTEB post-

post test score of 3.72 (*SD* = 0.59) and a mean STOE score of 3.33 (*SD* = 0.43) displayed a slight decrease from the post test, but still higher than their original perceptions.

Table 1

Mean scores and group differences for Personal Science Teaching Efficacy Belief and Science Teaching Outcome Expectancy

	Pre Test (n = 14)		Post Test Pre Test (n = 14)		Post-Post Test Pre Test (n = 13)	
Measure	Mean	*SD*	Mean	*SD*	Mean	*SD*
PSTEB	3.44	0.49	3.79	0.34	3.72	0.59
STOE	3.30	0.40	3.48	0.41	3.33	0.43

Objective two was to describe any possible difference in the mean levels of both constructs over the three testing periods. A one-way repeated-measures ANOVA was conducted to compare scores in both the PSTEB and STOE constructs across the three testing periods. Results from Maluchly's test for the PSTEB construct indicated the assumption of sphericity was not violated, $X^2(2) = 0.33$, $p<.05$. A significant effect of time for the testing period was not found for the PSTEB construct, $F_{(2, 11)} = 3.51$, $p=0.66$. When examining the means of the STOE construct, Mauchly's test revealed sphericity was violated, $X^2(2) = 0.03$, $p<.05$. Therefore, the Greenhouse-Geiser was utilized for epsilon adjustment. A significant effect for the testing period was not found for the STOE construct, $F_{(1.350, 17.461)} = 2.02$, $p=0.17$.

The third objective was to determine any mean difference between pre, post, and post-post test efficacy beliefs by specific items. A one-way ANOVA was conducted to evaluate the impact of the program on participants' scores by item on all three testing occasions. Homogeneity of variance was found not to hold for the population; therefore, Welch's *F* statistic was utilized. There was a significant difference in scores for three items across the three testing periods. Post-hoc comparison of item five, "I know the steps necessary to teach the science of agriculture concepts effectively" [$F_{(2, 22.902)} = 12.981$, $p<.001$], indicated a mean difference between both the pre and post test, as well as the pre and post-post test. Item 12, "I understand science concepts well enough to be effective in teaching the science of agriculture" [$F_{(2, 24.486)} = 4.374$, $p<.05$], resulted in a significant difference between the pre and post-post means. Lastly, item 24, "I don't know what to do to turn students on to the science of agriculture." [$F_{(2, 23.306)} = 6.175$, $p<.05$], displayed a significant difference between the pre and post test mean difference.

The effect size for all three items is considered a large effect as the calculated eta squared is greater than .14 for all three items (Cohen, 1992). The mean scores for the items with significant differences display a pattern of growth between the testing occasions (Table 2).

Table 2

Mean Score by Testing Occasion and Item

Item	Pre Test		Post Test Pre		Post-Post Test Pre	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
I know the steps necessary to teach the science of agriculture concepts effectively.	2.23*	.83	4.21*	.43	4.00*	.71
I understand science concepts well enough to be effective in teaching the science of agriculture.	3.36*	.74	3.93	.83	4.07*	.49
I don't know what to do to turn students on to the science of agriculture.	2.79*	.89	3.79*	.58	3.31	1.03

$*p<.05$

Conclusions, Discussion, and Recommendations

The results of this research are limited to the purposively selected population of the STEM-it Up professional development program. The authors note this as a limitation of the study. Therefore, the results of this study are only representative of the group of teachers who participated in the program and are not generalizable beyond the population utilized.

Overall, teachers displayed increased scores in both the PSTED and STOE constructs across the total period of time, with a slight decrease from the post to post-post test periods. This indicates the professional development was able to provide focused time and aid the teachers overall in both Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy. This conclusion is congruent with Ulmer et al. (2013), who also found increases in both areas after targeted professional development, with a slight decrease seen in the STOE construct.

Furthermore, teachers showed a significant increase in their efficacy beliefs to teach the steps of science in the horticulture/floriculture curricula across all three testing periods. STEM-it Up highlighted many areas of the technical and scientific aspects of the floriculture and horticulture industries. The focus of the professional development on the scientific concepts which drive common practices within curriculum facilitated the teachers' belief they can convey the same concepts and ideas to their students as supported by Darling-Hammond and McLaughlin (2011) asserted who posited that "teachers learn by doing, reading, and reflecting (just as students do)", p.83.

A significant increase was found in teachers' beliefs in their ability to engage, or "turn on" students in the science of agriculture between the pre and post tests. When teachers have increased confidence in their personal level of knowledge, as well as the tools needed to deliver this information to their students, they can display higher levels of confidence in their abilities to assist and engage their students. Participation in the program provided teachers with the focused and specific content needed for increased efficacy. Rice and Kitchel (2018) noted similar findings, reporting teachers found ease in incorporating science into the plant science curriculum.

Lastly, time as a significant effect was also found between the pre and post-post test for teachers' understanding of science concepts related to the teaching of agriculture. Background knowledge of curriculum related to scientific concepts was a focus of STEM-it Up. An increase in teachers' perceived understanding supports the achievement of this goal but also indicates an increased likelihood to teach scientific concepts in their class, in line with findings by Ramsey and Edwards (2011) and supported by Desimone's (2009) conceptual framework and the theoretical underpinnings of self-efficacy (Bandura & Schunk, 1981; Schunk, 2012).

Recommendations

Evaluating self-efficacy helped determine our participants' perceptions of their own performance before and after engaging in the program. Using our program as a model, we recommend teacher educators should consider how to create professional development experiences for agriscience teachers that target specific content to impact self-efficacy. In this case, STEM-it Up professional development program proved to be beneficial in assisting the participants to grasp the steps necessary to teach the science of agriculture concepts effectively and to know what to do to turn students on to the science of agriculture, more specifically with regard to horticulture/floriculture curricula.

The post post test design provided participants time to apply their new knowledge and skills from the program. Ulmer et al. (2013) also used a post post test design for CASE institute training. As people engage in activities they believe they can do, such as teaching content of which they are more familiar, it is recommend similar studies should also be designed for professional development with different content areas of focus to see if this model could be applicable for other career pathways (Maddux, 2016).

It is also recommended that some form of follow-up communication be planned to determine if and how the participants utilize what they learned as a result of participating in the three-day STEM-it Up program to benefit student achievement. Supovitz and Turner (2000) posit that high-quality professional development, coupled with inquiry-based instruction, increases student achievement. It would be helpful to know how agriscience teachers utilize the resources and transfer the knowledge they are exposed to in professional development sessions to alter their instruction and impact student learning. Data could be collected via survey design and/or qualitative research design using focus groups or structured interviews to help inform decisions for future professional development. No matter the structure or focus of professional development, it is recommended to continue to follow the guidelines for high-quality professional development set forth by Desimone (2009) including content focus, active participation, coherence, duration, and collective participation.

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Agricultural Educators' Levels of Personal Teaching Efficacy Towards STEM Education

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STEM (Science, Technology, Engineering, and Mathematics) education is becoming an integral part of modern agricultural education. If the integration of STEM into agricultural education is to succeed, it is vital that educators feel confident in their ability to teach such material. This study examines Mississippi and Tennessee agricultural educators' personal teaching efficacy towards STEM subjects. Analysis indicated that educators felt most confident in their ability to teach science, followed by technology, mathematics and then engineering. Recommendations for future research and practice include exploring agricultural educators' perceptions of and methods for teaching engineering, understanding the experience of minorities in STEM, and developing new courses for STEM-enhanced postsecondary agricultural educator preparation programs.

Introduction

Since the 1990s, there have been numerous initiatives pushing for increased integration of STEM content into other subject areas (President's Council, 2012). However, this mandate has been more difficult to implement than originally imagined. One of the largest challenges to the success of STEM education has been a lack of teacher quality in STEM fields (Gonzales & Kuenzi, 2012). Many teachers find themselves unprepared to teach newer, more difficult material, some are unsure of how to interest students in STEM topics and careers, and others are unaware of what different STEM disciplines entail (Seelman, 2003; Hirsch, Kimmel, Rockland, & Bloom, 2005; Gonzales & Kuenzi, 2012; Granata, 2014; McKim, Lambert, Sorenson, & Valez, 2015).

If American agriculture is to continue improving its "productivity, efficiency, and effectiveness," while "driving sustainable growth, scientific discovery, and innovation," it is essential that agricultural education produce "a sufficient supply of well-prepared agricultural scientists and professionals" (Doerfert, 2011, p. 18). In order to understand how STEM material might better be integrated into agricultural education, it is important to understand how individual teachers approach the task (Smith, Rayfield, & McKim, 2015). Integrating STEM

requires teachers to make decisions regarding subject matter, background context, instructional methods, and classroom environment. Recognizing how these choices are made can assist in identifying key factors that play into the success for failure of STEM integration.

Theoretical Framework

This study examined agricultural educators' integration of STEM subject material through Albert Bandura's social cognitive theory (1986). Social cognitive theory posits that human learning is a cognitive and self-regulated process that is controlled by outwardly observing the actions of others and inwardly reflecting upon them. The choices that a person makes are thus governed by the interactions of one's personal characteristics, past behavior, and social environment (Bandura, 1986; Pajares, 2002; McKim & Valez, 2016). These three factors all interact with one another in what is known as a triadic reciprocality (Bandura, 1986; Pajares, 2002).

Of the three factors, personal characteristics are often considered the most influential to Bandura's theory (Pajares, 2002). Personal characteristics considered by Bandura include a person's mental and emotional factors, their ability to understand their own thinking and behavioral processes, and self-efficacy (Snowman, McCown, & Biehler 2000, p. 276). Self-efficacy is defined as "people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandua, 1986, p. 391). Because self-efficacy relates to a person's confidence in their ability to achieve desired outcomes, it can have effects on one's choices, goals, motivation, outlook, persistence, and response to challenges (Bandura, 1986; Pajares, 2002). A person with high self-efficacy is more likely to appraise their skills and situations positively, take on difficult opportunities, manage stress effectively, and persevere over obstacles than someone with low self-efficacy (Bandura, 1994).

Self-efficacy in the classroom is no different. Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) defined teacher self-efficacy as a teacher's "belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific task in a particular context," (p. 233). There are two types of teacher self-efficacy: personal teaching efficacy and outcome expectancy (Tschannen-Moran et al., 1998). Personal teaching efficacy concerns itself with a teacher's confidence level regarding their teaching ability and ability to overcome obstacles that hinder student learning (Tschannen-Moran et al., 1998; Protheroe, 2008). An example of personal teaching efficacy is a teacher's confidence in their ability to explain a scientific concept such as photosynthesis. Outcome expectancy deals with a teacher's belief in their ability to influence factors that cannot be completely controlled (Tschannen-Moran et al., 1998). Tschannen-Moran et al. (1998) offer the example of a teacher being unable to control the value that a child's family places on education but being able to positively influence that child's

beliefs about education in some small way. Higher levels of teacher efficacy are correlated with improved classroom performance, behavior management, enthusiasm, motivation, organization, patience, resilience, and positivity (Bandura, 1994; Tschannen-Moran & Woolfolk Hoy, 2001; Protheroe, 2008).

A teacher's level of efficacy is both situation- and subject-specific. Teachers may feel more confident teaching certain subjects or working with certain students (Tschannen-Moran et al., 1998). When examining the integration of STEM content into agricultural education, it is therefore a worthwhile endeavor to consider each of the four STEM subjects individually. Despite the idea of STEM as a monolith, it is actually a complex entity consisting of smaller parts about which teachers have varying degrees of experience and opinion.

Purpose and Objectives

The purpose of this study was to identify agricultural educators' personal teaching efficacy levels regarding the integration of science, technology, engineering, and mathematics (STEM) content into agricultural education. Because STEM education is complex, and because teaching efficacy can be dependent upon the subject being taught and the situation in which it is taught, this study examined teacher efficacy for each of the four STEM subjects individually. This allowed teachers to consider each subject on its own merits and offered a more nuanced glimpse of the trends that currently exist in American agricultural education.

The following objectives guided this study:

1. Determine Mississippi and Tennessee agricultural educators' personal teaching efficacy levels towards science, technology, engineering, and mathematics (STEM).
2. Examine the relationship between overall STEM efficacy levels and self-perception of specific behaviors demonstrating personal teaching efficacy.

Methods and Procedures

The population for this study was in-service agricultural educators in Mississippi and Tennessee (N = 447). These teachers were chosen due to geographic location and researcher ability to gain teacher contact information. This contact information was provided by the Mississippi FFA Association and the Tennessee Department of Education. All 447 teachers were contacted via email and asked to participate in the study. Only data collected from respondents was used for statistical analysis. Approval to carry out this study was given by the Mississippi State University Institutional Review Board (IRB).

Participants were asked to complete a portion of the Science, Technology, Engineering, Mathematics, and Elementary Teacher Efficacy and Attitudes toward STEM (T-STEM) Survey. The T-STEM survey was developed by The Friday Institute for Educational Innovation at North Carolina State University (2012). The Friday Institute gave permission for the instrument to be used in this study. Originally there were five versions of the T-STEM instrument developed, but only the four made for specific instructors of STEM subjects were utilized for the purposes of this study (Unfried, Faber, Townsend, & Corn, 2014). These four versions were virtually identical to one another, with only the name of the STEM subject being substituted (Unfried et al., 2014). The instrument was also altered to include questions that gathered information on participant characteristics such as age, gender, ethnic background, and STEM education history.

The survey presented participants with 11 statements such as "I am continually improving my __ teaching practices," and "I know the steps necessary to teach __ effectively." Participants were asked to replace the blank in each statement with the name of a STEM discipline and then note their level of agreement or disagreement with that statement on a 5-point Likert-type scale. This scale ranged from "1 = strongly disagree" to "5 = strongly agree" (Unfried et al., 2014, p. 6). Once participants finished the 11 statements for the first STEM discipline (science, in this case), they were asked to repeat the process for the other three STEM areas.

Prior to actual data collection, the survey was pilot tested with 31 in-service agricultural educators from Alabama. Pilot test participants were selected based on their willingness to assist with the pilot test phase and were contacted via email. These participants were given a link to an online version of the T-STEM survey instrument and were asked to complete it while noting errors in grammar, spelling, formatting, and survey flow. Overall response to the survey was positive, and only one minimal edit was recommended. The pilot test was also used to calculate the reliability of the T-STEM instrument as used in the study. Cronbach's Alpha was 0.86 for the science section, 0.70 for the technology section, 0.82 for the engineering section, and 0.84 for the mathematics section. These alpha levels met Nunnally's (1978) threshold of 0.70, which is suggested as a baseline for early research in social science areas.

Data collection was carried out through the website Qualtrics. The 447 agricultural educators in Mississippi and Tennessee were contacted through email and asked to complete the survey on the website Qualtrics. All emails contained a short message thanking the recipient for their time and describing the survey's purpose. A link to the survey was also provided. An email reminder was sent one week after the initial survey release, followed by a second two weeks later. This schedule follows Salant and Dillman's (1994) recommended survey distribution procedures.

Collected data were analyzed using IBM Statistical Package for Social Sciences (SPSS) Version 24. Means for each item on the survey were calculated, as well as overall means for each of the four STEM subject areas. The T-STEM survey was scored on a summated scale. Each of the 11 survey items were scored on a 5-point Likert-type scale, giving a lowest possible efficacy score of 11 and a highest possible score of 55.

Ninety-one agricultural educators participated in the study, resulting in a 20% response rate. Of these 91 participants, 79 provided demographic information: 32 teachers from Mississippi and 47 teachers from Tennessee. In order to minimize bias, results were also analyzed based on the dates of collection and then compared using a standard t-test with an alpha level of 0.05. Results revealed that there were no significant differences between early and late responders.

Results

Participant Demographics and STEM Background

The average age of participants was 41.26 years (*SD* = 12.01), with the youngest participants indicating they were 23 years of age and the oldest indicating they were 65 years old. Forty-three participants were male (54.43%) and 36 were female (45.57%). When examining ethnic background, 76 respondents were White/Caucasian (96.20%), 2 were Black/African American (2.53%), and 1 selected “other” (1.27%).

Teaching career length varied from less than 1 year of experience (*f* = 5, 6.3%) to 42 years of experience (f = 1, 1.2%). The mean length of participants’ teaching careers was 14.14 years (SD = 9.30). Seventy-eight respondents reported they had earned a bachelor’s degree, with 36 (46.15%) having majored in agricultural or extension education, and 34 (43.59%) in other agriculture-related fields. Four respondents (5.13%) did not report their major, and three earned their degree outside of the field of agriculture (3.8%).

When considering STEM background at the undergraduate and graduate levels, science was the subject with which participants were most familiar. Responses showed that participants had completed a combined total of 699 science courses, with plant science/botany, biology, animal science, chemistry, and soil science being the most commonly. The other STEM subjects were less well represented, with mathematics having a total of 252 combined courses, technology having 161, and engineering having only 101.

Overall Mean Scores Towards STEM Subjects

An overall mean score for agricultural educators' teaching efficacy towards each STEM field was calculated using collected data. Results showed that the field of science had the highest mean score (*M* = 46.04, *SD* = 5.21), followed by technology (*M* = 41.06, *SD* = 5.80), mathematics (*M* = 37.95, *SD* = 7.49), and then engineering (*M* = 35.39, *SD* = 7.76). Table 1 displays these mean scores.

Table 1

Agricultural educators' mean personal teaching efficacy towards STEM subjects

STEM Field	*n*	*M*	*SD*
Science	91	46.04	5.21
Technology	91	41.06	5.80
Mathematics	91	37.95	7.49
Engineering	91	35.39	7.76

Personal Teaching Efficacy Towards Science

Science was the subject that showed the highest levels of efficacy with a mean score of 46.06 (SD = 5.21). The individual survey items with the highest means were "I am continually improving my science teaching practice" (M = 4.53, SD = 0.52), "I am confident that I can teach science effectively," (M = 4.36, SD = 0.64), and "I am confident that I can answer students' science questions" (M = 4.35, SD = 0.56). Items with the lowest means were "I would invite a colleague to evaluate my science teaching (*M* = 3.98, *SD* = 0.81), and "I wonder if I have the necessary skills to teach science" (*M* = 3.35, *SD* = 1.19). This last statement required reverse coding, as it was phrased in a negative manner. Table 2 shows these results in greater detail.

Table 2

Agricultural educators' personal teaching efficacy towards science

Item	*n*	*M*	*SD*
I am continually improving my science teaching practice.	91	4.53	.52
I am confident that I can teach science effectively.	91	4.36	.64
I am confident that I can answer students' science questions.	91	4.35	.56
When teaching science, I am confident enough to welcome student questions.	91	4.33	.59
I understand science concepts well enough to be effective in teaching it.	91	4.32	.63
I am confident that I can explain to students why science experiments work.	91	4.30	.64
When a student has difficulty understanding a science concept, I am confident that I know how to help the student understand it better.	91	4.26	.55
I know the steps necessary to teach science effectively.	91	4.26	.64
I know what to do to increase student interest in science.	91	4.00	.86
Given a chance, I would invite a colleague to evaluate my science teaching.	91	3.98	.81
I wonder if I have the necessary skills to teach science. *	91	3.35	1.19

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

* Reverse coded

Personal Teaching Efficacy Towards Technology

Technology showed the second-highest levels of personal teaching efficacy. The overall mean score was 41.06 (*SD* = 5.80). The statements with the highest level of agreement were "I am continually improving my technology teaching practice" (*M* = 4.11, *SD* = 0.62), "when I am teaching technology, I am confident enough to welcome student questions" (*M* = 4.02, *SD* = 0.64), and "I am confident that I can teach technology" (*M* = 3.85, *SD* = 0.77). Teachers felt the least confident about the statements "Given a chance, I would invite a colleague to evaluate my

technology teaching" (*M* = 3.62, *SD* = 0.90) and "I wonder if I have the necessary skills to teach technology" (*M* = 3.02, *SD* = 1.08). Table 3 displays these results.

Table 3

Agricultural educators' personal teaching efficacy towards technology

Item	*n*	*M*	*SD*
I am continually improving my technology teaching practice.	91	4.11	.62
When teaching technology, I am confident enough to welcome student questions.	91	4.02	.64
I am confident that I can teach technology effectively.	91	3.85	.77
I understand technology concepts well enough to be effective in teaching it.	91	3.79	.76
I am confident that I can explain to students why technology experiments work.	91	3.78	.72
I am confident that I can answer students' technology questions.	91	3.76	.76
When a student has difficulty understanding a technology concept, I am confident that I know how to help the student understand it better.	91	3.73	.68
I know the steps necessary to teach technology effectively.	91	3.70	.70
I know what to do to increase student interest in technology.	91	3.69	.83
Given a chance, I would invite a colleague to evaluate my technology teaching.	91	3.62	.90
I wonder if I have the necessary skills to teach technology. *	91	3.02	1.08

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree
* Reverse coded

Personal Teaching Efficacy Towards Engineering

Engineering had the lowest efficacy levels of the four STEM areas. The mean score was 35.39 (*SD* = 7.76). The statements with the highest means were "When teaching engineering I am confident enough to welcome student questions" (*M* = 3.48, *SD* = 0.97), "I am confident that

I can explain to students why engineering experiments work," (*M* = 3.38, *SD* = 0.90), and "I know what to do to increase student interest in engineering" (M = 3.27, SD = 0.99). The statements with the lowest means were "I know the steps necessary to teach engineering effectively" (*M* = 3.07, *SD* = 0.92), and "I wonder if I have the skill necessary to teach engineering" (*M* = 2.84, *SD* = 1.00). The entire list of engineering efficacy questions is in Table 4.

Table 4

Agricultural educators' personal teaching efficacy towards engineering

Item	*n*	*M*	*SD*
When teaching engineering, I am confident enough to welcome student questions.	91	3.48	.97
I am confident that I can explain to students why engineering experiments work.	91	3.38	.90
I know what to do to increase student interest in engineering.	91	3.27	.99
I am confident that I can answer students' engineering questions.	91	3.25	.95
When a student has difficulty understanding an engineering concept, I am confident that I know how to help the student understand it better.	91	3.24	.87
I am confident that I can teach engineering effectively.	91	3.24	.97
Given a chance, I would invite a colleague to evaluate my engineering teaching.	91	3.24	1.04
I am continually improving my engineering teaching practice.	91	3.19	.95
I understand engineering concepts well enough to be effective in teaching it.	91	3.19	.96
I know the steps necessary to teach engineering effectively.	91	3.07	.92
I wonder if I have the necessary skills to teach engineering. *	91	2.84	1.00

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

* Reverse coded

Personal Teaching Efficacy Towards Mathematics

Mathematics had the second lowest levels of personal teaching efficacy, above only engineering. “When teaching mathematics, I am confident enough to welcome student questions” was the statement with the highest mean (*M* = 3.48, *SD* = 0.97), followed by “I am confident that I can explain to students why mathematics experiments work” (*M* = 3.38, *SD* = 0.90), and “I know what to do to increase student interest in mathematics” (*M* = 3.27, *SD* = 0.99). The statements earning the lowest levels of confidence were “I know the steps necessary to teach mathematics effectively” (*M* = 3.07, *SD* = 0.92) and “I wonder if I have the necessary skills to teach mathematics” (*M* = 2.84, *SD* = 1.00). Participant responses to all mathematics-related statements are available in Table 5.

Table 5

Agricultural educators’ personal teaching efficacy towards mathematics

Item	*n*	*M*	*SD*
When teaching mathematics, I am confident enough to welcome student questions.	91	3.48	.87
I am confident that I can explain to students why mathematics experiments work.	91	3.38	.90
I know what to do to increase student interest in mathematics.	91	3.27	.99
I am confident that I can answer students’ mathematics questions.	91	3.25	.95
When a student has difficulty understanding a mathematics concept, I am confident that I know how to help the student understand it better.	91	3.24	.87
I am confident that I can teach mathematics effectively.	91	3.24	.97
Given a chance, I would invite a colleague to evaluate my mathematics teaching.	91	3.24	1.04
I am continually improving my mathematics teaching practice.	91	3.19	.95
I understand mathematics concepts well enough to be effective in teaching it.	91	3.19	.96
I know the steps necessary to teach mathematics effectively.	91	3.07	.92
I wonder if I have the necessary skills to teach mathematics. *	91	2.84	1.00

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

* Reverse coded

Conclusions and Recommendations

Overall, agricultural educators' personal teaching efficacy levels towards the STEM subjects were high, especially when considering science (*M* = 46.06, *SD* = 5.21) and technology (*M* = 41.06, *SD* = 5.80). Engineering (*M* = 35.39, *SD* = 7.76) and mathematics (*M* = 37.95, *SD* = 7.49) did receive lower mean efficacy scores, but these scores were still relatively high when comparing them to the T-STEM instrument's lowest possible mean score of 11. This agrees with Bandura (1994), who stated that highly efficacious people are more likely to appraise their abilities positively. Responses also demonstrated that teachers felt confident in their ability to teach STEM regardless of current knowledge or experience, as "I wonder if I have the skills necessary to teach __" was the lowest ranked statement for each field. This is a truly efficacious attitude, as teachers who possess higher levels of efficacy are more likely to take on greater challenges and experiment with their teaching methods and materials (Tschannen-Moran & Woolfolk Hoy, 2001). Even if teachers were not familiar with the material, they did not doubt that they possessed the skills to master it eventually. Teachers also felt confident in their ability to answer (or at least welcome) students' STEM-related questions in class. Highly efficacious teachers are known to be more engaging and student-centered (Tschannen-Moran and Hoy, 2001), and teachers' willingness to entertain such questions (and the potential for not knowing the answer) demonstrates it as such.

When statements are ranked from highest mean to lowest mean, a stark contrast emerged between how teachers viewed their efficacy levels in science and technology versus their efficacy levels in engineering and mathematics. For science and technology, teachers said they were continually improving their teaching practices, which agrees with the findings of Bandura (1986) and Tschannen-Moran and Woolfolk Hoy (2001). They stated that higher self-efficacy is associated with an increased desire to improve oneself and one's abilities so that future goals might be achieved. Teachers also said they felt confident in their understanding of science and technology concepts, and in their ability to teach those concepts effectively. Standard deviations for these subjects were very low, as well. Interestingly, teachers were not particularly amenable to allowing a colleague to evaluate their teaching in science and technology, which seems paradoxical when considering their continuous self-improvement. In addition, teachers felt less positive about their ability to help struggling students better understand science and technology material and were less sure how to interest students in these subjects. In all cases, though, when rankings were ignored, the mean scores for these items were higher than they were for the same items in engineering and mathematics, which does show higher levels of efficacy for science and technology overall. This agrees with Bandura (1994), Tschannen-Moran and Woolfolk Hoy (2001), and Protheroe (2008), who wrote that high efficacy teachers are better able to motivate and work with students regardless of their learning difficulties, behavior, or backgrounds.

For engineering and mathematics, teacher responses were more varied and standard deviations were much higher. Teachers felt most confident they could explain to students why engineering and mathematics experiments worked, and that they could increase student interest in engineering and mathematics. They were also more confident in their ability to help struggling students and were more likely to allow a colleague to evaluate their teaching in these subject areas. This is likely because while they are at least knowledgeable about the fundamentals of engineering and mathematics, at the same time they recognize that some feedback or guidance could help them achieve teaching goals (Tschannen-Moran & Woolfolk Hoy, 2001). Teachers were also less likely to be continually improving their engineering or mathematics teaching ability. This could be because they do not know how to do so, or because they do not recognize the value of doing so. It is possible that teachers who know only the basics do not fully understand the depth of the engineering or mathematics fields. In addition, teachers felt less confident in their ability to understand engineering and mathematics concepts well enough to teach them, and in their knowledge of the steps necessary to teach such concepts. Most teachers in the study had less experience in these areas, and very few had completed any courses in engineering or mathematics education. This lack of instruction, along with popular perceptions of what engineering and mathematics entail, likely caused teachers to express lower levels of teaching efficacy regarding their integration.

Further research into agricultural educator efficacy towards STEM subjects should focus on agricultural educators' perceptions of engineering and its use in the agriculture industry. Results of this study indicate that teachers did not have much experience with or confidence in their ability to teach engineering. Engineering is often the least understood and least integrated field of all the STEM subjects (Yoon, Evans, & Strobel, 2012; Stubbs & Myers, 2015), and it is important to understand how agricultural educators view the subject so that needs can be addressed in teacher education programs and through professional development opportunities. This research should also consider how engineering concepts are taught in both postsecondary preservice agricultural education programs and current high school-level programs. Agricultural education and STEM are founded on the principle of active learning, but lower efficacy levels are associated with less student-centered and "hands-on, activity-based" opportunities (Tschannen-Moran et al., 1998, p. 216). The lower levels of efficacy towards engineering may indicate that such material is not being taught in accordance with STEM and agricultural education-based values.

Research into the relationship between minorities and STEM is also an essential topic. Minorities are underrepresented in both STEM and agricultural education fields (NACME, 2019), and studying their specific beliefs and experiences could offer a more nuanced view. This study did not have a particularly diverse population, which leaves space for further exploration into minorities' viewpoints and efficacy levels regarding STEM.

Programs of study for future agricultural educators must be continually updated to ensure that needs for both knowledge and efficacy are being met. Teacher educators should assess their students' knowledge and efficacy through instruments like the T-STEM to determine individual needs and curriculum pathways. Preservice agricultural educators should also be required to complete broad overviews of the STEM fields instead of more in-depth courses that focus on specific STEM areas. Darling-Hammond (2008) notes that teacher efficacy in science and math increases alongside increased course load, although only up to a point. Once this point is reached, the course material outpaced the teacher's needs. This broad overview should include at least one engineering and one technology course related to agriculture, as well as a course instructing teachers in basic STEM principles.

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Determining the Degrees of Closeness on Multicultural Student Profiles: A Social Distance Research Design

Abstract

Social identity theory posits that people do not have one personal sense of identity, rather multiple identities based on group memberships. After four years of involvement in a secondary agricultural education program, the identity of the seniors is molded by the environment surrounded them over their tenure. The purpose of this study is to identify the acceptance level high school seniors, throughout a state, have toward multiple student profiles that reflect a diversity of social, racial and sexual identities. Using a social distance scale, the results reveal that students were more accepting of a student who resides from a farm background and are heterosexual; however, results reveal a resistance against a student not from a farm background, Black, and gay to enroll in agriculture courses. Results reveal a level of implicitness that hinders the enrollment of students from cultures different from the social identity of the current group membership. Recommendations for inclusive programs that provide opportunities for secondary students to collaborate with culturally different individuals as well as development of agricultural curriculum that encompasses a transformational approach to gaining cultural competence.

Introduction

The benefits inclusion and diversity pose to agricultural education can be readily found within previous educational research. Chatman, Sherman, and Doerr (2015) found that groups charged with a collectivistic task were more likely to complete the task better when the group consisted of diverse cultural nationalities. They also found that heterogeneous groups who were prepared to be more individualistic were more likely to execute the task worse (Chatman, Sherman, & Doerr, 2015). These findings could be utilized within education to create interventions that teach collectivistic mindsets to overcome the effects of homophily and in-group mentality. Chang, Witt, Jones, and Hakuta (2003) found that racially diverse environments lead to both qualitative and quantitative gains as they stimulated creativity and speculation. Furthermore, Terenzini et al. (2001), found that racial/ethnic composition of a classroom aided the development of students' problem-solving and group skills; while Strayhorn and Johnson (2014) noticed an increase in social activism. The benefits of diversity and inclusion have been found to increase student gains, but it also allows all students to develop a sense of belonging and Osterman (2000) found individual sense of belonging affects students' feelings about themselves. Therefore, one could posit that the inclusion of diversity within the secondary agriculture classroom would provide students with more learning advantages.

Diversity and inclusion may also provide critical, soft skills that the business sector is beginning to demand of its employees. Cultural competence is increasingly being considered as an essential skill in professional workplaces (Wood & Landry, 2008). This ability to integrate and transform knowledge about individuals and groups of people into specific standards, practices, and attitudes used in appropriate cultural settings increases quality of service and produces better business outcomes (Davis, 1997). While there is a gap in research of "business case for diversity" regarding the impact it has on the bottom line (Coleman, 1995), the current

research has focused on the potential for increased performance (Wood & Landry, 2008). Cultural diversity can provide businesses with diverse experiences and knowledge, which are beneficial qualities for companies with an orientation towards growth (Cox, 1994; McLeod et al, 1996; Priem, Harrison, & Muir, 1995). Furthermore, when inclusion is implemented by an organization, employees are more likely to feel valued and supported; therefore, tend to be more innovative (Eisenberger, Fasolo, & Davis-LaMastro, 1990). Diversity and inclusion will need to find its place in the agricultural education classroom to continue to meet the changing skill and knowledge demands of the 21st century agriculture industry.

Theoretical Framework/Literature Review

Social identity theory was created by Tajfel and Turner in 1979. Social identity theory says people do not have one personal sense of identity, rather multiple identities based on group memberships. They also say that these salient groups provide a feeling of belonging. In efforts to increase self-image, people boost the significance of the group they belong to, otherwise known as in-group mentality. The research team also found that intergroup discrimination would occur in attempt to boost group importance (Turner, Brown, & Tajfel, 1979). Members are able to enhance the status of their group by being more charitable and less envious of their fellow group members (Chen & Li, 2009). Charness, Rigotti, and Rustichini (2007) discovered that people naturally use their group membership as a compass to navigate social environments. Therefore, people will assume an identity that provides meaning and builds self-esteem (Vignoles, Golledge, Regalia, Manzi, & Scabini, 2006). While social identity theory presents positive motivation, it also holds the potential to create groupthink or negative peer influence.

Ekmerkci and Casey (2009) found that a higher frequency of interaction within a group and the more information received about the group will cause a person to create a stronger identity within the group. The more salient the group becomes in the formation of a person's identity the more predictable their behavior becomes according to Griepentrog, Harold, Holtz, Klimoski, and Marsh (2012). They argue within their paper that the closer the organization's values align with their own helps predict whether they will join the group. Griepentrog et al (2012) found that organizational identification, or defining yourself in terms of a particular organization, can occur before being formally brought into the group. Organizational identification is important in predicting whether the individual has intentions to pursue joining the organization or withdrawing from it (2012). Therefore, the more homophily found between the group and the individual combined with the frequency of interaction greatly impacts the group's amount of influence and consequently the individual's identity.

Social identity theory impacts how an individual looks at leadership and the relationship between a leader and employee. Chrobot-Mason, Gerbasi, and Cullen-Lester (2016) found that the stronger level of identification a person has with the company, the more likely they are to view fellow group members as leaders. Kalkhoff and Barnum (2000) found that when a person is looking for leadership, people within the group will always be more influential than a person outside the group. Next a high-status individual will be more influential than a low-status individual within the in-group. While the term high and low status stems from status-organizing theory, the research team found it run concurrently with social identity theory (Kalkhoff & Barnum, 2000). Hogg and Terry (2000) discuss that social identity and leadership within

organization contexts when minorities were unlikely to attain positions of leadership because they are less likely to match the organizational prototypes or in-group requirements prescribed by the organization. These findings display the importance leadership has within an in-group. In-group leadership sets the tone and organizational prototypes the rest of the group will model. If leaders do not set an inclusive mentality within the group, or even worse, do not set an ethical administration within, the group will follow suit.

Social identity theory and in-group mentality have provided positive outcomes as well. Chattopadhyay, Tluchowska, and George (2004) found that employees are more motivated to help a company that they feel a sense of belonging to. They do so through the creation of a model that explains both the positive and negative effects of group dissimilarity (Chattopadhyay, Tluchowska, & George, 2004). Van Knippenberg's (2000) posits that if social identity is important within a group then it is recognized that high work performance is in the best interest of the group. These findings explain how social identity can be used as a motivator to increase quality performance produced by students. Inclusivity of a group and a sense of belonging is a powerful influence for individuals to perform.

From social identity development comes power, and social power formulates distancing (Magee & Smith, 2013). As social groups are formed and power is gained, articulated predictions are made about how the social dynamic leads to social comparison, susceptibility to influence, responses to one's ability to think and emotions (2013). Since the horrid attacks of 9/11, social distancing has increased toward all ethnic groups, but more so toward Arabic Americans (Parillo & Donoghue, 2013). After conducting a 20 year longitudinal study, Smith, McPherson, and Smith-Lovin (2014), found that increasing social distancing was occurring among groups identified by their educational level, religious homophily, race and age. The authors warned that youth are increasingly isolated from diverse audiences and if continued, communities would see demographic heterogeneity, institutional segregation, economic inequality, and symbolic boundaries.

Purpose and Objectives

The purpose of the study was to evaluate the inclusiveness of Kentucky secondary agriculture students towards students of race (Black or White), sexuality (Heterosexual or Homosexual), and clique (Non-Farm Background and Traditional Farm Background) and to determine whether social distancing occurs within the mindsets of secondary agriculture youth.

The following research objectives were developed to be the focus:

RO1: Describe the breaking point in each social distance scale of the 8 Mock Student Profiles

RO2: Determine the rank of acceptance/tolerance by student profiles based upon Social Distance Scale means.

RO3: Determine the relationship of demographic variables to the identified breaking point from each student profile.

Methodology

The methodology of the research was based off of the transformative epistemology. Transformative epistemologies believe that research needs to address social oppression and the imbalance of power that results from it (Creswell, 2014). Transformative epistemologies traditionally address empowerment, inequality, oppression, domination, suppression, and/or alienation as the focal point of the study (2014). After receiving an "exemption certification" from the Institutional Review Board for protocol number 17-0579-P4S, data was collected.

Research Design

Social distance referred to as (Wark & Gilliher, 2007). One main concept of Social Distance Scales that was used within the study was the concept that an individual would "go just so far" in letting a person of another group near him or her, but would go no further, otherwise known as a *breaking point* (Newcomb, Turner, & Converse, 1965). How "far" the participants will let a person get in relation to themselves can be illustrated by the term *degrees of closeness.* The breaking point can be calculated by having a participant evaluate how close they would let a hypothetical person near him or her on varying degrees of closeness. The researcher will be referencing seniors enrolled in secondary agriculture classes throughout a state and their willingness to include students of diverse groups in varying degrees of closeness (i.e. allowing a student of a diverse group into their school versus sharing a room with the student on an FFA trip). The breaking point is the degree of closeness where the participant no longer feels comfortable with the Mock Student Profile (MSP). Once a breaking point occurs, the general population begins to follow suit on their degrees of closeness (Svensson et al., 2015)

Population and Sample

The population consisted of seniors enrolled in secondary agriculture throughout Kentucky during the fall semester of 2017 (N = 2,766). Seniors were purposefully selected because they are considered the face of four-year programs as they reflect the philosophies set-forth by the leaders before them (Dhuey & Lipscomb, 2008). A recruitment letter was sent out to all 140 secondary agriculture programs, requesting the participation of the seniors within each program through a provided school log-in and survey link with a designated time to complete. Of the identified seniors, 417 agreed to participate from 47 secondary agriculture programs. The programs resided throughout the state rather a particular region; particularly a minimum of three schools from each of the 11 designated regions. After removal of incomplete questionnaires due to the lack of consent, a remaining 399 responses deemed usable.

Of the 399 senior participants, the majority of the participants had never obtained an officer position within their FFA chapter nor served in a leadership role within other clubs and/or sports. Similarly, the participants were primarily White, rural, had never traveled abroad and identified themselves as Christian. When asked, the majority of the students reported that the highest accomplished educational level of at least one parent was a high school diploma and perceive to have a family household income between $50,000-$74,999. Overall, the youth participants reflected the overall demographics of Kentucky (US Census Bureau, 2019).

Once a participating senior obtained a direct link and connected to the questionnaire, a method of stratified sampling was utilized regarding the profiles being completed. Researchers generally want to obtain an overall estimation through inexpensive means (Jackson, 2011; StatPac, 2014); therefore, an online approach was selected versus face-to-face. In order to

maximize response rate, teachers were provided weekly email reminders for the six-week duration of project's data collection. Furthermore, the researcher followed the data collection techniques of sending reminders to non-responders set by Dillman, Smythe, Christian (2014) to improve response rate.

Instrumentation

An internet-based questionnaire was used for the benefits of user-friendliness, timeliness in reaching the participant, elimination of mailing expenses, decreases human error in entering data, and reduces time spent on coding responses (Roztocki, 2001). The questionnaire was divided into three sections. The first section included student consent.

The second section included social distance scales. The social distance scale was created by Emory Bogardus in 1924 (Faris, 1967). The social distance scale is an attitude scale used to measure prejudice. It is also an example of a Guttman scale in that it is unidimensional and cumulative (Wark & Galliher, 2007). Social distance scales traditionally use five to seven statements that prompt progressively more or less intimacy toward the group or person considered (2007). Eight mock student profiles were developed based off three bi-variate variables; Race (African-American and Caucasian), Sexuality (Heterosexual and Homosexual), and Social Subgroup (Ag kid with a farm background and athletic, not from a farm background). In order that all cultures were equally explored, the student profiles were separated into all possible existing options (see Table 1). Because students were stratified randomly by the online questionnaire, participating seniors only received 2 of 8 Mock Student Profiles.

Table 1
Mock Student Profile Narratives (*n* = 8)

Mock Student Profiles	Description
MSP 1	Student 1 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid with a farm background, White, and straight.
MSP 2	Student 2 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, White, and straight.
MSP 3	Student 3 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid, from a farm background, White, and gay.
MSP 4	Student 4 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, White, and gay.
MSP 5	Student 5 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid from a farm background, Black, and straight.
MSP 6	Student 6 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, Black, and straight.

MSP 7	Student 7 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid from a farm background, Black, and gay.
MSP 8	Student 8 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, Black, and gay.

Participants were able to manipulate the social distance section to express the degree of closeness, or the distance they were willing to include the mock student into their own life. The variables of social distance were: a) accept this student as a member in my school; b) accept this student as a student enrolled in my Ag class; c) accept this student as a member of my FFA chapter; d) accept this student as a member of the same FFA competitive team as me; e) accept this student as my FFA chapter President; and f) accept this student as my roommate on trips. The degrees of closeness range included a five-point scale where a "1" represented Strongly Disagree and "5" represented Strongly Agree. The final section of the questionnaire requested characteristic information, such as leadership positions, international travel, parental education, favorite genre of music, practicing religion, parental income, number of people in household, rural, suburban, or urban home residence, and race/ethnicity.

Validity and Reliability

To establish validity, a review process of a panel, consisting of experts in the field of inclusion and diversity as well as youth of similar backgrounds and ages, was established. All panel experts received documents containing the research purpose, objectives, and copies of the questionnaires. The members were asked to examine clarity, verbiage, understanding of phrases and visual appearance. Modifications were made following the expert panel's reviews to improve the age appropriateness of the questionnaire. To establish construct validity, the multitrait-multimethod matrix (Campbell & Fiske, 1959) was implemented. After assessing the six major considerations for construct validity, the scale reached critical value deeming it to be valid.

Reliability of the Social Distance scales were tested via test-retest for each Mock Student Profile. A pilot group of college freshman who were, the year prior, a senior in a secondary agriculture program reflected the demographic of the participants. Mock Student Profile 1 received an $r > .906$. Mock Student Profile 2 received an $r > .832$. Mock Student Profile 3 received an $r > .819$. Mock Student Profile 4 received an $r > .857$. Mock Student Profile 5 received an $r > .810$. Mock Student Profile 6 received an $r > .899$. Mock Student Profile 7 received an $r > .842$. Finally, Mock Student Profile 8 received an $r > .852$. According to Santos (1999), a Pearson correlations score on a test/re-test greater than 0.70 is considered reliable.

Data Collection

A recruitment letter was sent via email listserv to the state's 140 agricultural teachers. The agricultural educators distributed the questionnaire link to the senior members to increase response rate and minimize non-response error. Teachers were requested to provide time for students to complete the questionnaire from any electronic device that had connection to the internet as the questionnaire was designed to for compatibility on a computer, tablet, and smartphone. Email reminders were sent three times over the course of six weeks. A comparison of completed questionnaires following the first invitation to the last reminder was completed and

no significant difference was determined; thus, no error was present in respondent's delay. After the closure of the survey, answers were kept on a secure, online statistical analysis website.

Data Analysis

The questionnaire, in its entirety, was created in Qualtrics and then transferred over to the Statistical Package for the Social Sciences® [SPSS] 24. Frequencies and percentages were collected to describe the depth of inclusion at each degree of closeness for each Mock Student Profile, as reported by the five anchors presented. To determine the breaking point of inclusion for the social distance scales the number of nonresponses to each degree of closeness was calculated. A study conducted by Tourangeau and Yan (2007) found that respondents are less likely to answer questions that are sensitive and make them uncomfortable. Tourangeau, Rips, & Rasinski (2000) defined the term *sensitivity questions*, as questions closely related to the traditional concept of social desirability, to which a question elicits answers that are socially unacceptable or socially undesirable

The researchers based the breaking point calculations off Tourangeau and Yan's (2007) findings that to determine a breaking in degrees of closeness for the population, sensitive questions reflect a nonresponse rate that begins at 3%. Therefore, the research team calculated all breaking point for each mock profile when the nonresponse was above 3%. For the remaining objectives, the researchers utilized measurements of central tendencies and linear regression.

Findings/Results

Research objective one sought to determine the breaking point within the social distance scale by each Mock Student Profile (MSP). Breaking points were set at when a degree of closeness received a 3% nonresponse, as set by Tourangeua and Yan (2007). Based upon the findings, as provided in Table 2, no identified breaking point was determined for MSP 1 (Farm, White, Straight) and MSP 5 (Farm, Black, Straight). Mock Student Profile 2 (Athlete/Non-Farm, White, Straight), MSP 6 (Athlete/Non-Farm, Black, Straight), and MSP 7 (Farm, Black, Gay) identified a breaking point of acceptance at the 5th degree of closeness, *I would accept this student as my FFA chapter president.* The senior participants identified the 3rd degree of closeness, *I would accept this student as a member of my FFA chapter* as the breaking point for MSP 4 (Athlete/Non-Farm, White, Gay). Finally, MSP 3 (Farm, White, Gay) and MSP 8 (Athlete/Non-Farm, Black, Gay) had the earliest breaking point at the 2nd degree of closeness, *I would accept this student as a student in my Ag class.*

Table 2
Frequencies of Non-Response on Social Distance Scales by Student Profile (*n* = 399)

Degrees of Closeness *I would accept…*	MSP 1	MSP 2	MSP 3	MSP 4	MSP 5	MSP 6	MSP 7	MSP 8
…this student as a member of my school.	0 (0.0%)	0 (0.0%)	1 (1.1%)	1 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (2.4%)

…this student as a student in my Ag class	0 (0.0%)	1 (1.3%)	3 (3.4%)	2 (2.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (4.8%)
…this students as a member of my FFA chapter	0 (0.0%)	2 (2.5%)	4 (4.5%)	3 (3.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (6.0%)
…this student as a member of the same FFA competitive team as me	0 (0.0%)	0 (0.0%)	6 (6.8%)	7 (7.4%)	0 (0.0%)	2 (2.2%)	1 (1.4%)	6 (7.2%)
…this student as my FFA chapter president	0 (0.0%)	3 (3.8%)	10 (11.4%)	9 (9.6%)	2 (2.3%)	3 (3.3%)	3 (4.2%)	9 (10.8%)
…this student as my roommate on trips	1 (1.0%)	0 (0.0%)	13 (14.8%)	14 (14.9%)	0 (0.0%)	4 (4.4%)	10 (13.9%)	13 (15.7%)

Research objective two sought to rank the acceptance/tolerance level of the senior participants perceptions of each Mock Student Profile on the social distance scale. Before a rank could be provided, measures of central tendencies were obtained for each MSP by degrees of closeness (see Table 3). Then an overall mean for the Mock Student Profile was determined by the average of each degree of closeness. From each Mock Student Profile, it appears, as determined by Wark & Gilliher (2007), that the mean steadily decreases as it gravitates through the degrees of closeness.

Table 3
Mean Social Distance Score by Mock Student Profile (*n* = 399)

	Mean/SD					
	I would accept as a member of my school	I would accept as a student enrolled in my Ag class	I would accept as a member of my FFA chapter	I would accept as a member of the same competitive team as me	I would accept as our FFA chapter President	I would accept as my roommate on trips
MSP 1	4.65/.79	4.63/.78	4.63/.77	4.52/.87	4.27/1.05	4.39/1.05
MSP 2	4.43/.95	4.31/.94	4.29/1.09	4.20/1.16	3.59/1.49	4.05/1.15
MSP 3	3.98/1.28	4.15/1.12	4.04/1.25	3.92/1.19	3.53/1.47	3.57/1.43
MSP 4	3.95/1.47	3.89/1.45	3.74/1.51	3.65/1.49	3.27/1.60	3.42/1.69
MSP 5	4.62/.74	4.65/.72	4.62/.91	4.59/.78	4.40/1.05	4.36/1.01
MSP 6	4.64/.75	4.54/.90	4.48/.96	4.47/.95	3.87/1.42	4.29/1.29
MSP 7	4.41/1.06	4.34/1.15	4.34/1.15	4.14/1.37	4.02/1.34	3.38/1.57
MSP 8	3.92/1.36	3.83/1.31	3.80/1.35	3.68/1.41	3.29/1.51	3.20/1.60

Once an overall mean was determined from the degrees of closeness on each Mock Student Profile, a ranking could be ascertained. The ranking provides insight to a preferred

acceptance/tolerance, as determined by the senior participants. Based upon the overall mean in Table 4, MSP 5 (Farm, Black, Straight) had the highest ranked mean (*m* = 4.54) on the social distance scale, followed by MSP 1 (Farm, White, Straight), MSP 6 (Athlete/Non-Farm, Black, Straight and MSP 2 (Athlete/Non-Farm, White, Straight). Mock Student Profile 8 (Athlete/Non-Farm, Black, Gay) received the lowest ranked mean (*m* = 3.63) on the social distance scale.

Table 4
Ranking Social Distance of the Mock Student Profiles by High School Seniors (*n* = 399)

	Mean	Ranking
MSP 5 – Ag kid from a farm background, Black, and straight	4.54	1
MSP 1 – Ag kid with a farm background, White, and straight	4.52	2
MSP 6 – Athletic, not from a farm background, Black, and straight	4.39	3
MSP 2 – Athletic, not from a farm background, White, and straight	4.15	4
MSP 7 – Ag kid, from a farm background, Black, and gay	4.11	5
MSP 3 – Ag kid from a farm background, White, and gay	3.87	6
MSP 4 – Athletic, not from a farm background, White, and gay	3.66	7
MSP 8 – Athletic, not from a farm background, Black and gay	3.63	8

To solve for research objective three, which sought to determine a relationship of degree of closeness breaking point for each Mock Student Profile by the provided demographics of the seniors participants, a linear regression was ran for each MSP. Significance was set at the $a \leq .05$. Based upon Mock Student Profile 1 not having a breaking point, a regression was not analyzed. Significance in determining a demographic relationship to the breaking point was found in MSP 7 (Farm, Black, Gay) and MSP 8 (Athlete/Non-Farm, Black, Gay).

Based upon Mock Student Profile 7's breaking point, significance was determined that students who were not an FFA officer predicted a portion of the variance of social distance (β = .85; p = .00) within the fifth degree of closeness. Mock Student Profile 8's breaking point was the second degree of closeness. Students who were/are FFA Officers, from lower household income levels and reside in rural residence predict a portion of the variance of the social distance at the second degree of closeness.

Table 5
Linear Regression Analysis for Social Distance Towards Mock Student Profile by the Breaking Point in Degree of Closeness

	$\beta(p)$							
Demographic	MSP 1 NO BP	MSP 2 BP5	MSP 3 BP2	MSP 4 BP3	MSP 5 NO BP	MSP 6 BP5	MSP 7 BP5	MSP 8 BP2
FFA Officer	NA	.17 (.42)	.18 (.59)	-.30 (.32)	NA	.03 (.87)	.85 (.00)*	-.95 (.01)*
Team Captain	NA	.21 (.35)	.27 (.41)	-.08 (.80)	NA	-.01 (.98)	-.04 (.86)	.07 (.85)
Traveled Abroad	NA	-.16 (.45)	.33 (.32)	-.49 (.10)	NA	.04 (.84)	-.05 (.83)	-.16 (.66)
Parents' Ed Level	NA	-.07 (.76)	.32 (.32)	.26 (.38)	NA	-.12 (.49)	.02 (.92)	.45 (.23)

Household Earned Income	NA	-.27 (.23)	.32 (.33)	.16 (.61)	NA	-.13 (.45)	.05 (.85)	.88 (.02)*
Home Residence	NA	.04 (.86)	.08 (.81)	.11 (.72)	NA	.11 (.54)	.12 (.62)	.99 (.01)*
Race	NA	.08 (.71)	-.10 (.78)	.09 (.74)	NA	-.10 (.56)	-.24 (.31)	-.44 .24

Note. MSP7 $R^2 = 0.190$ [F (6, 110) = 12.35, p-value < .02]; MSP8 $R^2 = 0.271$ [F (7, 88) = 14.77, p-value < .01]

Conclusions, Implications and Recommendations

This study begins a necessary conversation regarding the relationship between social distancing and likeness and the potential effects on the culture of secondary agricultural education youth. The methodologies conducted in the study have limitations; thus generalizability is limited. To assist with participant fatigue, the researchers limited the students to only two randomized profiles, rather all eight. On average, each profile had 100 responses. The profile of Ag kid with farm background, White, and straight had the highest completion rate of over 98% while only 83% of the students completed the questionnaire for the profile of athletic, not from a farm background, Black and gay. Additional studies that can mirror what was established here can assist in strengthening the context regarding the cultural mindset and comfortability of the youth teachers are educating.

Social identity theory posits that people do not have one personal sense of identity, rather multiple identities based on group memberships (Turner, Brown, & Tajfel, 1979). In addition, these salient groups provide a feeling of belonging. In efforts to increase self-image, people boost the significance of the group they belong to, otherwise known as in-group mentality. Within the context of this study, it would appear that the seniors reflect a larger picture of intergroup discrimination occurring in attempt to boost group importance. When examining the participants' demographics, over 70% identified themselves as rural, White and Christian. The remaining of the participant demographics (parental educational level, family household income, involvement in school) seem to vary. Overall, the demographics of the participants, in regards to race, religious affiliation, and home residence, reflect that of secondary agricultural education throughout the state; thus, it is plausible the results mirror a mindset for a much larger population.

Based upon a degree of closeness, set by Tourangeua and Yan (2007), it can be concluded that the senior participants were most accepting of students that reside from a farm background, no matter the racial composition of the student profile. Agricultural education is deeply rooted in production agriculture, so it is not a surprise that no breaking point in the comfortability of each degree of closeness occurred. Similarly, Tajfel, Billig, Bundy, & Flament (1971) found that the subjects within their experiment mostly favored individuals with similar backgrounds in the distribution of rewards. The acceptance of students from farm backgrounds provides some positive contexts for the profession as the students in our secondary programs can assist a variety of students (i.e. new students in the school, students with disciplinary issues, etc.) if the students are reflective of the in-group's culture.

With the exception of having the student serve as the FFA chapter President, the same acceptance can be inferred regarding students who identify with a social class of "Athlete/Non-

Farm background. The racial background of the student had no indication to the seniors' degree of closeness. The researchers found it interesting that the social distance scale, although considered highly reliable (Santos, 1999), did not follow the suit of degrees of closeness for the Mock Student Profiles of straight athletes that do not reside on a farm. Within the findings, students were comfortable with the student profile as their roommate, but do not believe they are worthy of serving as the chapter president. Students who reflect similar backgrounds are accepted within the school, agricultural classes, FFA chapter and competitive events, but should not consider themselves for the perceived highest leadership position. Again, social identity theory concurs as Tajfel and Turner (1979) found that group and team dynamics provide an inclusive mindset for individuals with similar cultural backgrounds, but prefer the backgrounds most like them to serve in leadership roles. In order to overcome such mentalities, the academic leader must assist the young minds in separating what is valuable in the group identity and assist them in the value of individual and group identities and how diverse identities further strengthen the dynamic of the team (Garcia Martinez, Zouaghi, & Garcia Marco, 2017).

Unfortunately, the sexuality of the Mock Student Profile played a critical role in the seniors identified degrees of closeness. In MSP 3 and MSP 8, both of which had a sexual identity of gay, the seniors expressed a breaking point in their degrees of closeness when asked if they were okay with the student enrolling in the same agriculture course as them. To assist in developing a more welcoming environment to students who enter a school and/or secondary agriculture classroom, it is recommended, based upon the results of De Pedro, Lynch, and Esqueda, (2018) that LGBTQ support groups and peer and teacher interventions be created. Each are associated with creating higher levels of safety and acceptance among LGBTQ youth in rural schools. Simple steps, such as the completion of *Safe Space* training and certifying members as Safe Zone team member helps in establishing a positive support system, while also developing a more inclusive student program toward students of different sexualities.

As an approach to better understand the social distance established by the seniors, a ranking, derived from the mean of each mock student profiles' degree of closeness. Based upon the ranking, a defining line emerged into what the students were most comfortable with as all four Mock Student Profiles that were identified with a "straight" identity outscored the Mock Student Profiles that were identified as "gay". These results seem to reflect a common theme in secondary schools regarding the homophobia among teenagers (Pascoe, 2012).

Mock Student profiles 1 and 5 did not obtain a breaking point within the degrees of closeness; however, the other six profiles did. In order to identify a relationship between the demographics collected and the breaking points, linear regressions were utilized. Only MSP 7 and 8 were determined to have significance in predicting a portion of the variance. Both Mock Student Profiles reflected cultural identities of Black and gay; however, they were different regarding their social culture of farm or athlete/non-farm. Based upon the regression models, students who are FFA officers are more apt to provide a lower degree of closeness than the members who were not officers toward MSP8. It is unfortunate that that youth leadership are less accepting of diverse students; however, the lack of acceptance further confirms the social identity of the seniors' group dynamic. Considering the seniors resided from every region within the state and reflect demographics that mirror that of the state, it is posited that these attitudes reflect the youth throughout secondary agricultural education programs.

Brown (2018) was concerned that the current youth generation are subconsciously establishing a segregated community of friends within their school as a gap in socio-economic status continues to broaden. Within this study, the opposite is true as students provided a higher degrees of closeness if they perceive to have a higher family's household income. Coincidentally seniors from an urban community provided higher degrees of closeness than seniors from rural communities.

Establishing an inclusive secondary agriculture program is not an easy task, nor can it be accomplished quickly. Individual mindsets are shaped by the environment and groups that they are associated with (Tajfel & Turner, 1979) and these mindsets are difficult to amend. Throughout society, professional developments are provided to assist educators in gaining skills within the context of culturally relevant pedagogy; however, little results have spurred from such training. As a result, it is recommended that teachers find curricular methods that engages youth in conversations about these sensitive topics. The researchers are not recommending that teachers disengage from the necessary content requirements, set forth by their school and community, rather find ways to reform the curriculum to reflect multicultural education. Banks (1996), developed five approaches for multicultural education reform within the regular content delivery. It is recommended that classroom instruction seek methods that reach the fourth dimension, *content transformation,* and fifth dimension *social and civic action*.

Interventions can be as simple as using inclusive teaching methods or as complex as using multicultural education curriculum within the classroom. Research by Google found the most important factor of contributing to innovation by teams was "psychological safety" or the sense of confidence that a member's contributions will be valued and not embarrassed or rejected (Duhigg, 2016). Designing classroom procedures that promote crossing the homophilous lines and ensures student respect and empathy can be as simple as being cognizant when grouping students and fostering relationships across social groups.

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The Influence of CASE on Agriculture Teachers' Use of Inquiry-Based Methods

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Abstract

The central research question was: how does completion of the Southwestern Land Grant University CASE AFNR professional development institute influence behavior patterns of agriculture teachers for incorporating inquiry-based learning? This research was conducted utilizing a multi-case study design. Nine certified CASE teachers who completed the summer 2018 institute were interviewed, observed, and had lesson plans analyzed. Five major themes emerged from the data: 1) barriers to CASE implementation exist that impacted teacher behavior, 2) experience in industry leads to increased teacher efficacy for inquiry-based strategies, 3) traditionally certified teachers more likely to fall back on didactic teaching orientations, 4) disconnect between student capacity and CASE expectations of inquiry-based methods, and 5) in state training and networking played a vital role in teachers' perceptions of CASE. Further research recommendations include expanding the scope to provide insight on how lead teachers, regions, or curriculum pathways affect implementation of inquiry-based learning. Recommendations for practice include increased collaboration among CASE certified teachers, development of a state-wide online platform, and additional funding opportunities.

Introduction

Pedagogical research supports the need for teachers to shift their instructional methodology from passive, teacher-centered instruction to active, student-centered instruction (Smith, Shepard, Johnson & Johnson, 2005). Student-centered methods encourage students to reach higher levels of critical thinking needed in professional settings. In science education, one pedagogical method available to meet this need is inquiry-based learning, which is defined as students learning and/or applying material to meet a challenge or solve a problem (Nilson, 2010). This method can include questioning, experimentation, and interpretation of data. When used effectively, inquiry-based learning is focused on students utilizing their prior knowledge and experiences, with the assistance of instructor support, through engagement in higher-order thinking and problem-solving skills combined with reflection (National Research Council, 2000).

Historically, school based agricultural education (SBAE) programs across the United States have been at the forefront of integrating science techniques, including inquiry, in agriculture curriculum (Conroy, Dailey, & Shelly-Tolbert, 2000). Specifically, the Curriculum for Agricultural Science Education (CASE) is a national curriculum model created to enhance delivery of agriculture content using student-centered methods and provides a structured course sequence validated through alignment of lessons with national standards for agriculture, science, mathematics, and English. The mission and vision of CASE (2018), requires teachers to attend a CASE institute, which is an extensive professional development experience complete with hands-on lab instruction delivered through inquiry methods to achieve certification.

While CASE professional development institutes are designed to promote inquiry-based learning and science integration, little research has been completed on current certified CASE

teachers to determine the impact within their local programs. Currently, there are only a few empirical studies within agricultural education that address the CASE curriculum. Lambert, Velez, and Elliot (2014) explored practicing teachers' experiences when implementing CASE. Five themes emerged from this study including: adaptability towards the curriculum being student-centered, teachers enjoyed the content, materials and equipment were vital to the success of implementation, the institute was extremely important to their success, and the curriculum allowed teachers to refocus. Carraway (2015) investigated preservice agriculture teachers who received CASE training and found participants had positive views of science integration through CASE curriculum. However, participants also identified barriers to incorporating CASE including the expense of supplies and equipment needed. CASE is promoted to agriculture teachers nationwide, but with little research supporting the curriculum and its implementation, it is unknown what behaviors patterns are being exhibited by teachers after certification.

Conceptual and Theoretical Frameworks

The conceptual framework for inquiry-based learning utilized within this research was adapted from an empirical study on the effects of inquiry-based agriscience instruction on student achievement (Thoron & Myers, 2011). Effective inquiry-based instruction lies within a teaching and learning process that involves interactions between students and teachers and other factors including levels of inquiry, content, context, lesson planning, and classroom and school environments (see figure 1). This process is then affected by static attributes of the teachers, students, and social-cultural context. If all these components align, students are expected to develop scientific reasoning skills, argumentation skills, and academic achievement as outcomes.

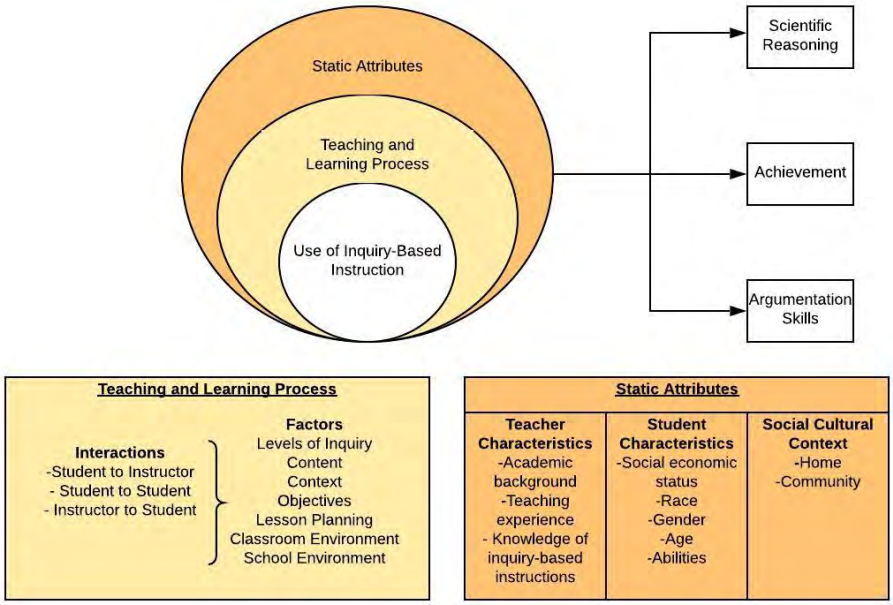

Figure 2. Conceptual model for the effects of inquiry-based instruction (Adapted from Thoron & Myers, 2011).

Within the teaching and learning process, inquiry-based learning promotes three types of interactions including: student to instructor, instructor to student, and student to student. These interactions are fluid and depend on a variety of factors. Student to instructor and instructor to

student interactions deal specifically with the instructor acting as a facilitator of learning. These are two-way interactions and can be differentiated by who is initiating the interaction. The interactions between students and teachers can be observed through a variety of exchanges including: the amount and level of questions students are asking the teacher, how well the students understand the content, and students' understanding of how this information can be applied in the real world. Teacher to student interaction can also be present during the teacher's preparation of the lesson or lab and the creation of learning objectives. Within inquiry-based learning, there is also a strong focus on student-to-student interaction built upon social and cultural contexts. These interactions help students work together in a constructive manner by developing their communication skills with diverse peers (Thoron & Myers, 2011). Both classroom and school environment can affect the interactions between students and teachers.

The outermost circle of the figure represents the static attributes that exist regardless of individual teacher or student action. These attributes can impede on every part of the teaching and learning process which affects the implementation of inquiry-based methods. These static attributes include those of the teacher, student, and social cultural context. For a teacher implementing inquiry-based learning, their effectiveness is dependent on their academic background, teaching experience, and knowledge of inquiry-based instructions. Teachers need to have knowledge in the subject and content being taught as well as appropriate ways to breakdown and relay the information to students (Rice & Kitchel, 2015). The teaching experience of a teacher, both years taught and quality of experiences, can affect their ability to implement inquiry-based methods along with their knowledge of inquiry-based methodology.

Static student attributes that can affect inquiry-based learning include socio-economic status, age, gender identity, race, ethnicity, and abilities. The environment students are within, including their school, home, and local community, can also play a role in the students' learning process. Inquiry-based learning is derived from a constructivist lens of learning where students can be affected by individual, interpersonal, and communal factors when constructing knowledge (Schunk, 2008). These individual static factors, such as age and maturity, can affect how students take responsibility for their own learning, including self-regulation strategies and metacognitive approaches to learning. Although some of these static attributes of the teacher and student can change over time, this framework captures a moment in time of incorporating inquiry-based learning into the classroom.

The theoretical framework used to guide this study was the Theory of Planned Behavior (Ajzen, 1985), which seeks to explain behavioral intentions of people (see figure 2). For there to be a change in someone's behavior there is a behavioral intention (BI) as a precursor. The intent of changing behavior stems from both indirect and direct determinants. The direct determinants, the factors that most directly affect behavioral intention, include: attitude toward the behavior (AB), subjective norm (SN), and perceived behavioral control (PBC). The indirect determinants, which are factors that prelude the direct determinants, include: behavioral belief (ABI), normative beliefs (SNI), and control beliefs (PCBI) (Ajzen, 1985).

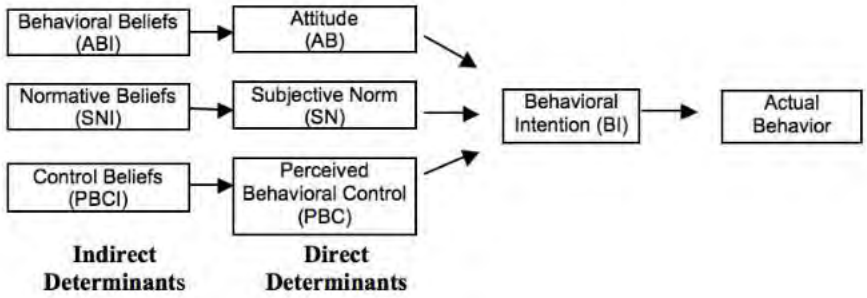

Figure 2. Theory of planned behavior (Adapted from Azjen, 1985 as cited in Lee, Cerreto, & Lee, 2010).

Attitude refers to how the individual views the behavior. For behavioral intention to happen, the individual's attitude towards behavior change needs to be positive. Subject norm contributes to the way individuals perceive that other significant people want them to engage in the behavior. When important people in an individual's life view this behavior change as something positive or necessary, it becomes important to the individual to have the intent to change their behavior. Finally, perceived behavioral control is when the individual believes they can perform the behavior successfully. If the individual does not believe they will be successful when exhibiting a behavior, it will not to be a behavior they will pursue (Lee, et al., 2010).

All these direct determinants have specific influential indirect determinants. Behavioral beliefs (ABI) link the behavior of interest to expected outcomes. An individual must be interested in the behavior and believe it is going to have a positive outcome. Normative beliefs (SNI) refers to the way the individual perceives behavioral expectations of important individuals which could include: teacher, doctor, administrator, boss, and/or coworkers. These normative beliefs when combined with an individual's motivation determine the prevalent subjective norm. Finally, control beliefs (PBCI) relate the perceived presence of factors that may facilitate or impede performance of a behavior. If an individual believes there is going to be some impeding factor to carrying out the behavior successfully then they are less likely to pursue the intention of changing the behavior (Ajzen, 1985). This theory was utilized in my study to consider the change that has, or has not, been implemented by CASE certified teachers. Although the institutes for CASE are more rigorous than many professional development workshops, teachers will not change their methodology if they are not completely "bought-into" the idea. Professional development can only go so far, if teachers do not value inquiry-based learning and science integration in their teaching, they will not incorporate it into their classroom.

Purpose of the Study and Central Question

The purpose of this study was to determine the influence of CASE Agriculture, Food, and Natural Resources (AFNR) certification on the behavior patterns of high school agriculture education teachers in one Southwestern state for implementing inquiry-based methods. The American Association for Agricultural Education National Research Agenda (2016-2020) calls for meaningful learning within SBAE programs to engage students and the need for motivated teachers to facilitate engagement (Edgar, Retallick, & Jones, 2016), which fits with the purpose of this study. My central question was: How does completion of the Southwestern Land Grant University (SWLGU) CASE AFNR professional development institute influence behavior patterns of agriculture teachers for incorporating inquiry-based learning?

Methods

I employed a multi-case study design where each CASE certified teacher served as an individual case (Yin, 2014). Case studies can be used to observe a process, which will allow the complex dynamics of the CASE curriculum in the classroom to be analyzed (Yin, 2014). In line with Yin (2014), I used a pragmatic approach as my epistemological lens. Pragmatism is the uncritical exploration of the practical applications of an idea or value (Crotty, 2012). When looking through a pragmatic lens, the view of the world can change depending on the person experiencing it (Yazan, 2015). It is also important that I disclose my positionality to avoid any biases in my research (Creswell, 2014). I was provisionally certified in the CASE AFNR curriculum in the Fall of 2017 as a preservice teacher and during student teaching, I integrated CASE lessons into my curriculum. I have also served as a teaching assistant for an integrated CASE course at the university level.

Description of the Case

The CASE curriculum is designed to promote common understanding of agricultural concepts by aligning the lessons to the National AFNR Standards and Next Generation Science Standards. The curriculum is delivered through a structured sequence of courses to enhance the total program of SBAE. For this study, I focused on the Introduction to AFNR curriculum, which is typically the first CASE curriculum in which teachers become certified. CASE is currently on its 13th year of implementation after the National Council for Agricultural Education launched the curriculum in 2007. This study only focused on CASE certified teachers currently in the chosen Southwestern state to be congruent with state standards. To become certified in CASE AFNR, teachers attended a 10- day institute at SWLGU during the summer of 2018. This specific institute was chosen because numerous in-state teachers attended and experienced the same professional development. The final requirement to participate was the teachers had to be actively implementing CASE AFNR in at least one course during the 2018-2019 school year.

Nine agriculture teachers agreed to participate in this study. Of the original 20 participants at the SWLGU institute, only thirteen were agriculture teachers in the chosen Southwestern state. One individual taught at the collegiate level making them ineligible for the study and three individuals opted out of the study. For eight of the participants, this institute was the first CASE curriculum certification. Participating teachers had a variety of teaching experience ranging from 1-38 years and obtained certification through various avenues. Teaching certifications included traditional certification (i.e. goes through a college or university teacher preparation program) or alternative certification (i.e. teacher who did not go through a teacher preparation program, but instead met requirements through work in the agriculture industry) (State Department of Education, 2018). Four of the teachers taught in rural SBAE programs and five taught in urban programs. Pseudonyms were assigned to each of the nine participants to protect their identity and any personal information disclosed within the research.

Data Sources and Collection

Multiple data sources were collected to achieve triangulation including a pre-interview, classroom observation with field notes, post-interview, and a textual analysis of lesson plan documents. All protocols were derived from the theoretical and conceptual frameworks and data were collected during the 2019 Spring semester. The semi-structured pre-interview was conducted over a Zoom video call prior to the observation of a CASE lesson to illicit perceptions

of the CASE curriculum, understanding of inquiry-based learning, and their process of incorporating inquiry-based learning into their instruction. An example pre-interview question was, “How do you expect your students to interact with each other during these inquiry lessons?”

Following the pre-interview, I visited each teacher to observe one CASE lesson lasting between 45-90 minutes. All teachers were at least in unit three of AFNR, which is the beginning of the science content. During the observation, I video recorded the lesson to refer to during analysis and took field notes on the various interactions within the classroom. Teachers also self-identified utilization of the CASE curriculum within this first year of teaching. Minimal utilization was defined as less than 25% use of the curriculum, moderate utilization was defined as 25%-50% use of curriculum, and heavy utilization was defined as more than 50% use of the curriculum. It is important to note that one participant, Theodore, was unable to be observed due to school restrictions, but participated in the pre- and post- interviews. In addition, I requested teachers to provide me with any documents they disseminated to their students for document analysis to observe if anything was changed from the original CASE materials.

Immediately after the in-class observation, I conducted a post-observation interview with the teacher. This interview allowed the teachers to reflect on the lesson they just taught and explain their thoughts on the amount of inquiry they included within the lesson. An example post-interview question was, “Has your teaching style changed since getting certified in CASE?” This question delved deeper into behavioral changes of teachers that were potentially impacted by CASE certification and institute participation.

Data Analysis and Trustworthiness

I analyzed all data sources using deductive and inductive analytical approaches and engaged in open, axial, and selective coding to let findings emerge from the data and to establish relationships across concepts (Creswell, 2014). After the first round of inductive coding, there was 220 individual open codes. Pattern matching was implemented following open coding, attending to the multiple sources of data within individual cases and across multiple cases to examine similar issues or trends (Yin, 2014), which yielded twenty-five emergent categories across all cases. Deductive analysis was also conducted by matching initial open codes with a structured coding framework derived from my theoretical and conceptual frameworks. Finally, categories from inductive and deductive analytic processes were collapsed into five overall themes that served as the basis for my findings.

To ensure the trustworthiness of my study, I utilized triangulation by collecting different data sources: pre- and post-interviews, classroom observations with field notes, and textual document analysis of curriculum materials (Creswell, 2013). To ensure opportunity for participant input in the analysis process, I engaged in member checking of my findings. I addressed researcher bias by disclosing my positionality (Creswell, 2013). Finally, I provided thick and rich description of the participant’s experiences by including quotes from the direct data sources (Tracy, 2010).

Findings

Barriers to CASE Implementation that Impacted Teacher Behavior

There were varying amounts of CASE AFNR curriculum utilization within the classroom for each participant during the 2018-2019 school year. James identified he had only utilized three

lessons from the CASE curriculum during the fall 2018 semester, while in contrast Gretchen utilized CASE for the majority of her lessons. Reasons for this variance among participants directly related to real and perceived barriers within the planning process for lessons and access to materials needed for conducting labs and activities. Each participant was asked, "When teaching an inquiry-based lesson, what are some of the things you have to plan for?" The purpose of this question was to highlight the process of implementing an inquiry lesson to identify the components of the teaching and learning process outlined in the conceptual framework. Gretchen said, "It is a very difficult and very different way of teaching, so I am glad that it [CASE] is kind of planned for me because I don't think I would know how to do that." This was echoed by numerous participants in the study. The CASE curriculum is inclusive of all instructional materials including PowerPoints, worksheets, and assessments. All documents are provided in both pdf and editable formats; however, none of the teachers used this editable version for the student activity worksheet during classroom observations. Despite a lack of alterations for those observed lessons, numerous participants discussed ways that they have adjusted previously taught CASE lessons or plans for altering future CASE lessons.

Following any CASE institute, teachers have the responsibility to figure out how the curriculum is going to fit into their individual courses and classrooms. Gretchen and Michael took a proactive approach to integration by incorporating CASE into their curriculum maps in August and regularly collaborated during the school year. Gretchen and Michael were two of four participants with heavy utilization and integration of the CASE curriculum. James, a participant with minimal utilization, suggested in his post-interview, "We needed time in the institute or after to be like here is what you need to do next." James had difficulty implementing CASE in his school, but also did not identify time set aside for curriculum planning. It is also important to note that teachers in multi-teacher departments, or in more urban areas with easier access to other teachers using CASE, were more likely to engage in proactive planning.

The second barrier to CASE implementation that emerged among multiple participants was acquiring the consumable materials and capital supplies needed to execute labs and activities. CASE provides a purchasing manual for all courses including AFNR; however, it can be expensive to purchase in entirety and targets specific vendors for specialized equipment. James surfaced his hesitance in purchasing materials for his rural program. "The only thing I didn't like…I really haven't done a lot with CASE this year because I don't have a lot of this stuff that I said I wouldn't be able to afford myself or from the school." The participants who struggled with obtaining the materials were mostly from rural schools. This is a static attribute of the school environment with a lower budget and lack of funding to go towards materials for CASE. Barbara explained, "funding for the equipment is very limited at my school so I am trying to piecemeal [supplies and equipment]." During James' classroom observation, he taught a CASE lesson that required no major supplies from the CASE purchasing manual. However, this did not negatively impact James' ability to incorporate inquiry-based approaches, utilize effective questioning strategies, probe students to think deeply about the content, and connect to their lives beyond the classroom. All participants in this study acknowledged that the materials are a vital part of the success of the CASE curriculum, even if materials are purchased from vendors not recommended through the CASE purchasing manual.

Experience in Industry Leads to Increased Teacher Efficacy for Inquiry-Based Strategies

All participants identified that the purpose of agricultural education, at least in part, was for students to develop technical skills in the agricultural classroom that were transferable to their future careers. This belief was amplified during classroom observations and interviews for participants who possessed personal experience working in the agriculture industry. Six of the nine participants were employed in other careers within the agriculture industry prior to entering the classroom. This career experience ranged from government employment, to business ownership, to Cooperative Extension agent roles. Just because the participant had experience in industry prior to teaching, does not automatically mean they were alternatively certified.

Each of these six participants with real-world industry experience exhibited more student-centered inquiry-based approaches during classroom observations, were able to reach deeper levels of inquiry through a strong connection to science utilized within industry and reported feeling more comfortable with inquiry-based methods. When asked about her beliefs surrounding inquiry-based learning, Jessica, who had over ten years of previous industry experienced responded, "Well I've always been all about that [inquiry]. So, CASE aligns with the practices I already like to do." Overall, this industry background influenced the following behaviors in teachers related to implementing inquiry-based methods: a stronger felt need to learn when introducing content, emphasis on problem solving approaches, development of employability skills, and higher expectations for critical thinking and real-world connections.

Teachers with industry experience consistently taught using interest approaches that connected closely to real world industry applications as evidenced through my observations. Moreover, interviews with teachers also surfaced overt attention to bridging the gap between scientific content and industry applications. During Barbara's observation she included personal stories during her interest approach on animal systems and made connections to industry competencies and skills. This impacted the classroom environment as students reciprocated by posing new questions related to their current jobs, all within the context of animal systems.

During my observations I paid careful attention to teacher questioning strategies, noting the types of questions asked (e.g. open ended vs. directed), use of probes when necessary, frequency of questioning overall, and depth of questions (e.g. what vs. why). James, who had industry experience, spent almost 1/3 of his class time questioning students, and often began questions with "why". In his post interview James said, "My personal experience helps when students ask why do we need to learn this? And I've seen a lot of the application of what we teach in real life and bring those points up to my students." When observing Jessica, I noticed that she was reluctant to simply answer a student question posed to her, but instead posed new questions to help students consider the content from a different perspective. Teachers with industry experience asked more questions total during my observations regardless of content context and challenged students to reach higher cognitive levels of thinking.

Other participants took their industry experiences as opportunities to teach their students problem solving and critical thinking skills through inquiry-based methods. Elyse said, "I will go to my grave saying the most important skill you can learn whether it's through jobs or school or whatever is problem solving." Jessica exemplified similar values about the importance of critical thinking and problem-solving skills. She pushed students to take ownership of their learning by solving issues on their own prior to interacting with her. James took this a step further by expecting students to not only be able to answer the reflection questions provided by CASE, but to verbally articulate the why behind their answers. He engaged in a class wide question and

answer session *after* collecting student worksheets, to reduce student reliance on their written answers. Forcing students to verbally articulate the science behind the process lends itself to argumentation skills and scientific reasoning, important outcomes in the conceptual framework.

Traditionally Certified Teachers More Likely to Fall Back on Didactic Teaching

Teachers who have been traditionally certified in a teacher preparation program were more likely to deviate from the student-centered inquiry-based approaches and instead, fell back on didactic teaching orientations. A teacher with a didactic orientation to teaching would view the teacher as a distributor of knowledge in a predominately one-way exchange between teacher and student. Two participants, both traditionally certified, noted it was difficult to not rely on traditional pedagogical strategies that more closely align with didactic teaching orientations. This stemmed from a desire to be in control of the classroom, which is easier to maintain with traditional lecture or discussion-based approaches. Michael described his experience before utilizing CASE, "I used to give directions in incredible detail to put a lot more of the responsibility in my hands." Although classroom management is important, the nature of inquiry-based learning is to have the students *inquire* into a subject, which requires teacher to transfer some control to students. During my observation of Tommy, I witnessed his shift from student-centered to teacher centered approaches during a single lab session. For the first half of the class, he responded to student questions that could be easily answered by the lab protocol with, "what do your instructions say?" However, as the class period grew shorter, Tommy fell back into the didactic orientation by simply answering the questions that the students posed.

Scarlett showcased similar difficulties to Tommy during her lesson on electrical power. She told one group while walking around the classroom, "Do not do it that way… You will set it up wrong and it will not work correctly." Students getting the correct answers was a concern of most of the traditionally certified teachers. With standardized testing initiatives and expectations of high student achievement on these exams, teachers are commonly expected to have students test their content knowledge through traditional exam questions that yield one correct answer. Inquiry-based learning challenges that expectation by allowing students to problem-solve with critical thinking skills, a greater focus on the process vs. product of learning. Michael, who was alternatively certified after working in industry, said, "I mean, just the structure of going through the process is more important to me than did I get the correct answer" and explained most of his grading is based off of completion of the process rather than accuracy of the product. In reverse, Gretchen expressed frustration towards CASE's assessments because, "they are so vague, the students do not know what to put, and then it is very difficult to grade."

Disconnect between Student Capacity and CASE Expectations of Inquiry-Based Methods

Inquiry-based methods inherently force the teacher into the mindset of a facilitator rather than the primary source of content knowledge for students. Eight participants identified that age affects inquiry-based learning, specifically discussing the maturity of the students to complete the labs and projects. Tommy explained, "You're trying to teach them something and at the same time you are trying to handle all of these students… The student maturity level actually makes it where I can't get through most of the curriculum." Multiple participants surfaced pushback from students on inquiry-based learning methods because they viewed it as more difficult when compared to their experiences in other classes. Scarlett elaborated on this idea, "when you do inquiry it is very kind of a high expectation for them to put in some effort to figure something

out. A lot of them are not willing to do that at first and not comfortable doing that." The issue of students not liking the agriculture course they were enrolled in, or having difficulty understanding the learning that was occurring, surfaced in six of the participants' interviews. Most noted that it was due to lower expectations of students in their prior education experiences.

James pointed out a generational shift in students by saying, "Kids today don't think for themselves. We could teach it to them today and they wouldn't be able to do it tomorrow on their own." The prior expectation for these students before CASE was focused on learning information and being able to take a test on the concept. This school culture and the students' past experiences are static attributes of the environment that affected the incorporation of inquiry-based learning. James said in his post-interview, "You can't skim by with CASE, you have to do the work." This is the component that students struggled with the most, leading them to push back on inquiry-based learning and ask for easier tasks. Most of the participants tried to combat this push back from students with a heavier focus on group work and collaboration among students. Collaboration mirrors problem-solving skills that students would experience in the real world. When asked about expectations of student to student interactions within inquiry-based lessons, Scarlett said, "It [group work] helps the students. More minds are not a bad thing. If we are all looking at the same thing together, we might see different things." Students can experience frustration when working on problems alone; however, in real world situations, they would have access to other resources than just their own mind.

In State Training and Networking Played a Vital Role in Teachers' Perceptions of CASE

All nine participants identified that having other teachers from the same state at their institute enhanced their overall experience. They surfaced strong collaboration with their colleagues and discussion about the curriculum in the context of their state and standards as particularly valuable. When asked about his institute experience, Theodore, an experienced teacher, described it as "Warm because of the relationships in there with my peers. Us older teachers, it's good for us to be with young teachers and frankly they helped build my confidence a little bit." Jessica explained, "The other great thing about the CASE institute is I initially didn't know everyone in that room, but I really bonded with them over the experience."

Four participants shared that the reason they chose to get CASE certified was from the testimonials of their colleagues in the same state who had previously gotten certified. This subject norm is what led the teachers to begin their intent to change behavior for incorporating inquiry-based learning through the CASE curriculum. Theodore said, "CASE is the future and that is where the profession is headed." The collaboration and partnerships developed with other participants from the same state fostered the desire and drive to adopt the behavior of incorporating inquiry-based methods into their classroom. These relationships and accountability could also lead to maintained behavior in the future.

Discussion

Barriers to CASE implementation ultimately affected the participants' behavior for incorporating inquiry-based methods. Equipment and supplies are vital for the successful implementation of CASE (Lambert, et al., 2015; Carraway, 2015); however, it can be a costly investment for teachers. This is an essential control belief that can lead participants to believe they will not be successful in implementing the curriculum without all the supplies and equipment. The second major barrier to emerge from the data was lesson and course planning.

Ball, Knobloch, and Hoop, (2007) outlined that the planning for a lesson can directly influence the delivery of content and student achievement outcomes. Although the CASE curriculum includes fully developed lessons and assignments (CASE, 2018), there are still aspects of the curriculum that must be set up or coordinated beforehand. Planning is a direct component of the teaching and learning process outlined in the conceptual framework. Course planning has been a known obstacle for agriculture teachers (Smalley & Smith, 2017) that can hinder their instructional preparation. The two participants who collaborated and outlined their curriculum maps for the entire year had the heaviest integration of the curriculum in their classrooms.

Duncan and Ricketts (2008) compared the efficacy of traditionally and alternatively certified agriculture teachers and concluded traditionally certified agriculture teachers had higher efficacy in the total program of agriculture and lower efficacy in technical agriculture content knowledge. Although not all the participants that supported this theme were alternatively certified, their experience in industry gave background and technical knowledge to help students understand the need to learn the concepts and their applicability to the real world. The value of this experience cannot be overlooked in terms of its impact on the delivery of CASE curriculum. Teachers with background knowledge of the industry can explain the concepts included in the CASE curriculum with deeper science explanations. In addition, teachers with industry background understand employability skills that are vital for success including problem solving skills, critical thinking, and teamwork (Casner-Lotto & Barrington, 2006). As the agricultural education profession continues to answer the call for career readiness from the Perkins Act of 2006, teachers must develop pedagogical content knowledge for all content areas in relation to industry practices and critical thinking skills.

Traditionally trained and certified teachers were more likely to fall back into traditional, didactic orientations for teaching when attempting to integrate inquiry-based learning. Washburn and Myers (2010) found that inquiry-based learning methods can be difficult for agriculture teachers to implement and when implemented often focus predominately on the teacher-centered side of the inquiry spectrum (National Research Council, 2000). Since the 1970s there has been a push for teachers to move towards active, student-centered instruction within the classroom (Smith, et al., 2005); however, professional development cannot force teachers to integrate inquiry-based methods. Teachers must value inquiry-based learning to effectively incorporate these pieces into the classroom (Lee, et al., 2010). Traditionally certified teachers were trained in teacher preparation programs where the primary method of teaching often stemmed from didactic orientations. Teachers with didactic orientations toward instruction generally relay information through lecture and discussion where students are accountable for knowing facts in order to test (Gess-Newsome & Lederman, 1999). This directly correlates to both teacher to student and student to teacher interactions within the conceptual framework. In didactic approaches to instruction, the classroom environment promotes teacher to student interactions as the primary source of knowledge and information. Didactic orientations may limit student questioning to the teacher or reduce their likelihood of collaborating with their peers.

Many participants surfaced that the success of inquiry-based methods in the classroom is deeply affected by student maturity. The maturity of the student is an individual influencer on their learning according to Vygotsky's Sociocultural Theory (Schunk, 2008) and directly relates to age as a static attribute outlined in the conceptual framework. The CASE curriculum contains built in expectations of students' abilities to follow directions, practice safety, and collaborate with peers. A lack of student maturity can hinder the teacher's ability to facilitate these activities

and labs for the entire class. Additionally, some participants expressed difficulty implementing CASE curriculum because students pushed back on inquiry-based approaches. Students are often accustomed to receiving information from a lecture and memorizing that information for testing purposes, within the current school system structure. However, this does not match the assessments necessary for inquiry-based methods that focus on real world situations (Schwartz, 1991). This type of assessment is more elaborate and time consuming than sequestered problem-solving assessments because students are constructing and practicing learning through the test itself. Since the school environment has created a culture where students are not exposed to inquiry and discovery methods as much as traditional classroom methods, teachers are likely to experience pushback when attempting to deliver these types of strategies within the classroom (Corkin, Ekmerkci, & Coleman, 2016).

All participants genuinely enjoyed the in-state institute and discussed benefits related to this experience. In line with the theoretical framework, colleague support and endorsement served as a subject norm and catalyst for behavioral change. There were numerous participants who chose to get CASE certified because of their other colleagues. With a state-wide endorsement for CASE certification, there is a normative belief that this behavioral change contains an expectation to incorporate inquiry-based methods. The subject norm of having valued colleagues both encouraging and collaborating for the integration of inquiry-based methods is extremely vital (Azjen, 1985). On a national scale, CASE has recognized the importance of collaboration and resource availability with the state leader model.

Recommendations for Further Research and Practice

As more teachers adopt CASE curriculum, the need for rigorous qualitative and quantitative research on how teachers are implementing this curriculum increases. Currently there is a paucity of research on CASE, with only two empirical studies conducted to date. My study was limited due to the time frame for data collection and investigation of a single institute. I recommend future research include an increased number of observations on CASE certified teachers to surface additional change and development for incorporating inquiry-based methods. Additionally, this study focused on immediate behavior change and discovered that within a single year it was easy for teachers to fall back into didactic orientations for teaching. Therefore, I recommend a longitudinal study to observe if the behavior change for incorporating inquiry-based methods is maintained after years of implementation. Finally, I recommend broadening the scope of the study to observe behavior change over a variety of institute experiences, regions of the country, and other CASE curriculums outside of AFNR.

The major themes that emerged from this study highlight various opportunities for future practice. My first recommendation is increased collaboration among CASE certified teachers within each state. This could be facilitated through collaboration sessions planned by the state CASE leaders and integrated during summer teachers' conference or as a separate professional development event delivered in-person or over an online meeting platform. This would allow for CASE teachers to share ideas for curriculum integration, assessment, and alternative materials that can be used for each lesson, within the context of individual states. In addition to collaborative professional development sessions, I recommend each state design and implement an online platform available to all teachers that is maintained by the state CASE leaders. Information on this platform could include contact information for CASE state leaders and their areas of expertise, opportunities for implementation grants, and a general page with frequently

asked questions. This could also serve as a resource for teachers who are considering getting CASE certified to help them understand the process and financial implications when presenting the opportunity to school administrators. Finally, I recommend increased opportunities for financial and resource support for currently certified CASE teachers and teachers who are interested in CASE certification. This could include more grant opportunities for CASE institute attendance and implementation scholarships for supplies. Local community and industry sponsors should be sought out to provide financial support at the state level, in addition to current national level grants and scholarships, to minimize barriers to implementation.

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Agricultural Education Student Teachers' Curricular Needs Regarding the National AFNR Career Pathways

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Abstract

This exploratory, pilot study assessed the perceived levels of importance and competence of student teachers in agricultural education regarding their ability to teach across the National Agriculture, Food, and Natural Resources (AFNR) Career Pathways. Using a congruent, parallel mixed-methods design, data were collected through questionnaires, interviews, and field notes with 16 student teachers. Descriptive statistics and eclectic coding were used to explain the quantitative and qualitative findings. Though the study cannot be generalized, findings were assessed using a needs assessment model to identify competence needs of the student teachers in regard to teaching across the eight National AFNR Career Pathways. Student teachers perceived all pathways to be important to teach but varied in their competence to teach them.

Introduction

Agriculture has been described as "the world's oldest science" (Ricketts, Duncan, & Peake, 2006, p. 48). By definition, agriculture is a comprehensive science, which includes principles of the physical, chemical, and biological sciences related to food production (Dailey, Conroy, & Shelley-Tolbert, 2001). The agricultural industry always has been and will continue to be an indispensable aspect of the economic, political, and social needs of the world (Newcomb, McCracken, Warmbrod, & Whittington, 2004). People's need for food, fiber, and fuel has existed throughout time (Doerfert, 2011). With this heavy reliance on the agricultural industry, it is imperative the public be knowledgeable about agriculture (Dale, Robinson, & Edwards, 2017). However, the increased *modernization* and *urbanization* of society has created a disconnect between the agricultural industry and the general public (Powell & Agnew, 2011) due to a lack of hands-on, lived experiences related to agriculture (Turnbull, 2002). This disconnect has resulted in a subsequent decline in agricultural knowledge (Blackburn, 1999; Dale et al., 2017; Kovar & Ball, 2013) and has caused the agricultural industry "to focus on ways to educate its consumer base more efficiently and more effectively" (Dale et al., 2017, p. 1).

One avenue for educating people about agriculture is through school-based agricultural education (SBAE) programs (The National Council for Agricultural Education, 2012). SBAE programs were established to combine the applied sciences of agriculture and education to teach individuals about the agriculture, food, and natural resources (AFNR) industry and to provide students with the essential skills to achieve success in related career pathways and/or in post-secondary education (Barrick, 1989; Roberts & Ball, 2009). To support the efforts of SBAE to adapt to the changing agricultural industry, The National Council for Agricultural Education (2015) recommended a curricular framework for meeting the broad definition of agricultural education (see Figure 1). This framework was designed to expose students to diverse areas of agriculture and develop their technical knowledge. This shift in curriculum occurred to reflect

changes in the industry, the perspectives of agriculturists, and the viewpoints of SBAE students (Martin & Enns, 2017), while meeting the needs of the 21st century society in the United States (DiBenedetto, Willis, & Barrick, 2018). Therefore, a demand exists to prepare high quality SBAE teachers to meet these curricular expectations (Duncan & Ricketts, 2008).

Figure 1. Curriculum framework of the National AFNR Content Standards (The National Council for Agricultural Education, 2015).

"Competent, qualified teachers are the backbone of high quality instruction at any level" (Leiby, Robinson, & Key, 2013, p. 180). To improve the competence of SBAE teachers, research is needed to identify teachers' current deficiencies in knowledge and competence (Clemons, Heidenreich, & Lindner, 2018; Findlay & Drake, 1989). Researchers have been called to assess the needs of SBAE teachers prior to their entering the teaching profession (Clemons et al., 2018; Sorenson et al., 2018). Therefore, what are the needs of preservice agricultural education teachers related to teaching across the eight National AFNR Career Pathways?

Theoretical Framework

This exploratory, pilot study was undergirded in Bandura's (1994) Self-Efficacy Theory. Self-efficacy is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 1). Bandura's (1977) Social Cognitive Theory nurtured the Self-Efficacy Theory, which includes a focus on individuals' perceptions of their performance abilities (Bandura, 1994; Knobloch, 2006). Bandura (1977) stated self-perceived efficacy could result in someone's ability to execute a behavior, complete a task, or produce an outcome successfully. "Self-efficacy also determines how well knowledge and skills are learned" (Whittington, McConnell, & Knobloch, 2006, p. 28). The belief an individual has about his or her ability to achieve a task may increase the likelihood of producing a competent performance (Stripling et al., 2008).

Bandura (1977) outlined four sources of efficacy: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal (see Figure 2). This study focuses on *performance accomplishments* and *vicarious experience*. Performance accomplishments are the abilities and achievements of an individual that impacts his or her perception of efficacy and are based on personal experiences of mastery (Bandura, 1977). "Success raises mastery

expectations; repeated failures lower them" (Bandura, 1977, p. 195). Performance accomplishments influence efficacy through four modes of induction: participant modeling, performance desensitization, performance exposure, and self-instructed performance (Bandura, 1977). Expectations of efficacy also are derived from vicarious experience, which is composed of the experiences an individual has had and the experiences of those around the individual (Bandura, 1977). Vicarious experience affects efficacy through two modes of induction: live modeling and symbolic modeling. The performance accomplishments and vicarious experience sources of efficacy are especially useful when measuring self-perceived competence because such are based on an individual's experiences and beliefs (Bandura, 1977).

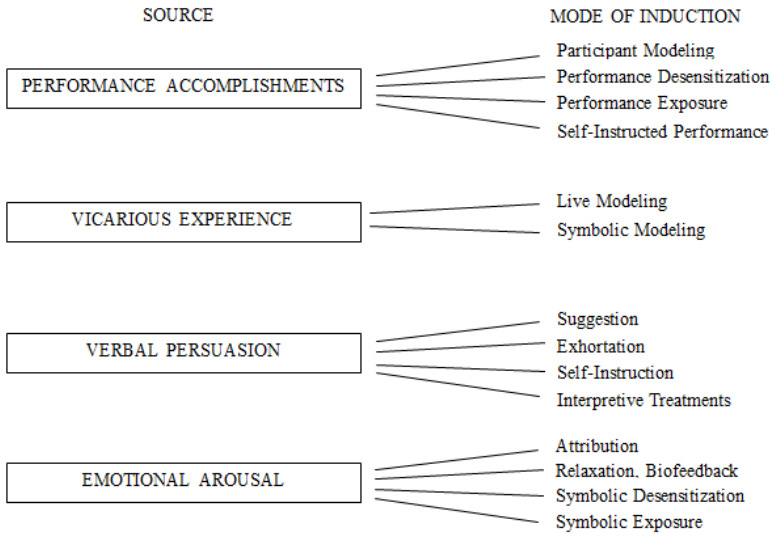

Figure 2. Bandura's (1977) Model of Sources of Efficacy Information.

Purpose and Objectives

The purpose of the study was to determine the perceived levels of importance and performance competence held by SBAE student teachers at Oklahoma State University regarding their ability to teach across the eight National AFNR Career Pathways (The National Council for Agricultural Education, 2015). "Training programs can apply the Borich (1980) Needs Assessment Model by defining what is as the measured behaviors, skills, and competencies of the trainee and what should be as the goals of the training program" (Borich, 1980, p. 39). To align with Borich's (1980) Needs Assessment Model, the teacher education program in agricultural education was viewed as the training program, and the trainees were the participating student teachers (N = 16) experiencing their student teaching internship during the Spring 2019 semester. The measured what is in the study was the participants' perceived levels of importance and self-perceived performance competence, as measured by a self-efficacy questionnaire. In addition, what should be was the expected ability of the participants to teach across the eight National AFNR Career Pathways. Three specific objectives guided the study.

1. Describe the agricultural education student teachers' self-perceived levels of importance to teach across the eight National AFNR Career Pathways.
2. Describe the agricultural education student teachers' self-perceived levels of performance competence to teach across the eight National AFNR Career Pathways.

3. Prioritize the eight National AFNR Career Pathways in need of competence enhancement using the Borich (1980) Needs Assessment Model.

Methodology

A convergent, parallel mixed-methods (Creswell, 2012) design was used for this study because it allows the researcher to collect quantitative and qualitative data simultaneously, conduct an analysis through comparing and relating the data, and conclude interpretations based on both data types (see Figure 3). Quantitative data were collected through questionnaires, and qualitative data were gathered through personal interviews, observations, and field notes (Ary, Jacobs, & Razavieh, 2002; Gall, Gall, & Borg, 2003). Collecting and analyzing both sets of data result in a more complete understanding of the phenomenon of interest (Creswell, 2012). To collect data, the lead researcher drove to each site to visit personally with each student teacher.

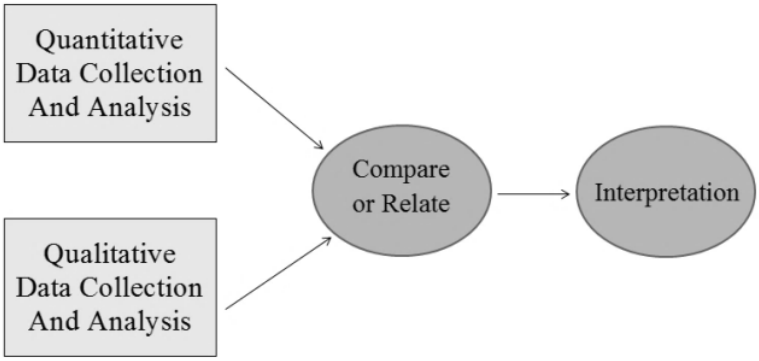

Figure 3. Creswell's (2012) convergent, parallel mixed-methods design.

To address Objectives 1 and 2, a researcher-developed questionnaire was distributed to the participants (N = 16). DiBendetto et al. (2018) recommended a cohesive and consistent instrument be created, assessed, and utilized nationwide to determine the curricular needs of preservice SBAE teachers. The distributed instrument was developed using questions in accord with Bandura's (1994) Teacher Self-Efficacy Scale and Tschannen-Moran's and Woolfolk-Hoy's (2001) Teachers' Sense of Efficacy Scale. The questionnaire was designed to assess the participants' perceptions of the levels of importance and competence to teach across the eight National AFNR Career Pathways. Nie, Lau, and Liau (2012) found Tschannen-Moran's and Woolfolk-Hoy's (2001) scale to have "good internal consistent reliability" (p. 415) with a Cronbach's alpha of .87. The response scale used in this study mirrors those used by Bandura (1994) and Tschannen-Moran and Woolfolk-Hoy (2001). A 9-point scale was employed to assess the participants' perceived importance and competence. The scale consisted of: 1 = *Nothing*, 2 = *Very little*, 3 = *Some*, 4 = *Quite a bit*, and 5 = *A great deal*.

To address Objectives 1 and 2 further, interviews were conducted using a semi-structured interview protocol with questions designed to not "get a simple yes and no answer, but describe an episode, a linkage, an explanation . . . to evoke good responses" (Stake, 1995, p. 65). Ten questions were created for the student teachers focused on their experiences and related perceptions of self-efficacy (Bandura, 1977) and their perceived levels of importance and competence associated with teaching across the National AFNR Career Pathways. Interviews were digitally recorded, transcribed verbatim by the researcher to enhance the reconstruction of the accounts, and sent to respondents to confirm transcriptions as a form of member checking

(Stake, 1995). Field notes were recorded in a reflective journal at each of the school sites visited for triangulation purposes, culminating in a comprehensive interpretation of the data.

Interviews were transcribed verbatim. Then, coding procedures described by Saldaña (2016) were used to interpret the data. Data were coded using the *eclectic* coding strategy, a hybrid coding method suited for explorative research (Saldaña, 2016). Eclectic coding allows the researcher to employ more than one coding strategy to create comprehensive themes from the data (Saldaña, 2016). The study used a hybrid of In-vivo, pattern, and descriptive coding to conduct three levels of coding based on suggestions by Saldaña (2016).

To address Objective 3, the Borich (1980) Needs Assessment Model was employed. The model takes two ratings (i.e., importance and competence) into account to determine where discrepancies exist. The discrepancy that exists within self-perceived levels of importance and performance competence is considered an informative measure if assessing the needs of agricultural education teachers (Clemons et al., 2018). Borich (1980) noted great value can be yielded by determining the existing discrepancies, between *is* and *ought*, to emphasize the needs for competence enhancement. Discrepancy scores were calculated by subtracting the mean competence rating from the mean importance rating for each preservice teacher within each of the eight National AFNR Career Pathways. A weighted discrepancy score was then calculated by multiplying the individual discrepancy scores by the mean importance rating for each pathway. Next, a mean weighted discrepancy score (MWDS) was calculated by finding the sum of the weighted discrepancy scores within each pathway and dividing each by the number of participants (N = 16). The pathways were ranked and categorized according to MWDS.

Findings and Interpretations

Objective 1 – Self-Perceived Importance

To address objective 1, mean scores were calculated to report the perceptions of SBAE student teachers regarding the importance to teach across the eight National AFNR Pathways (see Table 1). Overall, the student teachers perceived Food Products and Processing Systems (M = 8.16, SD = 1.15) as the pathway with the highest level of importance to teach. This was followed by Animal Systems (M = 8.09, SD = 1.11), Power, Structural, and Technical Systems (M = 8.06, SD = 1.26), Plant Systems (M = 7.86, SD = 1.43), Natural Resources Systems (M = 7.52, SD = 1.46), Environmental Service Systems (M = 7.47, SD = 1.67), and Agribusiness Systems (M = 7.39, SD = 1.47). Student teachers perceived Biotechnology Systems (M = 7.11, SD = 1.54) as the pathway with the lowest level of importance to teach.

Table 1

Student Teachers' Perceptions of Levels of Importance to Teach across the Eight National AFNR Career Pathways using Mean Scores (N = 16)

Pathway	*M*	*SD*
Agribusiness Systems	7.39	1.47
Animal Systems	8.09	1.11
Biotechnology Systems	7.11	1.54
Environmental Service Systems	7.47	1.67

Food Products and Processing Systems	8.16	1.15
Natural Resources Systems	7.52	1.46
Plant Systems	7.86	1.43
Power, Structural, and Technical Systems	8.06	1.26

Note. 1 = *None At All*, 3 = *Very Little*, 5 = *Some*, 7 = *Quite A Bit*, 9 = *A Great Deal*.

Objective 2 – Self-Perceived Competence

To address objective 2, mean scores were calculated to report the perceptions of SBAE student teachers regarding their performance competence to teach across the eight National AFNR Career Pathways (see Table 2). Overall, the student teachers perceived Animal Systems (*M* = 6.94, *SD* = 1.52) as the pathway with the highest level of competence to teach. This was followed by Plant Systems (*M* = 6.14, *SD* = 2.07), Food Products and Processing Systems (*M* = 6.09, *SD* = 1.63), Natural Resources Systems (*M* = 5.95, *SD* = 1.59), Environmental Service Systems (*M* = 5.33, *SD* = 1.91), Agribusiness Systems (*M* = 5.06, *SD* = 1.76), and Biotechnology Systems (*M* = 4.33, *SD* = 2.18.). Student teachers perceived Power, Structural, and Technical Systems (*M* = 8.06, *SD* = 1.26) with the lowest level of competence to teach.

Table 2

Student Teachers' Perceptions of their Performance Competence to Teach across the Eight National AFNR Career Pathways using Mean Scores (N = 16)

Pathway	*M*	*SD*
Agribusiness Systems	5.06	1.76
Animal Systems	6.94	1.52
Biotechnology Systems	4.33	2.18
Environmental Service Systems	5.33	1.91
Food Products and Processing Systems	6.09	1.63
Natural Resources Systems	5.95	1.59
Plant Systems	6.14	2.07
Power, Structural, and Technical Systems	4.83	2.26

Note. 1 = *None At All*, 3 = *Very Little*, 5 = *Some*, 7 = *Quite A Bit*, 9 = *A Great Deal*.

Regarding Agribusiness Systems, student teachers noted varying competence to teach within the pathway. "It's a little bit of a lack of [competence and] experience," said Ms. Kay about her competence to teach it. Six additional student teachers agreed with Ms. Kay, expressing a lack of competence resulting from a deficit of experiences related to the pathway. Mr. Jerry noted: "I feel confident to teach it;" however, he added later, "It would be something I would need a lot of refreshing on to feel really competent to pass on knowledge." Mr. Ellis recognized his competence in Agribusiness Systems by stating: "actually owning my own farm, it encompasses a lot of [agribusiness knowledge]." A lack of experience and academic preparation impacted the perceived competence of student teachers to teach content comprising the pathway.

The Animal Systems Pathway was an area where the student teachers perceived high competence. “That is definitely where I am most comfortable,” said Ms. Faulk. Fourteen additional student teachers shared Ms. Faulk’s perspective, expressing competence from their backgrounds. “I’ve been around livestock all my life, in all different forms,” said Ms. Cross. “I grew up showing livestock and we raised our own showing animals,” added Ms. Clemons. Ms. Baker added, “That’s what I did in high school, and that’s what I’ve been around.” However, Mr. Ellis added: “I really wasn’t confident in it. I’m not animal science minded.” The student teachers primarily perceived higher competence for Animal Systems because of past experiences learning, working, and teaching content related to the pathway.

For the Biotechnology Systems Pathway, Mr. Ellis noted low levels of competence. He stated: “I just haven’t done enough to make myself feel confident teaching [it].” Ms. Maxon said it was “just a little bit out of my comfort zone.” Ms. Baker noted: “I’d need a lot more education on it before I could teach more than a lesson or two on the subject.” These themes were supported by 12 additional student teachers. The student teachers perceived their competence regarding this pathway’s content as low resulting from a lack of related knowledge and experiences.

Regarding the Environmental Service Systems Pathway, student teachers reported having less competence to teach the content. “I’m a little more uncomfortable because I don’t have the experience,” said Mr. Down. Ms. Pale added: “I am not very strong in it because I haven’t had to teach it.” Ms. Kay stated: “To be honest, I don’t even know what all is encompassed by environmental services.” The student teachers have low perceptions of competence because they have not taught or worked specifically with Environmental Service Systems-related content.

The self-perceived competence of student teachers to teach within the Food Products and Processing Pathway also was low. To this point, Mr. Down shared: “It would be a weaker area of unfamiliarity.” Ms. Gray added: “I’m not proficient in it.” In fact, few student teachers shared any perspectives regarding the Food Products and Processing Systems Pathway. Instead, they made general statements similar to Mr. Down and Ms. Gray. Twelve student teachers expressed being uncomfortable when discussing content related to Food Products and Processing Systems. Their low competence may have led them to have few thoughts related to Food Products and Processing Systems because they lacked experience related to the pathway’s content.

For the Natural Resources Systems Pathway, student teachers indicated being somewhat competent to teach its content. “I feel like I have a good understanding of it but it’s just a matter of being confident enough that I can actually [explain] it to other people and teach it,” said Ms. Baker. Ms. Gray described an interest in Natural Resources stating that her competence was driven by “my love for the outdoors and understanding more about certain parts of it.” Ms. Alex added: “I have some experience in those areas and even with my background,” when describing her competence. However, 10 student teachers perceived that the Natural Resources Systems content expectations potentially overlapped with the Environmental Service Systems curriculum. Similar to Ms. Baker’s position, four additional student teachers expressed possessing Natural Resources Systems content knowledge and interest but lacked the related confidence to teach it. The student teachers perceived moderate competence based on their interests and varied experiences related to Natural Resources Systems. They perceived themselves as knowledgeable and interested in it, but identified some lack of competence to teach the pathway’s content.

The student teachers expressed a mixed degree of competence regarding their ability to teach the Plant Systems Pathway. “[Plant Systems] is what I did in high school, and that’s what I’ve been around,” said Ms. Baker. “I grew up around agronomical plants,” said Ms. Hale. Seven additional student teachers explicitly stated having former experiences related to Plant Systems. However, Mr. Ellis added, “I’m uncomfortable with it just because I don’t have that experience,” and Mr. Down said that, “it is where I usually get lost . . . . That’s where I lose a little bit of confidence.” In addition to Mr. Down and Mr. Ellis, five other student teachers expressed a lack of competence and experience related to Plant Systems, resulting in a wide variation of perceptions among the student teachers. The student teacher cohort varied in their personal perception of their Plant Systems-related competence. Student teachers with prior work or academic experiences expressed a higher perceived level of competence to teach Plant Systems than did their counterparts who did not have previous work experience.

Competence in Power, Structural, and Technical Systems also was perceived at varying levels by student teachers. “It isn’t high on my level of confidence,” said Ms. Maxon. “I can do assessment, but I can’t demonstrate what they’re supposed to do,” said Ms. Alex in regard to teaching Power, Structural, and Technical Systems in the laboratory. However, Mr. Ellis expressed competence by stating: “I enjoy doing that so I’m competent because I’ve been around it growing up,” and Mr. Nang stated: “I’ve had some experience and the longer I work, the more confident I’m becoming.” Moreover, Ms. Hale reported, “I need a better understanding of it.” Eleven additional student teachers agreed with Ms. Hale and identified a lack of knowledge. The student teachers with experiences related to Power, Structural, and Technical Systems expressed higher levels of competence than did and the student teachers with no or little experience.

Objective 3 – Competence Enhancement

To address objective 3, the National AFNR Career Pathways were prioritized into three categories for competence enhancement based on their MWDS (see Table 3). Category I is considered a *high need* and consisted of all MWDS larger than 1.20. Category II is considered a *moderate need* and consisted of all MWDS ranging from 0.90 to 1.20. Category III is considered a *low need* and consisted of all MWDS ranging from 0.50 to 0.89. Category I consisted of the Power, Structural, and Technical Systems (MWDS = 1.63) and Biotechnology Systems (MWDS = 1.24) Pathways. Category II included the Agribusiness Systems (MWDS = 1.08), Food Products and Processing Systems (MWDS = 1.06), and Environmental Service Systems (MWDS = 0.99) Pathways. Category III consisted of the Plant Systems (MWDS = 0.84), Natural Resources Systems (MWDS = 0.74), and Animal Systems (MWDS = 0.58) Pathways.

Table 3

Student Teachers’ Perceptions of Competence and Knowledge Enhancement Needs of the National AFNR Career Pathways using Mean Weighted Discrepancy Scores (N = 16)

Category	National AFNR Career Pathway	MWDS
I	Power, Structural, and Technical Systems	1.63
	Biotechnology Systems	1.24
II	Agribusiness Systems	1.08

	Food Products and Processing Systems	1.06
	Environmental Service Systems	0.99
III	Plant Systems	0.84
	Natural Resources Systems	0.74
	Animal Systems	0.58

Conclusions

Objective 1 – Self-Perceived Importance

Student teachers varied in their perceptions regarding the level of importance they placed on teaching across the eight National AFNR Career Pathways (see Table 1). However, all pathways were deemed quite a bit important to teach by the respondents. The student teachers placed high importance on teaching the Food Products and Processing Systems, Animal Systems, and Power, Structural, and Technical Systems Pathways and a moderate level of importance on teaching the Plant Systems, Natural Resources Systems, Environmental Service Systems, and Agribusiness Systems Pathways. Regarding Biotechnology Systems, student teachers perceived it to be the least important to teach of the eight National AFNR Career Pathways. Lower levels of strengths and interests related to the pathways, as perceived by the student teachers in their interviews, resulted in a lower level of importance placed on those pathways. Based on personal interviews, the student teachers value, and therefore choose to teach, courses related to their own personal interests and abilities. Therefore, it can be concluded the interests and the strengths of the teacher are the most substantial factor affecting teacher-placed importance within the pathways.

Objective 2 – Self-Perceived Competence

The self-perceived competence needed to teach across the eight National AFNR Career Pathways varied substantially among student teachers (see Table 2). Student teachers reported a high level of competence in teaching Animal Systems, Plant Systems, and Food Products and Processing Systems Pathways, a moderate level of competence to teach Natural Resources Systems, Environmental Service Systems, and Agribusiness Systems, and a low level of competence in the Power, Structural, and Technical Systems and Biotechnology Systems Pathways. In personal interviews, student teachers reported their perceived competence is impacted by their various personal, professional, and academic experiences. It can be concluded that student teachers are competent to teach across the Animal Systems, Plant Systems, and Food Products and Processing Systems Pathways because, as the qualitative data found, they have had appropriate academic preparation and personal experiences, based on their personal perspectives.

The qualitative data indicated student teachers were competent in pathways based on their interest in the content. Therefore, it is concluded based on the findings that student teacher competence results from teacher interests, personal experiences of the teacher related to agriculture, and professional work experiences of the teacher. Bandura (1977) identified emotional arousal, such as interest and excitement about a topic, as an expectation for self-efficacy (see Figure 2) aligning with the conclusion that teacher interest motivated perceived competence. Additionally, personal experiences affect teacher competence (Cole, 1984; Edwards & Briers, 2001; Findlay, 1992; Findlay & Drake, 1989) as does vicarious experience (Bandura, 1977), aligning with the conclusion that personal and professional experiences of the teacher impact student teacher competence to teach across the eight National AFNR Career Pathways.

Objective 3 – Competence Enhancement

Student teachers reported a high need for competence enhancement in the Power, Structural, and Technical Systems and the Biotechnology Systems Pathways (see Table 3), which is congruent with findings by Leiby, et al. (2013) who called for professional development in agricultural mechanics for SBAE teachers. A moderate need of enhancement was expressed for the Agribusiness Systems (which also was identified in 1994 by Radhakrishna and Bruening as an area in need of enhancement), Food Products and Processing Systems, and Environmental Service Systems Pathways (see Table 3). Natural Resources Systems, Plant Systems, and Animal Systems were found to be pathways in low need for knowledge and competence enhancement based on both the quantitative findings and personal interviews.

According to Bandura (1977), competence and self-efficacy result from experience and success (see Figure 2). High levels of self-efficacy are related to higher amounts of experiences while a low self-efficacy is related to the lack of experiences associated to the specific task being assessed (Bandura, 1977). The student teachers' self-perceived competence to teach within the National AFNR Career Pathways, as found by the data, is impacted by their teacher self-efficacy. Based on the discrepancy scores and personal perceptions of the student teachers, it can be concluded, knowledge and competence development amongst students enrolled in agricultural education is needed for the Agribusiness Systems, Biotechnology Systems, Food Products and Processing Systems, and the Power, Structural, and Technical Systems Pathways.

Recommendations for Practice

It is recommended the Oklahoma State University teacher preparation program consider revising the core courses for agricultural education majors to include additional coursework in the plan of study related to all eight National AFNR Career Pathways. Moreover, the Oklahoma State teacher preparation program in agricultural education is urged to enhance its curriculum in the Power, Structural, and Technical Systems and the Biotechnology Pathways to expand the knowledge and competence of preservice teachers related to these pathways. Based on student teacher perceptions, it is recommended for experiences related to the Agribusiness Systems Pathway to be introduced into OSU's teacher preparation program. It is recommended to expand the agricultural mechanics course offerings in OSU's agricultural education to provide preservice teachers with more exposure to Power, Structural, and Technical Systems prior to or during student teaching. This may occur through additional undergraduate course options, short course or weekend trainings, and/or strategic student teaching site placements. Likewise, it is recommended for other university teacher preparation programs in agricultural education to assess the competence of their preservice teachers to teach across the National AFNR Career Pathways and enhance the related curriculum and experiences, as warranted.

Further, it is recommended for all university teacher preparation programs in agricultural education to emphasize the importance of preservice teachers acquiring agriculturally related work experience prior to student teaching. Bandura (1977) stated vicarious experience and performance accomplishments relate positively to increasing a person's self-efficacy (see Figure 2). Therefore, an increase in appropriate experiences may improve the self-perceived competence among SBAE student teachers regarding aspects of the AFNR industry and its allied sectors. This practice may occur through the creation of a list of viable and helpful work experiences, internship opportunities, short course or weekend training programs, campus

involvements, and research topics to be distributed to preservice teachers during their preparation program. It is recommended for the teacher preparation program in agricultural education to increase the amount of early field-based experiences, in the classroom or otherwise, required for preservice teachers prior to student teaching.

Beginning SBAE teachers may require additional professional development experiences to enhance their knowledge and competence to teach across the eight National AFNR Career Pathways. It is recommended that the Oklahoma State University agricultural education faculty members collaborate with staff members of the Oklahoma Department of Career Tech to create systematic, prolonged, and intensive professional development experiences for SBAE teachers. This professional development should align directly to the National AFNR Content Standards to enhance teacher efficacy within the career pathways' content.

Recommendations for Research

Due to participant size and state specificity, the findings in this study should not be generalized beyond the Oklahoma State teacher preparation program in agricultural education. To address this limitation, a similar study should be replicated at OSU with a larger group of participants and across the United States in other teacher preparation programs for agricultural education. This could occur by assessing all beginning agricultural education teachers within a particular state rather than only student teachers or through conducting regional studies assessing agricultural education student teachers at various institutions. In particular, individual states in the United States should conduct their own needs assessments for knowledge and competence enhancement related to the National AFNR Career Pathways within their university teacher preparation programs in agricultural education to determine where gaps and deficiencies exist. In addition, this study should be replicated over time to evaluate other cohorts in OSU's teacher preparation program in agricultural education and detect trends in competence, knowledge, and perceived importance regarding the National AFNR Career Pathways.

It is recommended a longitudinal study be conducted with the cohort of student teachers assessed to measure their competence to teach across the National AFNR Career Pathways as they progress into their teaching careers. These student teachers could be followed throughout their careers to determine how their perceived importance and competence change in regard to teaching across the pathways. A longitudinal study assessing these variables over time could identify changes in teacher competence and the factors affecting such. Future studies also should assess the impact these teachers have on their SBAE students' learning about content knowledge in the AFNR pathways and its contribution to their agricultural literacy.

Investigations also should occur to identify what specific competencies exist within each of the eight pathways. For example, although teachers reported high competence in Animal Systems, generally, are they equally competent to meet each expected competency across the entire pathway? Research is needed to define the specific competencies associated within each pathway and then to assess teacher competence related to such. Finally, it is recommended university teacher preparation programs in agricultural education assess the needs for their state's agricultural industry as related to the National AFNR Career Pathways. By understanding the needs of the AFNR industry, the needs of students enrolled in SBAE courses can be understood better. This is congruent with recommendations by Ramsey and Edwards (2011) who stated SBAE teachers are expected to provide experiences to their students that reflect aspects of the

industry. By understanding student needs, the expectations and needs of SBAE teachers become more transparent and their curricular needs at the university-level can be more clearly identified.

Discussion and Implications

Based on personal interviews, it is indicated the course selections and teacher-placed importance ratings (see Table 1) are motivated by teacher interest, student demand, and local community expectations and agricultural presence. A lack of community needs related to a certain pathway, as perceived by the student teachers, led to a lower level of importance placed by the teacher to teach courses related to that pathway. It is concluded that SBAE student teachers rated the levels of importance based on the perceived needs of their local community. These conclusions align to the National FFA's Local Program of Success Guide, which identifies strong local partnerships and community support as an integral part of successful SBAE programs (National FFA Organization, 2018). In addition, student teachers rated teaching across the eight AFNR pathways higher in importance than competence (see Tables 1 and 2). This is congruent with findings of employees perceiving employability skills to be more important than their ability to perform those skills (Radhakrishna & Bruening, 1994; Robinson & Garton, 2008).

A lack of community demand results in fewer Biotechnology Systems courses being taught in the classroom instruction dimension of SBAE programs. This implies a low level of importance placed on teaching certain pathways, such as Agribusiness Systems and Biotechnology Systems, in the SBAE classroom because they are being taught through the SAE and FFA portion of the agricultural education three-circle model. Perhaps, this implies, some pathways may be better suited to be taught through the SAE and FFA portion of the three-circle model rather than in the classroom instruction portion where they are traditionally expected to be taught.

The existence of community and student demands result in the regular inclusion of the Animal Systems Pathway in SBAE programs in [state]. With a local emphasis on content related to Animal Systems, student teachers require strong competencies in this pathway prior to entering the profession. This implies the high competence of the student teachers in Animal Systems is due to [state's] emphasis on animal science, which is a popular course in high school SBAE programs. Student teachers know Animal Systems is an expected pathway to be taught and have sought out opportunities to be competent in it prior to student teaching. Perhaps, if a culture like this were created in [state] in regard to other National AFNR Career Pathways, student teachers would place a high level of importance on acquiring experiences related to those pathways as well. However, changing the culture to include additional areas of emphasis is an imperative task. Dewey (1938) stated experiences, at times, might be misinforming. It is implied the student teachers have a high knowledge in Animal Systems because of their experiences related to livestock production and exhibition. But, do we truly understand the breath, depth, and scope of the student teachers' Animal Systems competence and knowledge? Perhaps, their perceived competence related only to a small portion of the content in Animal Systems.

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Secondary Agricultural Teacher Self-Efficacy in Agribusiness and the Relationship to Collegiate Course Work

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Abstract

This study determined the relationship between teacher agribusiness self-efficacy and collegiate business courses. Mississippi and Tennessee secondary agricultural education teachers (n = 111) completed a researcher developed survey using competencies from secondary agribusiness courses. Participants rated their confidence to teach each competency using a 5 point scale (1 = no confidence to 5 = very confident). The survey determined the types and number of collegiate business courses completed by the participants. The mean agribusiness self-efficacy was 3.18 (SD = 0.79), indicating that teachers are only somewhat confident to teach agribusiness. Nine agribusiness teacher self-efficacy themes were discovered though factor analysis using the teachers' confidence ratings. It was concluded that teachers who completed an introductory to agribusiness and a marketing courses at the collegiate level had a higher agribusiness self-efficacy. The study determined that agribusiness self-efficacy is positively related to the number of collegiate business related courses completed. It is recommended that universities include a marketing course along with an introductory to agribusiness course to prepare pre-service agricultural education teachers. It is also recommended for additional teacher agribusiness self-efficacy research to be conducted.

Introduction

Agricultural education classes offered at the secondary level provide students with opportunities to learn about the production of food and fiber and how those resources move from producer to consumer. Courses in agricultural education may include areas such as plant science, animal science, agricultural mechanics and engineering, biotechnology, natural resources and environmental science, agribusiness, and food processing. Students learn both technical and soft skills in agricultural education programs that can be utilized throughout their life (National Council for Agricultural Education, 2015).

The study of agribusiness concepts and principles is an important topic throughout agricultural education. Courses in agribusiness education prepare students for a wide variety of careers by teaching students finance, marketing, management, economics, leadership, and communication. The study of agribusiness can occur in career pathways, standalone courses. or integrated as smaller units into other agricultural education courses (TDOE, 2017).

Agribusiness topics can increase financial literacy (National Council for Agricultural Education, 2015), which has become an issue in the United States (Crow, 2015). The National Financial Capability Study (FINRA, 2017) found that 63% of United States citizens were unable

to score higher than 60% on a financially literacy quiz. Two-thirds of young adults in the United States did not have a basic understanding of financial literacy in areas such as inflation, risk management, and interest rates (Gale, Harris, & Levine, 2012). Many people lack the skills to distinguish between the numerous retirement, savings and credit options available (Hastings, Madrian, & Skimmyhorn, 2013). Due to findings such as these and the causes and effects of the recession of late 2000s, financial education is one tool of increasing the public's financially literacy (Hastings et al., 2013). The goal of agribusiness education is to teach students economic, business, and financial principles so they can apply that knowledge throughout their future (TDOE, 2017).

Teachers must have confidence in order to teach students. Teacher confidence is positively linked to effective teaching strategies, classroom management, teaching well-being, and job satisfaction (Collie, Shapka, & Perry, 2012). Teachers, or any other individuals, will more likely participate in activities that they high confidence and less likely in areas of low confidence (Bandura, 1994). If teachers lack confidence in a subject, then they are more likely avoid teaching the subject if given a choice. Teachers could exhibit decreased classroom performance if they are required to teach the subject matter that they lack confidence.
The concept of teacher confidence is also known as teacher self-efficacy, which Bandura (1994) defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (p. 71). A person's self-efficacy influences their motivation and behavior (Bandura, 1994). Teacher self-efficacy is positively related to job satisfaction and classroom performance and is negatively related to teacher stress (Collie et al., 2012). Teachers who have a high self-efficacy level have students with higher motivation to learn and achieve (Klassen & Chiu, 2010).

Even though research in agricultural teacher self-efficacy is increasing, the focus of agricultural teacher self-efficacy has concentrated on career commitment, agricultural mechanics and engineering, and mathematics (McKim & Velez, 2016). While there have been studies in teacher self-efficacy on specific agricultural subject areas, limited teacher self-efficacy studies have been conducted in the subject of agribusiness. An increased understanding of teacher agribusiness self-efficacy will provide school leaders, policy makers, and secondary agricultural education teachers the knowledge to optimize agribusiness education while developing curriculum, selecting proper coursework, and providing professional development. High self-efficacy levels would suggest teachers are more effective at teaching agribusiness standards. Low self-efficacy levels would suggest that teachers need additional training to optimize agribusiness education.

Research has shown that teacher self-efficacy in agricultural mechanics is related to the number of agricultural mechanics courses completed (Byrd, Anderson, Paulsen, & Shultz, 2015). No research has been published relating the number of collegiate-level agribusiness courses with teacher self-efficacy in providing students with agribusiness education. Current teachers should assess their agribusiness self-efficacy and relate it to the coursework they completed at the collegiate level. Certain types of agribusiness or business-related courses might be related to teacher agribusiness self-efficacy similar to Byrd et al. (2015) study of agricultural mechanics.

Colleges and universities are challenged with selecting optimal courses for preservice agricultural education teachers to take with the limited number of hours available (Duncan, Ricketts, Peake, & Uesseler, 2006). Preservice agricultural education programs typically provide a generalized educational approach because they need to prepare students for a wide range of possible future teaching positions. With a limited number of hours for undergraduate education, it is difficult to provide a preservice teacher with all the skills and knowledge they would possibly need as an agricultural teacher (Duncan et al., 2006).

Theoretical Framework

Albert Bandura's Social Cognitive Theory served as the theoretical framework for this study. The social portion of the theory recognizes human actions within society, and the cognitive aspect acknowledges how cognitive processes influence human motivation and action (Bandura, 2011). According to Social Cognitive Theory, human behavior, personal characteristics, and environmental factors are linked by a triadically reciprocal interaction (Figure 1; Bandura, 2011). The triadical reciprocation indicates that each factor has influence over the other two factors.

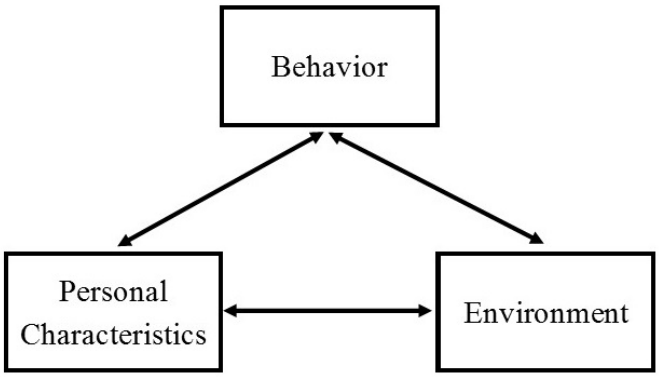

Figure 1 Social Cognitive Theory (Bandura, 2011)

Self-efficacy beliefs determine how people are motivated, they feel, they think, and behave (Bandura, 1994). Often an individual's motivation and action are based less on what is objectively true and more on what they believe to be true (Bandura, 1997). Individuals are more likely to participate in activities that they have a high self-efficacy and avoid tasks where they have low self-efficacy (Bandura, 1994). Teachers will work harder, set challenging goals, outcome setbacks quicker, and persist longer if they have high self-efficacy. Conversely, teachers will avoid tasks, have low aspirations, have weak commitment, and become stressed when they have low self-efficacy (Bandura, 1994). Bandura (1994) noted that an individual's self-efficacy does change in life, but these changes are not stages which everyone has to pass. Changes in self-efficacy depend on emotional, physical, and cognitive development, environment situations, and personal experiences (Bandura, 1994).

Literature Review

Teacher self-efficacy is a complex issue that is not easily defined and is difficult to understand (Burris, McLaughlin, McCulloch, Brashears, & Fraze, 2010). Gibson and Dembo (1984) defined teacher efficacy as multidimensional factor with personal teacher efficacy being a teacher's ability to influence student learning and general teaching efficacy being a teacher's ability to control the learning environment in spite of outside forces such as socioeconomic status and school conditions. Collie, Shapka, and Perry (2012) stated teacher self-efficacy is "judgement of his or her capabilities to bring about desired outcomes of student engagement and learning" (p. 2).

Teacher efficacy refers to the capability of a teacher, not the intent of the teacher. Teacher self-efficacy is the teacher's belief that they can achieve the objective (Collie et al., 2012). The study of teacher efficacy is concentrated on if the teacher can complete the objective instead of will they complete the objective (Klassen & Chiu, 2010). Today, the study of teacher self-efficacy can be focused in overall teacher self-efficacy or into more specific terms such as self-efficacy in classroom management, self-efficacy in content knowledge, self-efficacy in student engagement, self-efficacy in instructional strategies as well as other topics (Collie et al. 2012). Even though the definition of teacher self-efficacy has evolved over the years, the key concept remains. Teacher self-efficacy involves a teacher's belief in their capability to educate students.

Teacher self-efficacy has been determined to influence several important educational factors. Student motivation and achievement are positively associated with teacher self-efficacy (Klassen & Chiu, 2010). Teachers with higher teacher self-efficacy tend to try harder with more persistence leading to better classroom performance (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Teacher self-efficacy is positively linked to effective teaching strategies, classroom management, teaching well-being, and job satisfaction (Collie et al., 2012). High teacher self-efficacy has been associated with lower teacher stress (Klassen & Chiu, 2010). Career persistence and teacher self-efficacy demonstrate a positive relationship (McKim & Velez, 2016). With reduced stress, increased job satisfaction, and better classroom performance, high teacher self-efficacy can be used to predict highly effective teachers who are less likely to leave the profession (Collie et al., 2012).

Even though teacher self-efficacy is typically positively related to teacher performance, some research suggests this is not always true. Stripling and Roberts (2012) assessed preservice teachers' self-efficacy and actual ability in mathematics. The preservice teachers reported a high level of mathematics teaching self-efficacy and a moderate level of personal mathematics self-efficacy. However, preservice teachers scored low on mathematics ability, leading to a negative relationship between self-efficacy and performance. Scales, Terry, and Torres (2009) conducted a similar study with agricultural teachers and science. Teachers in the study reported a high level of teacher self-efficacy regarding scientific concepts. When assessed with a standardized biological examination, only 10% of the agricultural education teachers received a proficient score or higher.

Limited research has been conducted regarding teacher content knowledge self-efficacy in agricultural education (McKim & Velez, 2016). This is especially true regarding in agribusiness. Burris et al. (2010) examined first and fifth-year agricultural education teachers in

Texas to self-assess their ability to teach five content areas of agricultural education. First-year agricultural teachers cited they were most confident in teaching animal science objectives and least confident in teaching agricultural mechanics and technology. Fifth-year teachers believed their strongest area was animal science and their weakest area was environmental science followed closely by plant and soil science. Agribusiness was rated as the second strongest content area by both first and fifth-year teachers. Both groups rated themselves at a moderate level for agribusiness self-efficacy. This study determined overall teacher self-efficacy for general agricultural education content areas. It did not determine teacher self-efficacy for specific standards. Little work has been conducted to determine agricultural teacher self-efficacy in the area of agribusiness content standards.

Agricultural teacher education programs are challenged with creating the optimal program of study to prepare secondary agricultural education teachers. Teacher preparation programs face ongoing challenges such as aligning with current technological trends (Rojewski, 2002) and changing career competencies (Duncan et al., 2006). The complication is multiplied for agricultural education programs as they must prepare future teachers in the multiple areas such as animal science, agricultural engineering, plant science, agribusiness, and beyond (Burris et al., 2010). It is important to select the optimal program of study because subject matter knowledge is an important trait of effective teachers (Roberts & Dyer, 2004).

Courses taken during preservice training can impact teacher self-efficacy. Tschannen-Moran & Woolfolk Hoy (2007) found that teachers can alter their teacher self-efficacy the greatest during preservice training by preparing themselves with the proper coursework. Similarly, Watters and Ginns (1995) suggested that teacher self-efficacy is influenced by learning experiences, such as types of college courses completed. McKim and Velez (2017) found significant correlations between preservice coursework and classroom management, leadership, science teaching, and math teaching self-efficacies among agricultural education teachers with one to five years of teaching experience. Stripling and Roberts (2012) discovered that preservice agricultural education teachers who took advanced mathematics courses in high school and college performed better on basic mathematics ability tests as compared to preservice teachers who only took basic or intermediate mathematics courses. A relationship did exist between the number and types of agricultural mechanics courses completed (Byrd et al., 2015). However, researchers cited that a threshold could exist after two agricultural mechanics courses. Even though specific content self-efficacy might increase, overall self-efficacy may not increase after the threshold is reached (Byrd et al., 2015).

Purpose / Objectives

The purpose of this study was to determine agricultural teacher self-efficacy based on Mississippi and Tennessee agricultural education agribusiness course standards. The study also examined if teacher agribusiness self-efficacy was related to such as business related coursework completed in college. The study had the following research objectives:

1. Identify post-secondary business related coursework completed.
2. Determine major agribusiness themes using Mississippi and Tennessee agricultural education state competencies.

3. Determine the teacher self-efficacy of Mississippi and Tennessee secondary agricultural education teachers for teaching agribusiness.
4. Discover if a relationship existed between teacher agribusiness self-efficacy and various demographic characteristics.

Methods

A descriptive correlational research design utilizing cross-sectional survey techniques was used in this study. This method was chosen because the study only plans to determine if relationships exist with no attempt to determine the cause of the relationships (Fraenkel, Wallen, & Hyun, 2012). The descriptive portion of the design was selected to determine characteristics of secondary agricultural education teachers in Mississippi and Tennessee, and the correlational portion of the design will determine if relationships exist between agribusiness self-efficacy and the remaining variables. There was no attempt to determine causal relationship between the variables. Cross-sectional survey technique was used because a predetermined population was surveyed during one point in time (Fraenkel et al., 2012).

The survey instrument was constructed to obtain teacher confidence ratings in agribusiness as well as various demographics. The first section of the survey consisted of state competencies from Mississippi and Tennessee secondary agribusiness courses. Student competencies were used from Mississippi's Science of Agribusiness Level I and Level II courses. Course standards were used from Tennessee's Principles of Agribusiness and Agricultural Business and Finance courses. The competency section consisted of 88 total items. Teachers rated their confidence in their ability to teach each indicator based on a five-point scale (*1 = No Confidence, 2 = Little Confidence, 3 = Somewhat Confident, 4 = Confident, 5 = Very Confident*). The second section of the questionnaire consisted of demographic type questions.

Face and content validity of the survey was determined by a panel of experts consisting of Mississippi State University agricultural education and agricultural economics professors. A pilot test using 32 Alabama secondary agricultural education teachers was conducted for purpose of checking for internal consistency reliability. Reliability analysis resulted in a Cronbach's α of 0.988for the 88 agribusiness competencies. The survey was also modified based on responses from the pilot study.

The study was administered to Mississippi and Tennessee secondary agricultural education teachers using Qualtrics. These states were selected due to location and ease of obtaining contact information. Survey participation request emails were sent to 447 teachers (139 from Mississippi and 308 from Tennessee). Surveys were administered using techniques suggested by Don Dillman's Tailored Design Method for Web Questionnaires and Implementation (Dillman, Smyth, & Christian, 2014). The initial email was sent on December 3, 2018 with reminder emails sent on December 10, 2018, December 18, 2018, January 7, 2019, and January 15, 2019. Data collection ended on January 22, 2019. One hundred eleven (N = 111) secondary agricultural education teachers completed the survey, resulting in a 24.8% response rate.

Data were analyzed using SPSS. Responses and data were reviewed prior to analysis. *A priori* alpha value was set at 0.05. All assumptions were checked and data was transformed as needed. Outliers were defined as cases whose z-scores exceeded three standard deviations from the mean. Normality was checked using Shapiro-Wilk and confirmed by inspecting the histogram. Levene's test was used to determine the homogeneity of variance assumption. Linearity and homoscedasticity were checked by analyzing scatterplots. Durbin-Watson test was used in determining independence. Multicollinearity was assessed using VIF values.

Data analysis included univariate and multivariate techniques. Factor analysis was conducted using the 88 agribusiness course competencies using principal components analysis and direct oblimin (oblique) rotation. Multiple linear regression, using stepwise techniques, was used to determine the influences of *Collegiate Course Type* on the *Agribusiness Self-Efficacy* variables. Correlations were used to determine the relationships between *Agribusiness Self-Efficacy* variables to number of collegiate business related courses completed.

Results / Findings

Demographics

One hundred eight of the 111 participants completed at least one agribusiness or business related collegiate course at the undergraduate or graduate level. Three did not complete an agribusiness or business related course at the collegiate level. Introduction to Agribusiness (Agricultural Economics) was the most selected course with 93 secondary agricultural education teachers selecting the course option. Entrepreneurship was the least non-other course selected course option with ten participants indicating that they completed the course. Table 1 shows the frequencies and percentages for participants based on *Collegiate Course Type*.

Table 1 Agribusiness and Business Related Courses completed by Secondary Agricultural Education Teachers from Mississippi and Tennessee (N = 111)

Course	*f*	%
Introduction to Agribusiness	93	83.8
Farm Management	53	47.7
Macroeconomics	37	33.3
Microeconomics	36	32.4
Management	29	26.1
Marketing	28	25.2
Accounting	24	21.6
Business Law	23	20.7
Personal Finance	13	11.7
Finance	11	9.9
Entrepreneurship	10	9.0
Other Business Type Course	9	8.1

On average, participants completed approximately five (M = 4.68, SD = 5.45) agribusiness or business-related courses at the collegiate level. Three participants did not complete an agribusiness or business related course while in college, and one individual completed 36 business type courses (*Range* = 0 – 36). The median and mode for business related courses was three.

Factor Analysis

A principal component analysis was conducted with the 88 Mississippi and Tennessee agribusiness course competencies using direct oblimin (oblique) rotation. Using Kaiser's criterion of 1, nine factors with an eigenvalue greater than 1 combined to explain 78.03% of the variance.

The correlation matrix was examined to determine the degree to which the competencies are correlated as described by Field (2013). Fifteen pairs of competencies had a correlation below 0.3. One pair of competencies had a correlation above 0.9. The majority of the correlations being between 0.3 and 0.9 suggests reasonable factorability and limited multicollinearity issues (Field, 2013). The Kaiser-Meyer-Olkin measure of 0.89 indicated that the sample was adequate for analysis, "Meritourious" according to Hutcheson and Sofronious (1999). Bartlett's Test of Sphericity (χ^2_{3828} = 13087.07, $p < 0.001$) proved that the data set was appropriate for factor analysis. Agribusiness competencies were grouped using the greatest correlation according to the structure matrix. Each factor was given a name based on the agribusiness competencies that loaded on the factor. Cronbach's α indicated high internal consistency reliabilities for all the competencies as well as the competencies associated with each individual factor (all Cronbach's α > 0.904). Table 2 includes the total number of competencies per each factor and the factor's Cronbach's α.

Table 2 Number of Competencies and Cronbach's α for each Factor and All 88 Competencies (N = 111)

	Number of Competencies	Cronbach's α
Management and Entrepreneurship	28	0.993
Budgeting	11	0.985
Legal Regulations	6	0.904
Finance	11	0.949
Agribusiness Marketing	5	0.913
Risk Management	6	0.948
Business Planning	6	0.924
Agribusiness Importance	5	0.920
Macroeconomics	10	0.964
Total	88	0.993

Agribusiness Teacher Self-Efficacy

A mean was calculated for each participant based on their self-efficacy rating for each competency. The calculated mean became a participant's *Overall Competency*. Participant's

Overall Competency variable ranged from 1.17 (*SD* = 0.43) to 4.78 (*SD* = 0.43) on a scale of 1 to 5. The mean *Overall Competency* was 3.18 (*SD* = 0.79).

A mean was calculated for each of the individual factor themes which became a participant's dependent variable score for Objective 4 statistical analysis. *Budgeting* had the highest mean (*M* = 3.59, *SD* = 0.80). *Risk Management* had the lowest mean (*M* = 2.84, *SD* = 0.80). Means and standard deviations of the *Overall Competency* and the nine factors are in Table 3.

Table 3 Means and Standard Deviations for each Factor and All 88 Competencies

	M	*SD*
Overall Competency	3.18	0.79
Management and Entrepreneurship	3.15	0.87
Budgeting	3.59	0.80
Legal Regulations	2.99	0.80
Finance	3.27	0.79
Agribusiness Marketing	3.19	0.85
Risk Management	2.84	0.90
Business Planning	3.18	0.87
Agribusiness Importance	3.46	0.88
Macroeconomics	2.86	0.91

Note: Self-efficacy scores ranged from 1 to 5 (*1 = No Confidence, 2 = Little Confidence, 3 = Somewhat Confident, 4 = Confident, 5 = Very Confident*)

Influence of Business Related Collegiate Coursework Teacher Agribusiness Self-Efficacy

The *Overall Competency* and eight factor means produced a non-significant Shapiro-Wilk test ($p > 0.05$). The Shapiro-Wilk test for *Budgeting* was significant (0.958, $df = 111$, $p < 0.001$). *Budgeting* was transformed by squaring the variable (^2). Transformed *Budgeting* had a non-significant Shapiro-Wilk test result (0.984, $df = 111$, $p = 0.196$). *Budgeting* was used as transformed when dependent variable normality assumption was needed.

Three courses (Marketing, Introduction to Agribusiness, and Microeconomics) entered into regression equations for *Overall Competency* ($R^2 = 0.180$, $F_{3,107} = 7.82$, $p < 0.001$), *Management and Entrepreneurship* ($R^2 = 0.166$, $F_{3,107} = 7.08$, $p < 0.001$), *Agribusiness Marketing* ($R^2 = 0.178$, $F_{3,107} = 7.71$, $p < 0.001$), and *Business Planning* ($R^2 = 0.186$, $F_{3,107} = 8.14$, $p < 0.001$). Marketing and Introduction to Agribusiness were the only courses that were included in the regression equation for *Budgeting* ($R^2 = 0.131$, $F_{2,108} = 8.11$, $p = 0.001$) and *Agribusiness Importance* ($R^2 = 0.159$, $F_{2,108} = 10.20$, $p < 0.001$). The *Legal Regulations* regression ($R^2 = 0.165$, $F_{2,108} = 10.64$, $p < 0.001$) and *Finance* regression ($R^2 = 0.139$, $F_{2,108} = 8.72$, $p < 0.001$) included Farm Management and Marketing courses. Marketing and Finance entered into the regression equation for *Risk Management* ($R^2 = 0.132$, $F_{2,108} = 8.25$, $p < 0.001$).

Business Law was the only course that entered into *Macroeconomics* multiple linear regression equation ($R^2 = 0.061$, $F_{1,109} = 7.13$, $p = 0.009$). All multiple regression models resulted in a small effect size using Cohen's *f* (Watson, 2018). Table 4 includes R^2 vales and equations for the 10 multiple linear regression models.

Table 4 Multiple Regression Summary on Self Efficacy of 10 Agribusiness Self-Efficacy variables by Collegiate Course Type ($N = 111$)

Dependent Variable	R^2 Value	Equation
Overall Competency	0.180	0.456(Introduction to Agribusiness) + 0.422(Marketing) + 0.354(Microeconomics) + 3.031
Management and Entrepreneurship	0.166	0.483(Introduction to Agribusiness) + 0.413(Microeconomics) + 0.406(Marketing) + 2.507
Budgeting[T]	0.131	3.482(Marketing) + 2.684(Introduction to Agribusiness) + 10.388
Legal Regulations	0.165	0.502(Marketing) + 0.385(Farm Management) + 2.684
Finance	0.139	0.505(Marketing) + 0.301(Farm Management) + 2.998
Agribusiness Marketing	0.178	0.442(Microeconomics) + 0.436(Marketing) + 0.416(Introduction to Agribusiness) + 2.591
Risk Management	0.132	0.613(Finance) + 0.507(Marketing) + 2.66
Business Planning	0.186	0.513(Introduction to Agribusiness) + 0.477(Microeconomics) + 0.391(Marketing) + 2.502
Agribusiness Importance	0.159	0.652(Marketing) + 0.450(Introduction to Agribusiness) + 2.912
Macroeconomics	0.061	0.555(Business Law) + 2.741

[T] – *Transformed*

Assumption analysis produced several issues for the number of collegiate business related courses variable. Two outliers existed in the data. The Shapiro-Wilk test was significant (0.629, $df = 102$, $p < 0.001$), indicating non-normality. Analysis of residual graphs indicated heteroscedasticity. Field (2013) suggested using Spearman correlation coefficient (r_s) when one

of two variables have issues with normality and outliers. The 102 cases were analyzed using Spearman's r_s.

The number of collegiate related business courses completed by the teachers was significantly related to all 10 of the agribusiness self-efficacy variables ($p < 0.001$). All correlations have a medium-large effect size (Watson, 2018). Results for Spearman's correlation tests are found in Table 5.

Table 5 Spearman's Coefficient for Number of Collegiate Courses Completed and the 10 Agribusiness Self-Efficacy variables ($n = 102$)

Variable	r_s
Overall Competency	0.422^{***}
Management and Entrepreneurship	0.405^{***}
Budgeting	0.354^{***}
Legal Regulations	0.445^{***}
Finance	0.408^{***}
Agribusiness Marketing	0.375^{***}
Risk Management	0.412^{***}
Business Planning	0.403^{***}
Agribusiness Importance	0.393^{***}
Macroeconomics	0.373^{***}

*** $p < 0.001$

Conclusions and Recommendations

Factor analysis divided the 88 state agribusiness course competencies into nine factors. *Management and Entrepreneurship*, the largest factor, contained 28 competencies. *Agribusiness Marketing* and *Agribusiness Importance*, two smallest factors, contained 5 competencies each. The researcher had hoped that the groups would have been closer in size. The diversity of the largest factor (*Management and Entrepreneurship*) added difficulty to discovering a common theme.

The factor themes were similar to major themes in agribusiness education. Reviewing agribusiness course competencies from Mississippi and Tennessee, the themes are similar to the units from the courses. However, some competencies were grouped differently than what leaders from both states have published.

The number of collegiate business related courses completed was moderately related to agribusiness self-efficacy. While taking more business related collegiate courses increased confidence to teach agribusiness competencies, the moderate correlation indicated teachers

would react differently by taking an additional course. The amount of increase in teacher agribusiness self-efficacy with an additional business related course would also be dependent on the type of course. Further research should be conducted as to the optimal number of courses to complete at the collegiate level.

Bandura (1994) wrote that an individual's self-efficacy impacts how they are motivated, how they behave, and how they perform. Teachers are more likely to perform better in areas where they are confident and avoid topics where they lack confidence. Self-efficacy can change throughout a person's life. Teachers should participate in positive cognitive development activities and use constructive feedback in hopes to increase their teacher self-efficacy.

This study concludes that the teachers are somewhat confident to teach agribusiness. While a level of somewhat confident is better than little or no confidence, it does indicate that secondary agricultural teachers lack confidence in teaching agribusiness competencies. The lack of confidence to teach agribusiness competencies could lessen a teacher's classroom performance as described by Collie, Shapka, and Perry (2012) and Tschannen-Moran, Woolfolk Hoy, and Hoy (1998). Teachers are more likely to spend time and effort on concepts they are confident with, such as budgeting and inductor topics, as compared to concepts they lack confidence, such as government regulations and risk management. Student motivation and achievement levels could be negatively impacted with lower teacher self-efficacy levels as stated by Klassen & Chiu (2010). The lower teacher self-efficacy ratings will likely increase stress levels (Klassen & Chiu, 2010), decrease job satisfaction (Collie et al., 2012), and career persistence (McKim & Velez, 2016).

The variation of confidence in topics is confirmed by analysis of means of the different factors. Throughout the study, *Budgeting* and *Agribusiness Importance* demonstrated the highest competency mean ratings and *Macroeconomics*, *Risk Management*, and *Legal Regulations* exhibited the lowest competency mean ratings. The remaining four factors, *Management and Entrepreneurship*, *Finance*, *Agribusiness Marketing*, and *Business Planning*, were consistently located between the highest two and lowest three themes. While this study did not attempt to determine causation between the factor differences, it is concluded that teachers are most confident to teach the competencies from *Agribusiness Importance* and *Budgeting* and least confident to teach competencies from *Macroeconomics*, *Risk Management*, and *Legal Regulations*. The lack of confidence in those areas could lesson a teacher's classroom performance levels.

Preservice secondary agricultural education teachers are limited to the number of collegiate level courses they take during their undergraduate pursuits. University agricultural education officials are tasked with developing the proper course of study for future secondary agricultural education teachers. Adding courses in one area will reduce courses in other areas. Based on the results of this study, it is concluded that agricultural education professors consider requiring at least an introductory to agribusiness course and a marketing course as part of degree requirements for preservice secondary agricultural education students to optimize agribusiness teacher self-efficacy.

Further research is needed in the areas of agribusiness teacher self-efficacy. Additional research is needed to determine the optimal number of collegiate business related courses as it influences agribusiness self-efficacy. Research should also include how increases in collegiate business related courses will impact teacher self-efficacy in other agricultural content areas. While this study determined that the number and types of collegiate business related courses do influence teacher agribusiness self-efficacy, approximately 80% of the variation was not explained. Additional research is needed to determine what additional factors account for the remaining sources of variation in teacher agribusiness self-efficacy.

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What Technical Agricultural Mechanics Knowledge and Skills are Needed by School-based Agricultural Education Teachers?

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Abstract

A priority of agricultural teacher preparation programs is to develop technically competent school-based agricultural education (SBAE) teachers (Whittington, 2005). SBAE teachers should be knowledgeable in various content areas within SBAE curricula (Roberts & Dyer, 2004), such as agricultural mechanics. Hainline and Wells (2019) identified that Iowa SBAE teachers need a broad swath of knowledge and skills related to technical agricultural mechanics. Is this finding consistent in other areas of the country? Using Roberts and Ball's (2009) content-based model for teaching agriculture as the conceptual framework for our study, we used a three-round Delphi technique to identify the technical agricultural mechanics knowledge and skills SBAE teachers in Arkansas, Louisiana, Oklahoma, and Texas should possess to provide quality instruction. Spread across all four states, a panel of 47 SBAE teachers with expertise in agricultural mechanics contributed data for the present study. Thirty-five teachers participated in all three rounds. After the conclusion of all three rounds, 71 technical agricultural mechanics knowledge and skill items were identified. We recommend a variety of efforts to help expand teachers' competence in these knowledge and skill items be undertaken.

Introduction

School-based agricultural education (SBAE) programs serve a variety of functions, such as engaging students in local-, regional-, state-, and national-level activities (Phipps, Osborne, Dyer, & Ball, 2008), stimulating awareness of and preparation for careers in the agricultural industry (Stripling & Ricketts, 2016), and connecting academically-oriented, theoretical knowledge to practical, agriculturally-oriented applications (Haynes, Robinson, Edwards, & Key, 2012; Young, Edwards, & Leising, 2009). SBAE programs are intended to be led by qualified, effective SBAE teachers (Easterly & Myers, 2017a; Phipps et al., 2008). Effective SBAE teachers are necessary components of quality SBAE programs (Easterly & Myers, 2017a) and display a variety of characteristics (Eck, Robinson, Ramsey, & Cole, 2019; Roberts & Dyer, 2004), including dedication, pedagogical knowledge, and knowledge about agricultural subject matter. Knowledge about agricultural subject matter has been consistently identified as a trait of effective SBAE teachers (Eck et al., 2019; Roberts & Dyer, 2004; Whittington, 2005).

SBAE teachers can be developed into capable, effective, and knowledgeable professionals through multiple approaches. At the pre-service level, agricultural teacher preparation programs are tasked with developing teacher candidates to implement quality SBAE programming (Myers & Dyer, 2004; Roberts & Dyer, 2004; Whittington, 2005). Within agricultural teacher preparation programs, opportunities for agricultural subject matter

knowledge development can occur through various methods, including early field experiences (Wells, Smalley, & Rank, 2018), technical agricultural coursework (Hainline & Wells, 2019), and student teaching experiences (Wells, Hainline, & Smalley, 2019; Whittington, 2005) to help prepare teacher candidates for the realities of teaching and learning in SBAE settings. Agricultural teacher educators must consider the depth and breadth of agricultural subject matter knowledge needed by beginning teachers within the scope and structure of pre-service program curricula (Roberts & Kitchel, 2010). To provide a foundation for entering the profession, agricultural teacher preparation programs must offer pre-service teachers opportunities to develop their knowledge and skills in agricultural subject matter (Whittington, 2005).

Beyond pre-service agricultural teacher preparation programs, professional development opportunities can help to ensure in-service SBAE teachers are capable, effective, and knowledgeable professionals (Grieman, 2010). Webb, Westfall-Rudd, Scherer, and Rudd (2019) detailed SBAE teachers can network collaboratively to promote professional learning "that keeps them abreast of changes in the [agricultural] industry and provides an avenue for their lifelong learning experiences" (p. 199). Easterly and Myers (2017b) found SBAE teachers tended to desire professional development relevant to their particular instructional areas. Shoulders and Myers (2014) indicated professional development can serve as an avenue for fostering change within SBAE teachers. Touchstone (2015) further opined that relevant professional development opportunities could help to retain SBAE teachers within the profession, particularly in terms of assisting early-career teachers to continue teaching.

Recent studies have consistently indicated SBAE teachers across the United States have various professional development needs. Clemons, Heidenreich, and Lindner (2018) noted Alabama SBAE teachers reported many professional development needs across the domains of teaching and learning, SBAE program management, FFA / leadership development / SAE, and technical agricultural subject matter. Similar to Clemons et al. (2018), Figland, Blackburn, Stair, and Smith (2019) reported teachers in Louisiana likewise needed professional development in different aspects of SBAE. In the case of Oregon SBAE teachers, Sorensen, Lambert, and McKim (2014) found professional development needs can vary depending upon individual teachers' experience levels. Smalley, Hainline, and Sands (2019) further reported Iowa SBAE teachers need professional development in a broad range of agricultural subject matter across differing career pathways, such as agribusiness, agricultural biotechnology, and agricultural mechanics. These findings indicate SBAE teachers can broadly identify the professional development they need to be effective in their respective programs. To further clarify the agricultural subject matter expertise that should be developed, perhaps a closer look at a particular career pathway such as agricultural mechanics would be useful.

In 2015, The National Council for Agricultural Education established content standards in eight career pathways. These career pathways include: (1) Power, Structural and Technical Systems, (2) Plant Systems, (3) Natural Resource Systems, (4) Food Products and Processing Systems, (5) Environmental Service Systems, (6) Biotechnology Systems, (7) Animal Systems, and (8) Agribusiness Systems. Among the career pathways, Power, Structural, and Technical Systems (i.e., agricultural mechanics) is a common pathway in many SBAE programs in which teachers should be prepared to teach safely and effectively (Hainline & Wells, 2019; Saucier, Vincent, & Anderson, 2014). However, pre-service (Tummons, Langley, Reed, & Paul, 2017)

and in-service teachers (Burris, McLaughlin, McCulloch, Brashears, & Fraze, 2010) often feel under-prepared to teach agricultural mechanics coursework.

Agricultural mechanics coursework includes a vast array of content areas that may be taught in any individual SBAE program (Burris, Robinson, & Terry, 2005; Hainline & Wells, 2019; McCubbins, Anderson, Paulsen, & Wells, 2016; McCubbins, Wells, Anderson, & Paulsen, 2017; Wells, Perry, Anderson, Shultz, & Paulsen, 2013). Among these content areas, teachers may be faced with teaching metalworking, welding, biofuels, alternative energies, structures, woodworking, power mechanics, electricity, and more (Hainline & Wells, 2019). SBAE teachers need agricultural subject matter expertise to effectively teach content that is relevant and can best serve students over the long term (Easterly & Myers, 2017a; Eck et al., 2019; Hainline & Wells, 2019; Roberts & Ball, 2009).

Effective SBAE teachers actively pursue learning opportunities to improve their abilities as education professionals (Roberts & Dyer, 2004). Opportunities to learn and practice relevant knowledge and skills will help teachers develop a degree of competence in agricultural subject matter (Whittington, 2005). However, specific knowledge and skills necessary to provide high-quality, engaging, safe, and effective educational experiences in agricultural mechanics content areas need to be defined, particularly as new technologies, products, and processes continue to advance the standards employed by industry members (Hainline & Wells, 2019).

Conceptual Framework

We used Roberts and Ball's (2009) content-based model for teaching agriculture (see Figure 1) as the conceptual framework for our study.

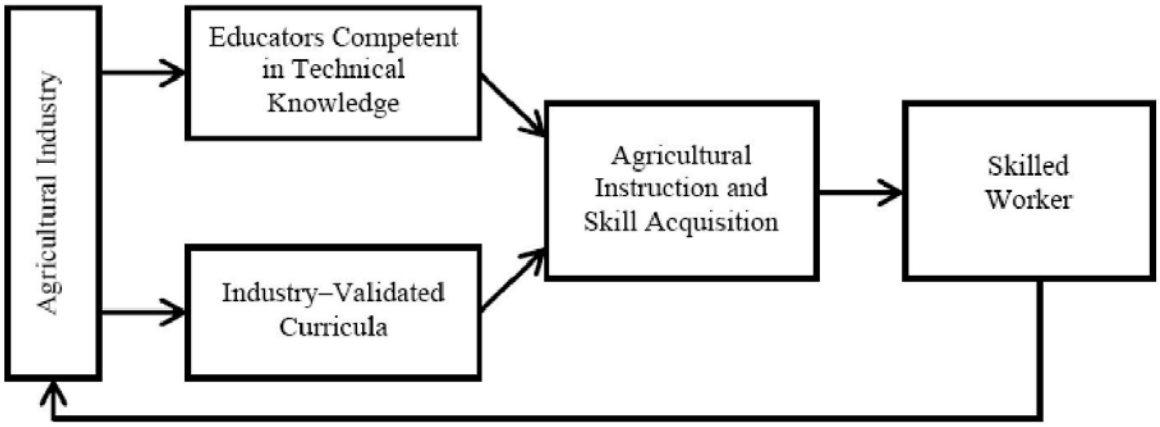

Figure 1. A content-based model for teaching agriculture. Reprinted from "Secondary Agricultural Science as Content and Context for Teaching," by T. G. Roberts and A. L. Ball, 2009, *Journal of Agricultural Education, 50,* p. 84. Copyright 2009 by *Journal of Agricultural Education*.

We focused upon the *Educators Competent in Technical Knowledge* aspect of this model with a specific interest in its eventual impact on the broader agricultural industry. SBAE teachers are

tasked with helping prepare the next generation of agricultural industry employees and leaders (Stripling & Ricketts, 2016). As such, SBAE teachers must be prepared to deliver learning experiences that actively engage students (Phipps et al., 2008; Talbert, Vaughn, Croom, & Lee, 2014). Roberts and Ball (2009) described their model as follows:

> It begins with the agricultural industry, which provides the basis for the curricula taught and for teacher preparation. In turn, teachers utilize the curricula to provide industry-relevant instruction that results in observable skill acquisition. The end result is skilled workers that are ready for successful employment in the agricultural industry. (p. 84)

Roberts and Ball (2009) noted while SBAE is transitioning toward into a contextually-driven entity, a content-focused model "[is] relevant and appropriate for contemporary agricultural education" (p. 86). The agricultural industry plays a key role in the purpose and function of SBAE (Doerfert, 2011; Stripling & Ricketts, 2016). Thus, SBAE teachers are agricultural industry stakeholders who help prepare future generations of stakeholders. Due to this role, SBAE teachers should have a degree of expertise in knowledge and skills relevant to agriculture (Whittington, 2005). As noted by Easterly and Myers (2017a), knowledgeable and skilled teachers are essential assets of quality SBAE programs.

In the context of agricultural mechanics coursework, teachers must be prepared to engage with other SBAE stakeholders, such as industry personnel and agricultural teacher educators, to provide their students with learning opportunities reflecting current practices used within the agricultural industry (Hainline & Wells, 2019; McCubbins et al., 2017). To help better ensure the agricultural mechanics-related knowledge and skill needs of the agricultural workforce in Arkansas, Louisiana, Oklahoma, and Texas are met, SBAE teachers' expertise needs should be defined.

Purpose & Objective of the Study

The purpose of our study was to describe the technical agricultural mechanics knowledge and skills SBAE teachers in Arkansas, Louisiana, Oklahoma, and Texas need to have to adequately deliver agricultural mechanics instruction within their respective SBAE programs. The perceptions of a panel of SBAE teachers with expertise in agricultural mechanics were used to accomplish our purpose. Our research objective was to identify the technical agricultural mechanics knowledge and skills needed by SBAE teachers in these four states. Our study aligns with Research Priority 3 of the American Association for Agricultural Education (AAAE) National Research Agenda (NRA): Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016).

Methods

Using a panel of SBAE teachers with expertise in agricultural mechanics, we employed a three-round Delphi technique to develop consensus regarding the technical agricultural mechanics knowledge and skills SBAE teachers in Arkansas, Louisiana, Oklahoma, and Texas need to effectively provide instruction in agricultural mechanics. The present study was part of a

larger study. All recruitment and data collection procedures were conducted electronically via Qualtrics.

Participants

The panel members were selected via a nomination process. The nomination process employed a snowball sampling technique and was guided by established selection criteria: (1) the panel member must have at least 10 years of agricultural mechanics teaching experience and (2) the panel member has taught agricultural mechanics courses in at least seven of the last 10 years. We initiated the nomination process by reaching out to state-level SBAE leaders (e.g., agricultural teacher educators, state-level agricultural education / FFA staff, etc.) in the four states via e-mail and asking them to identify SBAE teachers who met our selection criteria.

Within the first-round instrument, each nominated SBAE teacher was asked to verify if his / her agricultural mechanics teaching experience met the criteria for the study. The first-round instrument also provided a platform for the nominated SBAE teachers to nominate other SBAE teachers who they believed fit the minimum experience criteria for this study. At the conclusion of the nomination process, 47 SBAE teachers with expertise in agricultural mechanics agreed to participate in our study as panel members. To aid in the retention of panel members throughout all three rounds of our study, we offered each panel member a chance to win one of six $50 gift cards. Dillman, Smyth, and Christian (2014) noted offering appropriate compensation to participants can help to increase response rates. Each panel member was informed his / her name was entered into the gift card drawing one time per each round he /she participated in. Thus, each panel member's chances of winning one of the gift cards increased as a direct result of his / her engagement throughout the study's duration.

The panel members had an average of 19.83 (SD = 7.20) years of teaching experience and an average of 19.41 (SD = 7.15) years of teaching experience in their current state. When asked about their participation in agricultural mechanics-focused FFA Career Development Events (CDEs), 45 panel members reported training at least one agricultural mechanics-focused CDE team in the past five years. The panel members indicated their students participated in a wide range of agricultural mechanics-focused FFA CDEs (i.e., Agricultural Technology and Mechanical Systems CDE, Tractor Tech CDE, Electrical Systems CDE, Carpentry CDE, Small Engines CDE, and Welding CDE). Aside from CDE participation, a majority of the panel members (n = 38) noted students in their SBAE programs have exhibited projects at agricultural mechanics project shows at the local, regional, state, and / or national level.

Each panel member was asked to identify experiences influencing their perceptions of which agricultural mechanics knowledge and skills are needed by SBAE teachers. Experiences with teaching agricultural mechanics coursework (f = 43, 91.48%), experiences working in the agricultural industry (f = 28, 59.57%), and attending professional development workshops (f = 28, 59.57%) were the three experiences the greatest number of panel members perceived to influence their perceptions of the knowledge and skills needed to effectively teach agricultural mechanics (see Table 1).

Table 1

Experiences Influencing Panel Members' Perceptions of the Agricultural Mechanics Knowledge and Skills Needed by SBAE Teachers (N = 47)

Experience	*f* (%)
My experiences teaching agricultural mechanics coursework	43 (91.48)
My experiences working in the agricultural industry	28 (59.57)
Attendance at professional development workshop sessions	28 (59.57)
My experiences with FFA activities (e.g., the Agricultural Mechanics CDE, etc.)	26 (55.32)
Meetings with other agricultural education teachers outside of my program	25 (53.19)
My high school coursework when I was a student	22 (46.81)
Attendance at annual agricultural education teacher conference(s)	22 (46.81)
Meetings with industry representatives	21 (44.68)
My early field experiences / observations before student teaching	19 (40.43)
My teacher education program coursework	18 (38.30)
My experiences with student Supervised Agricultural Experience programs	17 (36.17)
Meetings with other agricultural education teachers within my program	17 (36.17)
My student teaching experience	16 (34.04)
Meetings with community members	16 (34.04)
Meetings with my former students	16 (34.04)
Meetings with my current students	15 (31.91)
Compliance with mandated course standards	14 (29.79)

Data Collection / Instrumentation

Three different Qualtrics-based instruments were used to establish consensus among the panel members throughout the three rounds of our study. Following the initial distribution of each Delphi instrument, two reminder emails were sent to the participants in seven-day increments. The first-round instrument was linked to the recruitment e-mail which provided information about the study and asked participants to sign an electronic informed consent form. The first-round instrument included demographic and background characteristic items (e.g., teaching experience, CDE team involvement, etc.), a request form to nominate other SBAE teachers each panel member believed met the initial selection criteria, and the following open-ended question: What technical agricultural mechanics knowledge and skills are needed by agricultural education teachers to successfully teach agricultural mechanics courses in [STATE]?

After round one responses were collected, 96 unique technical knowledge and skill items were identified by the panel members. The 96 items gathered from the first-round instrument were presented to the panel members within the second-round instrument. Each item was coupled with a six-point scale (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Slightly disagree*, 4 = *Slightly agree*, 5 = *Agree*, 6 = *Strongly agree*) which allowed each panel member to gauge his / her level of agreement with the importance of each item. The second-round instrument also included an open-ended item which prompted the panel members to include any other agricultural mechanics knowledge or skill items not presented on the second-round instrument.

The second-round instrument was only sent to the 47 panel members who provided feedback in the first-round Delphi instrument. Forty-one panel members completed the second-round Delphi instrument, accounting for a response rate of 87.23%. Congruent to the consensus criteria utilized in a myriad of prior agricultural education Delphi studies (Hainline, Burris, Ulmer, & Ritz, 2019; Lundry, Ramsey, Edwards, & Robinson, 2015; Ramsey, 2009), Delphi items which were rated as *Important* or *Extremely Important* by 75% or more of the panel members were considered to have met consensus amongst the group. The items on the second-round Delphi instrument which were rated as a three (*Important*) or four (*Extremely Important*) by 51% to 74% of the panel members were re-evaluated by the panel members on the third-round instrument. The items which failed to receive a rating of three or four from at least 51% of the panel members were excluded from the study.

On the third-round instrument, the panel members (who provided input on the first two rounds of the Delphi process) were asked to gauge their level of agreement with the importance of each item on a six-point scale (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Slightly disagree*, 4 = *Slightly agree*, 5 = *Agree*, 6 = *Strongly agree*). Similar to the second-round instrument, items which were rated as *Important* or *Extremely Important* by 75% or more of the panel members were considered to have met consensus. All third-round items which fell below this threshold were eliminated from further consideration. At the conclusion of data collection for round three, 35 (85.37% response rate) panel members responded on the third-round instrument.

Validity and Reliability

The first-round instrument was reviewed by a panel of three expert agricultural teacher educators to ensure content validity and enhance the readability of the instrument. These experts were asked to assess the appropriateness of the open-ended items and provide any suggestions to refine the instrument. All three experts deemed the items to be appropriate, but the wording of the items was augmented based on the experts' suggestions.

Goodman (1987) posited the content validity of Delphi instruments were enhanced by selecting knowledgeable individuals who have a strong interest in the given content matter of the study. In the context of this Delphi study, the participants were carefully selected based on the aforementioned selection criteria—bolstering the content validity of this study. Moreover, the implementation of the three-round Delphi process served to increase the concurrent validity of the study (Hasson, Keeney, & McKenna, 2000; Sharkey & Sharples, 2001; Walker & Selfe, 1996).

Regarding instrument reliability, Dalkey, Rourke, Lewis, and Snyder (1972) indicated a reliability coefficient of 0.70 could be expected from a Delphi panel with 11 or more members, and a coefficient of 0.90 was expected from a Delphi study with 13 or more members. The number of participants in each round of this Delphi study (Round 1, $n = 47$; Round 2, $n = 41$; Round 3, $n = 35$) exceeded the participant size threshold presented by Dalkey et al. (1972), which implied the findings of this study were reliable.

Data Analysis

Data from the open-ended questions on the first-round Delphi instrument were analyzed by organizing the panel members' responses into categories and deleting duplicate responses. The demographic / background characteristic items on the first-round instrument and the frequencies and percentages of the scale items on the second- and third-round instruments were analyzed using the IBM® SPSS® (Version 25) data analysis software.

Results

Round One

The panel members initially provided 143 technical agricultural mechanics knowledge and skill items for consideration. Duplicate responses were eliminated from the list, resulting in 96 unique technical agricultural mechanics knowledge and skill items.

Round Two

Ninety-six items were presented back to the panel members in the second-round instrument. After the completion of the second round of our study, 70 items were considered to have achieved consensus (i.e., 75% of the panel members either agreed or strongly agreed with the importance of the item). Nineteen items received a five (*Agree*) or six (*Strongly agree*) from 51% to 74% of the panel members and were subsequently presented in the third-round instrument. Seven items received less than 51% agreement and were excluded from further consideration (see Table 2). It should be noted that some items were skipped by at least one panel member during the questionnaire completion process. Thus, the percentage of agreement with these items was adjusted to correspond with the number of panel members who answered these items. These items are marked in Table 2.

Table 2

Round Two and Three Findings: Agricultural Mechanics Knowledge and Technical Skills Needed by SBAE Teachers

Agricultural Mechanics Item	*n*	Category	% Agreement
Personal protective equipment (PPE) identification and use[a]	41	General Agricultural Mechanics	100
Estimating materials[a]	41	Layout and Measurement	100
Tape measure use[a]	41	Layout and Measurement	100
Drill press use[a]	41	Carpentry / Woodworking	100
Circular saw use[a]	41	Carpentry / Woodworking	100
Wood fastener (ex. screws, nails, glue) use[a]	41	Carpentry / Woodworking	100
Hand tool (ex. screwdriver, hammer, pliers) use[a]	41	Carpentry / Woodworking	100
Power tool (ex. cordless drill, impact wrench) use[a]	41	Carpentry / Woodworking	100
Wrench and socket use[a]	41	Engines and Machinery	100

Agricultural Mechanics Item	*n*	Category	% Agreement
Gas metal arc welding (GMAW [MIG welding])[a]	41	Metal Fabrication	100
Oxy-fuel cutting[a]	41	Metal Fabrication	100
Understanding welding principles (ex. joint types, welding positions)[a]	41	Metal Fabrication	100
Angle grinder use[a]	41	Metalworking	100
Bench grinder use[a]	41	Metalworking	100
Using tools in welding (ex. grinders, chipping hammers, wire brushes, etc.)[a]	41	Metalworking	100
Speed square use[a,c]	40	Layout and Measurement	100
Laying out a project[a]	41	Layout and Measurement	97.6
Band saw use[a]	41	Carpentry / Woodworking	97.6
Table saw use[a]	41	Carpentry / Woodworking	97.6
Jig saw use[a]	41	Carpentry / Woodworking	97.6
Reciprocating saw use[a]	41	Carpentry / Woodworking	97.6
Knowledge of types of saw blades and their uses[a]	41	Carpentry / Woodworking	97.6
Reading blueprints[a]	41	Construction and Manufacturing	97.6
Equipment maintenance[a]	41	Construction and Manufacturing	97.6
Wiring outlets[a]	41	Electrical Systems	97.6
Shielded metal arc welding (SMAW [Arc welding])[a]	41	Metal Fabrication	97.6
Chop saw use[a]	41	Metalworking	97.6
Tool identification[b,c]	34	General Agricultural Mechanics	97.0
Miter saw use[a]	41	Carpentry / Woodworking	95.1
Pneumatic (air) tool use[a]	41	Carpentry / Woodworking	95.1
Painting and finishing projects[a]	41	Construction and Manufacturing	95.1
Wiring trailer electrical systems[a]	41	Electrical Systems	95.1
Wiring single-pole switch circuits[a]	41	Electrical Systems	95.1
Plasma arc cutting processes[a]	41	Metal Fabrication	95.1
Structural welding techniques[a]	41	Metal Fabrication	95.1
Using measurement and marking tools (ex. calipers, micrometers, transits, fill gauges)[a]	41	Layout and Measurement	92.7
Wiring double-pole switch circuits[a]	41	Electrical Systems	92.7
Ability to look at a picture and build the project[a]	41	Layout and Measurement	90.2
Building large projects (ex. trailers, barbeque pits)[a]	41	Construction and Manufacturing	90.2

Agricultural Mechanics Item	*n*	Category	% Agreement
Performing safe tractor operation procedures (ex. driving, attaching equipment)[a]	41	Engines and Machinery	90.2
Center punch use[a]	41	Metalworking	90.2
Using polyvinyl chloride (PVC) pipe[a,c]	40	Plumbing Systems	90.0
Drawing plans to scale[a]	41	Layout and Measurement	87.8
Technical manual use[a]	41	Layout and Measurement	87.8
Designing projects from scratch[a]	41	Layout and Measurement	87.8
Understanding the principles of electrical theory (ex. conductors, insulators, alternating current [AC], direct current [DC])[a]	41	Electrical Systems	87.8
Electrical systems tool (ex. multimeter, voltmeter, wire strippers) use[a]	41	Electrical Systems	87.8
Wiring three-way switch circuits[a]	41	Electrical Systems	87.8
Understanding the principles of four-stroke engine operational theory[a]	41	Engines and Machinery	87.8
Understanding the principles of two-stroke engine operational theory[a]	41	Engines and Machinery	87.8
Cold saw use[a]	41	Metalworking	87.8
Wood building construction[a]	41	Construction and Manufacturing	85.4
American Welding Society (AWS) standards for welding practices[a]	41	Metal Fabrication	85.4
Flux-core arc welding (FCAW)[a]	41	Metal Fabrication	85.4
Using appropriate plumbing fittings[a,c]	40	Plumbing Systems	85.0
Understanding units of electrical measurement (ex. amperes, volts, Ohms)[a]	41	Electrical Systems	82.9
Understanding principles of metallurgy (ex. identifying metals, use of metals)[a]	41	Metalworking	82.9
Fence construction[a]	41	Construction and Manufacturing	80.5
Building forms for concrete projects[a]	41	Construction and Manufacturing	80.5
Tap and die use[a]	41	Metalworking	80.5
Understanding the principles of diesel engine operational theory[a]	41	Engines and Machinery	80.5
Hydraulics systems and tool (ex. shears and punch presses) use[a]	41	Construction and Manufacturing	78.1
Estimating material needs for concrete projects[a]	41	Construction and Manufacturing	78.1
Powertrain theory and application[a]	41	Engines and Machinery	78.1

Agricultural Mechanics Item	*n*	Category	% Agreement
Using cross-linked polyethylene (PEX) pipe[a,c]	40	Plumbing Systems	77.5
Metal building construction[a]	41	Construction and Manufacturing	75.6
Mixing, placing, and finishing concrete projects[a]	41	Construction and Manufacturing	75.6
Wiring four-way switch circuits[a]	41	Electrical Systems	75.6
Gas tungsten arc welding (GTAW [TIG welding])[a]	41	Metal Fabrication	75.6
Iron worker use[a]	41	Metalworking	75.6
Computer numerical control (CNC) systems use[a]	41	Metalworking	75.6

Note. [a]Item reached consensus in round two; [b]Item reached consensus in round three; [c]Item was not answered by all panel members. 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Slightly disagree*, 4 = *Slightly agree*, 5 = *Agree*, 6 = *Strongly agree*.

Round three

The third-round instrument contained 19 technical agricultural mechanics knowledge and skills items. These items were: (1) *Tool identification*, (2) *Understanding OSHA regulations and industry codes*, (3) *Computer-aided drafting (CAD) design skills (ex. AutoDesk Inventor, Solidworks, Torchmate, SketchUp, VCarve)*, (4) *Global positioning system (GPS) use*, (5) *Surveying: Using a transit and GPS / laser equipment*, (6) *Radial arm saw use*, (7) *Dust collection systems use*, (8) *Plumbing system layout*, (9) *Using copper pipe*, (10) *Pipe threading equipment use*, (11) *Irrigation system design, installation, and use*, (12) *Electrical motors and controls use*, (13) *Understanding the principles of tractor systems (ex. steering control, braking, safety systems)*, (14) *Understanding the principles of emission systems and controls*, (15) *Understanding the principles of alternative fuel systems*, (16) *Oxy-fuel welding*, (17) *Brazing using a gas torch*, (18) *Soldering*, and (19) *Performing sheet metal work*. Only *Tool Identification* achieved consensus during the third round. At the closure of the third round of our Delphi study, all items that did not achieve the consensus threshold were excluded from further consideration. In total, 71 technical agricultural mechanics knowledge and skills items achieved consensus in our study.

Conclusions, Discussion, & Recommendations

We identified 71 technical agricultural mechanics knowledge and skills SBAE teachers in Arkansas, Louisiana, Oklahoma, and Texas need. Consistent with Hainline and Wells's (2019) study with Iowa SBAE teachers, we likewise found SBAE teachers in other states need numerous technical agricultural mechanics knowledge and skills to successfully deliver agricultural mechanics instruction in SBAE programs. Moreover, the agricultural mechanics knowledge and skills identified within our study were quite congruent with the agricultural mechanics topics discussed throughout other scholars' works (Burris et al., 2005; Hainline & Wells, 2019; McCubbins et al., 2017; Saucier et al., 2014; Wells et al., 2013).

Within their content-based model for teaching agriculture, which served as the conceptual framework for our study, Roberts and Ball (2009) indicated SBAE teachers should be competent in their agricultural subject matter knowledge, which is congruent with Eck et al.'s (2019) and Roberts and Dyer's (2004) findings. Easterly and Myers (2017a) noted effective teachers are paramount for the operation of high-quality SBAE programs. Roberts and Dyer (2004) further noted effective SBAE teachers seek out professional learning opportunities to improve their performance as educational professionals. Webb et al. (2019) specified professional learning opportunities can help to keep SBAE teachers informed about agricultural subject matter, which in turn guides curriculum development and implementation practices that impact student learning. We as agricultural teacher educators must ensure we help to facilitate the development of effective teachers through a variety of means, including high-quality early field experiences, professional development opportunities, and rigorous agricultural teacher preparation coursework.

We recommend agricultural education stakeholders in Arkansas, Louisiana, Oklahoma, and Texas (e.g., agricultural teacher educators, agricultural education / FFA staff, etc.) work to strengthen the quality, depth, and breadth of agricultural mechanics training offered to both pre-service and in-service teachers. Pre-service teachers (Tummons et al., 2017) and in-service teachers (Burris et al., 2010) often feel underprepared to teach agricultural mechanics. However, experience allows for greater comfort with teaching agricultural mechanics to occur (Burris et al., 2010), which could help to promote effective teaching of agricultural mechanics coursework within SBAE programs.

Regarding potential for further inquiry into agricultural mechanics knowledge and skill development for SBAE teachers, we recommend agricultural teacher educators across these four states critically examine their respective institutions' practices regarding agricultural mechanics preparation for pre-service and in-service teachers. Hainline and Wells (2019) indicated agricultural mechanics will, as agricultural subject matter, continue to evolve in depth and scope. Stripling and Ricketts (2016) decreed SBAE teachers as vital cogs in the agricultural workforce development machine. As such, agricultural teacher educators must be prepared to help facilitate the agricultural mechanics knowledge and skill development process in numerous ways, such as undergraduate- and graduate-level coursework and professional development opportunities.

Other SBAE stakeholders such as industry representatives, state-level agricultural education / FFA staff, and so forth should be recruited to help address the complexities associated with SBAE teachers' development of agricultural subject matter expertise. Subject matter expertise is vital to high-quality SBAE programs (Easterly & Myers, 2017a) but cannot necessarily emerge from only agricultural teacher preparation program coursework. The panel members in our study frequently indicated their expertise in agricultural mechanics subject matter was cultivated in a variety of ways beyond just their agricultural teacher preparation coursework. The subject matter knowledge and skill development processes of SBAE teachers with expertise in technical agriculture components of SBAE programming deserve additional inquiry. This inquiry could yield additional insight into how to best approach the development of high-quality SBAE teachers.

Designing appropriate curricula and educational experiences is complex and multi-faceted (Roberts & Kitchel, 2010), particularly considering degree plan limitations, budgetary concerns, and so forth. Neither agricultural teacher educators nor agricultural teacher preparation programs alone should be expected to shoulder the burden of ensuring SBAE teachers are technically competent. Several approaches should be considered, such as trainings at regularly-scheduled SBAE teacher conferences, professional development opportunities offered by industry stakeholders (e.g., Briggs and Stratton Instructor Field School sessions, Lincoln Electric Welding Educator Skill Advancement Program courses, etc.), SBAE teacher-led trainings at the local, regional, state, and / or national level(s), and so forth. Such approaches could be beneficial for introducing SBAE teachers to individuals who may be able to address their needs in a different manner than coursework completed within an agricultural teacher preparation program.

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What are School-based Agricultural Education Teachers' Experiences When Implementing the CASE Mechanical Systems in Agriculture (MSA) Curriculum?

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Abstract

Science, technology, engineering, and mathematics (STEM) applications have become increasingly more commonplace in school-based agricultural education (SBAE) settings in recent decades. Curriculum for Agricultural Science Education (CASE) programming has provided a practical outlet for STEM-focused, inquiry-based teaching and learning activities (Velez, Lambert, & Elliott, 2015). The Mechanical Systems in Agriculture (MSA) curriculum was recently field-tested nationally with several SBAE teachers. Framed within Rogers' (2003) diffusion of innovations theory, we studied six teachers' experiences when implementing the MSA curriculum throughout the 2018-2019 academic year. Using qualitative research methods, we conducted two one-on-one interviews with each SBAE teacher at different parts of his / her respective academic year. Data were coded in accordance with Merriam's (2009) recommendations. Four dominant themes emerged: (1) the journey toward innovation; (2) learning as you go; (3) logistical and implementation challenges; and (4) students' needs and preferences. Several prominent sub-themes emerged as well. Our findings highlight that although challenges existed, the MSA curriculum was suitable for enhancing the rigor and relevance of these teachers' agricultural mechanics curricula. We recommend MSA curriculum stakeholders collaborate to continuously improve its design and flexibility.

Introduction

Applications of academic content in school-based agricultural education (SBAE) have been studied extensively in recent decades. Parr, Edwards, and Leising (2006) noted teaching mathematics concepts contextually through agricultural mechanics content can positively impact student learning outcomes. Haynes, Robinson, Edwards, and Key (2012) suggested student learning of academically-focused content can be supported when taught through a practical, familiar context such as SBAE coursework. Parr, Edwards, and Leising (2008) reported contextually teaching mathematics via agricultural mechanics coursework "did not significantly diminish students' acquisition of technical competence" (p. 68). Moreover, agricultural teacher educators (Swafford, 2018), SBAE teachers (Stubbs & Myers, 2015), school administrators (Ulmer et al., 2013) and science teachers (Thompson & Warnick, 2007) see value in using SBAE to contextually teach academic concepts. SBAE teachers exhibit a degree of confidence with integrating biological science concepts within their coursework (Chumbley, Hainline, Russell, & Ruppert, 2019). As noted by Balschweid and Thompson (2002), SBAE teachers often have positive attitudes regarding teaching applied science content within their coursework. Such findings positively indicate value in, support for, confidence in, and attitudes toward addressing academic content within the context of SBAE do exist.

As SBAE has evolved in recent decades, the expectations for effective teaching practices have likewise been impacted. Effective SBAE teachers are knowledgeable in agricultural subject matter (Eck, Robinson, Ramsey, & Cole, 2019) and proactively, contextually teach academic concepts throughout their curricula (Roberts & Dyer, 2004). As greater calls for academic content application in the context of SBAE have been sounded, expectations have increased for teachers to respond (McKim, Sorenson, & Velez, 2016). Robinson, Westfall-Rudd, Drape, and Scherer (2018) posited about SBAE teachers' potential for effectively and robustly teaching academic content, opining that "[SBAE] teachers can lead the charge on STEM [science, technology, engineering, and mathematics] education, honing the innovative techniques and providing exemplars for best practices in the field of STEM education" (p. 263).

The integration of career and technical education (CTE) and core academic content can be a challenge for many CTE professionals (Drape, Lopez, & Radford, 2016). Quality professional development (PD) in programs such as the Curriculum for Agricultural Science Education (CASE) can help address these concerns. Sustained PD has shown to support STEM reform (Capraro et al., 2016). Previous research has shown high-quality teacher PD typically has statistically significant, positive effects on teaching practices and student outcomes (Darling-Hammond, 2010; Nadelson et al., 2013). Opportunities for active learning and continual growth add to the success of teacher PD (Guskey & Yoon, 2009; Smith & Smalley, 2018).

CASE curricula are designed to be an innovative and integrated approach to teaching and learning in SBAE settings. It is guided by an inquiry-based, scientific approach to teaching in SBAE programs (Velez, Lambert, & Elliott, 2015). This interdisciplinary curriculum allows teachers and students to learn complex systems within a familiar context. Understanding complex systems is a key skill to success in agricultural, food and natural resources (AFNR) education (Culhane, Niewolny, Clark, McConnell, & Friedel, 2016; McKim, Pauley, Velez, & Sorensen, 2018). McKim et al. (2018) found CASE certified teachers had slightly higher perceived science knowledge than non-CASE certified educators. CASE curricula have shown to be beneficial to teachers who are developing their innovative classroom (Velez et al., 2015). As the integration of core academic subjects into AFNR continues to be struggle for some educators, research into innovative programs like CASE continues to remain important.

CASE curricula development was initiated in 2007 under the direction of the National Council for Agricultural Education (CASE, n.d.c). CASE curricula adoption and use has continued to increase in recent years (CASE, n.d.a). Moreover, as a practical, science-focused, innovative educational resource that focuses on using inquiry-based learning to guide students in the learning process (CASE, n.d.c), recent expansions of CASE curricula to include agricultural mechanics content is timely. Agricultural mechanics content has a historical role in SBAE (Burris, Robinson, & Terry, 2005) and has traditionally included numerous areas, including small gas engines, building construction, welding and metal fabrication, and so forth (Hainline & Wells, 2019). Agricultural mechanics can serve as a natural, useful, suitable vehicle for providing contextually-focused instruction in core academic concepts (Parr et al., 2006).

Developed for field testing during the 2018-2019 academic year, the CASE Mechanical Systems in Agriculture (MSA) curriculum incorporates a wide range of agricultural mechanics topics within its design, including electrical systems, power equipment technology, structural

systems, and so forth (CASE, n.d.b). As such, it stands to reason examining how and why some SBAE teachers have elected to incorporate a recently developed, innovative, inquiry-based approach to teaching agricultural mechanics content is warranted. Perhaps understanding such reasons could be useful in charting the course for future innovative teaching practices for teaching agricultural mechanics content in SBAE programs.

Theoretical Framework

Rogers' (2003) diffusion of innovations theory, in particular the five stages (i.e., knowledge, persuasion, decision, implementation, and confirmation) in the innovation-decision process, guided our study. According to Rogers (2003), "diffusion is the process which (1) an *innovation* (2) is *communicated* through certain *channels* (3) over *time* (4) among the members of a *social system*" ([emphases in original] p. 11). These four main elements are applicable in every diffusion program (Rogers, 2003). Rogers (2003) described the diffusion of innovations as a social process where individuals mainly rely on subjective evaluations of other individuals to evaluate a given innovation. The communication channels impact at all stages of adoption.

In the context of our study, SBAE teachers (i.e., social system element) described their adoption and implementation experiences with the newly developed MSA curriculum (i.e., innovation element). SBAE teachers who provided feedback about their experiences with MSA training and implementation of the new curriculum were the first to adopt the aforementioned curriculum (i.e., time element). We also inquired about various influences which impacted the SBAE teachers' decision to adopt the new curriculum (i.e., communication channels element).

Based on the participant inclusion criteria for this study, all SBAE teachers who participated in our study had progressed to at least the fourth sequential stage (i.e., implementation) of the adoption process. However, Rogers (2003) noted every stage of the innovation decision process serves as a potential point to actively or passively reject the innovation. Evaluating the SBAE teachers' omnibus views of the MSA curriculum and associated training provide insight on the teachers' intentions to continue using the curriculum or possibly experience dissonance and choose to discontinue their adoption of the curriculum.

Purpose & Objectives

The purpose of our study was to explore the experiences SBAE teachers had when implementing the MSA curriculum in their respective programs. Our purpose was based upon the eight research questions that ultimately guided our study:

1) Why did SBAE teachers chose to implement the MSA curriculum in their programs?
2) How have SBAE teachers implemented the MSA curriculum in their programs?
3) What procedures do SBAE teachers use when preparing to teach the MSA curriculum?
4) What teaching approaches do SBAE teachers use when teaching the MSA curriculum?
5) What challenges / successes do SBAE teachers experience when teaching MSA curriculum?
6) How do SBAE teachers address fidelity of the MSA curriculum as they implement it?
7) What are SBAE teachers' future plans regarding teaching the MSA curriculum?

8) What, if any, changes to their professional practice do SBAE teachers plan to make or would like to make as related to CASE course implementation?

Our study aligned with Research Priority 2 of the American Association for Agricultural Education (AAAE) National Research Agenda (NRA): New Technologies, Practices, and Products Adoption Decisions (Lindner, Rodriguez, Strong, Jones, & Layfield, 2016).

Methods

Recruitment

Our study was initiated upon Institutional Review Board (IRB) approval. A recruitment e-mail containing information about the study, participation requirements and expectations, and a link to an electronic informed consent form was sent to all 13 teachers who attended the MSA CASE Institute (CI). Six teachers who were able to implement at least some portions of the MSA curriculum in their programs during the 2018-2019 academic year signed the electronic informed consent form and participated in our study.

About the Participants

Three teachers were male and three were female. A majority of the SBAE teachers taught in rural areas (n = 5) and had an average student enrollment of 136.50 (SD = 107.62) in their SBAE programs. The average years of SBAE teaching experience was 16.17 years (SD = 13.98), with an average of 6.08 years (SD = 4.84) of teaching experience at their present school. Regarding CASE certifications prior to engagement in this study, all teachers were MSA-certified and five teachers held certifications in other CASE curricula. Five teachers were certified in the Introduction to AFNR curriculum, three teachers were certified in the Agricultural Power and Technology (APT) curriculum, three teachers were certified in the Principles of Agricultural Science - Animal (ASA) curriculum, and two teachers were certified in the Natural Resources and Ecology (NRE) curriculum.

Data Collection

Data were collected via two electronic one-on-one interviews conducted with each SBAE teacher throughout the 2018-2019 academic year. Each interview session was audio-recorded. The initial interview with each SBAE teacher was conducted at least one month into the course(s) in which the MSA curriculum was being used. The second, follow-up interview was conducted during the latter half of the course(s) in which the MSA curriculum was being used. Some teachers' schools used year-long course schedules while others used semester- and trimester-long courses, thus impacting the timing of each interview. The timing of each interview was intentional, as we sought to grant each teacher enough time to adequately implement the MSA curriculum within their courses.

We developed and used two different semi-structured interview protocols to guide each one-on-one interview session (see Tables 1 and 2). The protocols were developed by the researchers and were designed to help elicit information about the teachers' experiences with

teaching using the MSA curriculum at differing points in time throughout their courses. In addition to the written list of items used for each interview, probing questions were also used. During each interview session, field notes were taken and were used in both the member check and data analysis processes.

Table 1

Items Used During the Initial Interview

Interview Items
Describe why you chose to implement the CASE MSA curriculum in your program.
Describe how you have implemented the CASE MSA curriculum in your program this year.
Describe your procedures for preparing to teach the CASE MSA curriculum.
Describe the teaching approaches you have used when teaching the CASE MSA curriculum.
Describe any challenges you have experienced when teaching the CASE MSA curriculum.
Describe any successes you have experienced when teaching the CASE MSA curriculum.
Describe the fidelity of the CASE MSA curriculum as you have implemented it thus far.
Describe your future plans regarding teaching the CASE MSA curriculum.
Based on your experiences thus far, describe any changes to your professional practice that you plan to make or would like to make as they relate to CASE course implementation.

The purpose of these second, follow-up interviews was to review information from the initial interview to ensure accurate representation and understanding of the information (i.e., member checking) and to better understand how the experience of implementing the MSA curriculum had evolved over time (see Table 2).

Table 2

Items Used During the Second, Follow-up Interview

Since the last time we spoke:
How have your procedures for preparing to teach CASE MSA curriculum changed?
How have your teaching approaches for the CASE MSA field test course changed?
What modifications do you plan to make to the CASE MSA field test course in the future?
How have challenges or successes you experienced with the MSA curriculum evolved?
How have your perceptions of CASE MSA fidelity evolved as you implemented it?
Based on your experiences, describe any changes to your professional practice that you plan / would like to make related to CASE course implementation broadly speaking.

The follow-up interview protocol also included background and demographic items (i.e., previous CASE certifications, teaching experience, school characteristics, and available facilities). We sent an e-mail to the six SBAE teachers who participated in the initial interview to help establish a time for the follow-up interview session. All six teachers participated in the follow-up interview. Each interview was independently transcribed and re-checked for accuracy.

Data Analysis

To promote trustworthiness of results, we employed established qualitative methods. As transcriptions were reviewed, responses were open-coded by each of us (i.e., researcher triangulation). The identified codes were compared and a master list of codes was created (Merriam, 2009). These codes were grouped using axial coding, categorized systematically, and informed by our study's purpose (Merriam, 2009). Transcriptions were reviewed and categories were refined, revised, and consolidated as analysis continued. Finally, primary categories or themes were named. The findings were cautiously analyzed, and statements were reviewed and synthesized before being finalized. Trustworthiness and reliability of data were established through our use of a research log and by peer review of data analysis (Creswell, 2013; Merriam, 2009).

Another important step we included was bracketing, which strengthened the trustworthiness of the study (Merriam, 2009). Regarding Merriam's (2009) recommendations for strengthening trustworthiness of our study, it was appropriate to discuss bracketing to identify any potential biases which could have been present based on our own experiences with SBAE prior to conducting this study. As authors, we each have differing and sometimes overlapping experiences related to the teaching and learning processes in SBAE. We are each former SBAE teachers and bring a wide range of backgrounds related to teaching and learning in agricultural education settings. Two of the researchers actively facilitate and hold CASE certifications.

Results

Four major themes and six sub-themes emerged from the interviews we conducted. The themes and sub-themes included *the journey toward innovation*, *learning as you go* (i.e., *learning with the students* and *experience prompts changes*), *logistical and implementation challenges* (i.e., *equipment and material requirements* and *program set-up as a restriction to implementation*), and *students' needs and preferences* (i.e., *successes* and *challenges*).

The Journey toward Innovation

The SBAE teachers who participated in the MSA field test course indicated their participation and desire to earn the MSA certification were associated with their desire to enhance the agricultural mechanics components of their respective SBAE programs. When asked about their motivation to implement MSA in their programs, Gary and Paul believed the curriculum would assist them in providing a stronger focus on STEM concepts and bolstering the rigor of their agricultural mechanics courses. Paul stated, "[i]t [MSA curriculum] is an exciting curriculum and it takes something which is thought of as 'dumb ag. mech.' and it brings out the technical side for the stuff to work." Gary felt some of the topics included in the MSA curriculum (e.g., robotics, electronics, and geographic information systems [GIS]) were very relevant and should be covered to align with 21st century agricultural mechanics topics.

Paul's motivation to implement the MSA curriculum was also linked to his desire to shift his agricultural mechanics course from teacher-centered learning to student-centered learning. Paul said, "I love the idea of being able to start one of the APPs, give them the stuff and let them go with it, and walk around and interact with the students and have those personal interactions." Gary noted he liked how the MSA curriculum "puts the kids in charge of their learning."

The teachers indicated they were also motivated to implement the MSA curriculum because they believed it provided students with industry-focused applications. When discussing engine tear-down and re-build activities, Julie questioned how the learning activities related to the skills and knowledge her students need to gain employment. Julie stated, “You can’t make money doing small engine repair, so we need to move away from traditional shop-based classes, and I want to teach them a skill and then let them apply it.” She also said she would “catch myself telling students to do certain things with engines, but I had nothing to apply it to.”

Julie noted the MSA curriculum implementation provides a foundation for talking about the new technologies and engineering concepts that underpin engine theory. She believed this transformation in curriculum and the way she teaches her small gas engine course will ultimately make her students more employable. With a similar sentiment, Paul indicated the MSA curriculum allowed students to explore scientific principles and gain a better understanding of “why they work the way they do.” Moreover, Paul felt the MSA curriculum topics aligned with skills needed to gain employment in emerging industries. Paul said his motivations to incorporate learning activities associated with robotics and 3D printing were tied to programming and manufacturing—career options he perceived to have growth in the future.

Learning as You Go

While the teachers were excited about the MSA curriculum and felt positive about the benefits it would have for their students, they grappled with the challenge of effectively implementing the curriculum and achieving some sense of competency related to the topics. The teachers indicated the MSA Institute (CI) allowed them to walk through the curriculum lesson-by-lesson, but when they were tasked with facilitating the lessons for their students, they were often learning or re-learning with their students. As a part of the teaching process, teachers also reflected on areas which they wish to improve in the next time they teach the MSA curriculum.

Learning with the students. Many of the teachers noted they felt like they became a learner along with their students when walking through the MSA lessons for the first time. Some of the teachers, such as Kate and Sue, claimed they do not have strong agricultural mechanics backgrounds, which forces them to read ahead to stay on-pace with their students. Sue revealed before using the MSA curriculum, her agricultural mechanics courses mainly focused on what she felt were fundamental concepts and skills associated with electrical wiring, welding, and woodworking. Sue noted she has learned from her students during some of the MSA lessons focused on small gas engines, structures, drafting and design, and robotics. Sue stated, “I don’t like to not know the answer so it has been kind of difficult for me. I am having to learn along with my students which has been a frustrating and humbling experience.”

Despite his 30 years of agricultural mechanics teaching experience, Gary indicated he struggled to keep up with some technology used in the MSA curriculum. Gary admitted he had limited computer-aided design (CAD) experience and struggled with the Onshape design software. His lack of background knowledge with CAD software drove him to rely on his tech-savvy students to make sense of the process. Gary explained he works closely with his students to help anticipate upcoming issues. Similar to Gary, John believed his students have taught him a lot about the course he did not know as a teacher. John teaches in a small school and only has

two students in his MSA-focused course, so when there is a MSA activity which requires three partners, he frequently takes on the role of a student.

Experience prompts changes. The teachers commonly noted their experience in the MSA CI and their experience with teaching the curriculum for their first time has provided them with insight on changes that they will make in the future. In regard to first-hand learning experiences in the CI, Kate indicated her learning experiences in the PD allowed her to pinpoint which concepts her students would struggle with they engaged with the MSA curriculum. In agreement with Kate, Gary noted his struggles in the CI associated with some topics gave him a grasp on the areas that his students would experience issues and frustrations with. Gary indicated he put extensive time into better understanding these concepts before introducing them to his course so he would be better prepared lead students thought the activities and projects. While Paul felt prepared to teach the MSA curriculum after his CI experience, he had a semester gap between the CI and the first time that he taught the curriculum. This presented to him the need to brush up on the material. When discussing his process of re-familiarizing himself with curriculum, he said, "[Regarding] the coding for the robotics…or 3D design principles, I will have to practice to keep sharp on because it is something if I don't use I will forget it."

Sue indicated her experience with using the engineering notebook at the CI has prepared her to teach about this aspect of the curriculum and that her notebook serves as a good reference for herself and her students. Sue stated, "I can tell them that I know what they are going through and I use it as an example for them to buy in to the process of using the notebook." Sue indicated she saw value in using the notebook, but after a few units she started to augment the way she used them in her course. For example, she indicated her students became frustrated with some of the redundancy between what they answered on worksheets and the entries they were required to make in the notebook. Therefore, she gives modified instructions to remedy this issue. Other teachers, such as Gary, Julie, and John, had strong opinions about the utility of the engineering notebook and either augmented its use or deleted it from the curriculum altogether. Julie noted she stopped using the notebook because it was too technical for her special needs students.

Aside from the engineering notebook, teachers made (or plan to make) some changes based on their specific needs. When asked about the extent to which he used the MSA curriculum with fidelity, Paul revealed there were some "modifications… I make and I know this is not the CASE way and it is not a lack of appreciation for what they do at CASE, but I have not stuck to the curriculum." In fact, Paul indicated the only MSA lesson he taught "as-is" was the building materials strength testing. In contrast, Gary was persnickety about following the curriculum as written, but he made some additions to assist his students. He noted he created a PowerPoint presentation with pictures of finished projects to serve as a guide for future students.

Julie, who mainly used the small gas engines portion of the MSA curriculum, noted she weeded through the unit and removed some things. She cut down on her use of demonstration videos, as she felt they weren't helpful. Instead, she went back and added some procedural items to add clarity. Unlike many of the other teachers, Julie had implemented the MSA curriculum twice, which gave her the opportunity to fine-tune the way she used the curriculum. One of her main reflections from the first time she taught it was she was still acting as the "authoritative teacher" and not as the facilitator. Julie explained, "I have changed my teaching approach by

being more hands-off. I have to let the student's problem solve on their own." She explained, "[t]his is what industry needs from workers, so my teaching strategies [are] to have them go over the purpose of the lab and then I have to be confident to let them go on their own."

The teachers also provided input on how they plan to change the structure of their own course curricula to better serve their students. Both Julie and Sue felt like the MSA curriculum could be broken down into multiple semesters. Julie mentioned she may break down the curriculum between two to three courses while Sue said, "I could see myself splitting this class into a Unit A and a Unit B. Like maybe units one through three in one year and four and five in another year." Sue also suggested that unit five could be separated into its own independent study course for students who need course credit but have schedules which restrict them from enrolling in SBAE courses. Gary is not planning on making any major changes to his teaching of the MSA curriculum; however, he saw value in alternating the CASE APT and MSA curricula every other semester. He believes the rotation will assist students with acquiring fundamental concepts in APT which they will apply in the MSA course the following semester.

Logistical and Implementation Challenges

Equipment and material requirements. The procurement and specificity of equipment and materials needed to teach the MSA curriculum served as an implementation barrier for the teachers. Julie indicated she was concerned with securing funding to implement MSA. She estimated the minimum it would cost for baseline supplies would be $14,000. While she received some grant funding, she was planning on submitting more grant applications to purchase supplies related to GIS, GPS [global positioning systems], and robotics. Sue was able to secure grant funding but had to hold off on buying some specialty supplies until she had received more funds. She also noted that she had to be creative with finding others to lend her supplies. Sue stated, "[r]ight now I am having to borrow three 3D printers from the middle school because I didn't have the money to do it. I am not against sharing these, but it would be nice to have our own."

Some teachers were successful in securing funding for supplies and equipment necessary to implement the MSA curriculum but they were experiencing difficulty with ordering supplies from vendors. Gary and Paul were working through these issues at the times of both interviews. Paul noted some specialty robotics equipment needed was exclusively produced by a small technology company that has a long turnaround. During the second, follow-up interview, Paul said it had been three months since he ordered these CASE-recommended supplies and he was still waiting to receive them. The specificity of the supplies used in the MSA curriculum served as an issue for teachers who had different supplies or textbooks. For example, Sue had engines for her students but they did not match up with the engine model used in the MSA curriculum. Since the MSA small gas engine unit was written for one specific engine type, the teachers without the same engines were forced to purchase new ones or re-write certain parts of the curriculum to accommodate the differences between engines. Another example of a required material is the textbooks which are used to supplement the curriculum. Gary was forced to use the textbooks his school already had and had to find additional resources to help his students.

Program set-up as a restriction to implementation. Along with the teachers' struggle to secure needed equipment, the teachers also indicated they faced programmatic roadblocks

when attempting to integrate the new curriculum in their programs. Paul explained because of state-mandated standards, he doesn't "have free reign to go whole hog on [his] CASE courses." He is a strong advocate of CASE and wishes he could find a better way to link the CASE with state mandates. Kate's concerns with the full implementation of MSA curriculum was its misalignment with co-curricular events. Specifically, she was concerned MSA would not prepare her students for the FFA Welding Career Development Event (CDE) in her state. John was restricted from teaching some MSA units due to overlap with another course at his school.

Other school-based programmatic barriers the teachers noted was the dispersion between the curriculum schedules predicated by CASE and their scheduled course duration in their local programs. For example, he struggled with implementing the year-long curriculum in his single-semester courses. John explained he only has 47 minutes per day for one semester and it was difficult for students to finish MSA activities. He had to find room to store partially-completed projects for the students to finish the following day. Additionally, John and Kate offered their schools' no-homework policies further exacerbated the issue with guiding students through the MSA curriculum. Julie indicated her nine-week course was way too short to implement the MSA curriculum with fidelity. She said that it took her students about three weeks to figure out that there might not be a right or wrong answer and she had to "modify everything so they weren't overwhelmed with the content. I need a few more years to train the students on using CASE before I remove the modifications." In fact, Julie noted some of her students had to come in on a day school was out because they didn't have their engines back together.

Sue also felt like the MSA curriculum took more time than what CASE prescribed. She tried to pay attention to the CASE timeframe, but a CASE two-day lesson took students four days to complete. She was also dealing with unique implementation challenges because she was also allowing her student teacher, who had no previous experience with CASE, to help teach MSA. Sue concluded her remarks by adding, "[w]e are on a seven-period day and I think if I was on a block schedule it would be easier for me to facilitate these lessons."

Students' Needs and Preferences

Successes. The teachers expressed one of the biggest successes of the MSA curriculum adoption was student "buy-in." Sue and Julie felt this curriculum reinvigorated their students' interest in agricultural mechanics content because it offered learning experiences outside the traditional agricultural mechanics model. Kate said her students took the course because they thought it was going to be a welding course and were surprised and excited to have a course which incorporated innovative activities. Sue noted her students were apprehensive at first but they found value in the MSA curriculum once they were immersed in learning.

Julie noted her students loved the new curriculum and it shifted her small gas engines course "from one where students were dumped into, into one which they want to be in." She also signified some of her students who had taken the course before MSA curriculum use had a desire to re-take the course with the new curriculum. Kate and John also said they had students which expressed an interest in taking or retaking the MSA-focused course based on how it linked to their interest. When asked about what specific MSA lessons were appealing to their students, the teachers provided a wide variety of responses. Gary's students loved the load-tested activity and

Kate's students loved the industry representatives activity. John said the tractor pull exercise was well-received by his students. His students liked the activity so much they exceeded the expectations of the lesson by re-engineering a robotic tractor in attempt to pull a 50-pound load.

The teachers felt the MSA curriculum helped their students to become autonomous. Sue offered, "[w]hen we were doing those [structural] beams, the fundamental parts on the structural systems weren't working out. I didn't have anything printed out to help them with pitfalls, so they had to just figure it out on their own." Sue noted, "[w]hile they were frustrated, they could peer-teach and figure it out and share with others. It was a blessing to have to have them figure it out on their own."

Kate noted when she assigned MSA curriculum group work, her students would work on their own and get back with their partners afterwards to compare results. Kate said MSA allowed students to problem-solve and work collaboratively. Sue and Julie noted the MSA curriculum has contributed to the success of students with learning disabilities. Sue stated the curriculum has "allowed some of my students who are not highlighted in academic area, they shine in here because they figure out some processes where they might not in other classes." Julie indicated this curriculum improved the problem-solving abilities of students with special needs.

Another student success associated with MSA was the learning and benefits of mastering the content extended well beyond the walls of the SBAE program. Kate felt the engineering reports the students completed in the MSA curriculum have helped students complete lab reports in other courses (e.g., chemistry and biology). She also reported her students' writing and math skills have improved based on the MSA industry-based applications. Paul and Sue provided examples of their students using MSA-inspired projects as entries for science fairs. Paul said he had students in the SBAE program and students in his student enrichment course who decided to develop science fair projects based on their experiences with the 3D printer. Sue noted she had one student conducting research on the impact of different octanes of gasoline on engine efficiency and two students researching load testing based on activates in the MSA curriculum.

Challenges. The teachers felt like the student-centered learning approach of the MSA curriculum also served as a challenge for their students. Paul indicated his students did not know how to handle the "student-driven side of the [MSA] curriculum." Paul noted his students wanted explicit instructions and did not like the open-ended style of learning. Sue's students also found it was challenging to follow the detailed instructions provided by CASE. To remedy this issue, she had her students read the instructions in groups and focus on the most vital points.

Kate indicated her students, who had not previously taken a CASE-based course, experienced frustration with the curriculum. She insisted the small gas engines portion of the curriculum needs to provide more background information to better assist students' comprehension of the procedures. Kate felt it was important to provide students with background information on tasks at hand to ensure success. Kate stated, "[d]uring the engineering part, the students didn't do very well because they didn't think though the concepts before getting to the report." Some students in the MSA-focused courses perceived the curriculum to be too rigorous. John explained, "[i]t's tough. If students don't think they will be good at it, they give up right away." While John agreed that using the MSA curriculum enhanced the rigor of the agricultural

mechanics program, he believed some student resistance was a product of his program's culture. Specifically, students complained about the intensive writing assignments and were resentful because the writing expectations were greater than those in other agricultural courses.

Conclusions, Discussion, & Recommendations

Following the three key components of Rogers' (2003) diffusion of innovations theory (i.e., the concept of social systems, the idea of compatibility of innovative ideas, and the categorization of early adopters), we found the MSA curriculum can serve as an innovation that lends itself to adoption. The compatibility of combining agricultural mechanics subject matter with real-world, problem-based learning in the classroom was seen to be innovative and adoptable by participants. Participants identified a primary social system of learning with the students and approaching the MSA curriculum lesson-to-lesson as a positive towards adoption. The teachers who were early adopters modified the curriculum as needed to reach the educational goals of their agricultural mechanics courses. These modifications primarily focused around challenges faced with equipment and material costs.

By virtue of the field test status of the MSA curriculum, the teachers in our study are considered early adopters per Rogers (2003). This trend of early adoption was evidenced by the teachers' CASE certifications prior to undertaking the MSA curriculum. While these teachers expressed a willingness to attempt something new within their agricultural mechanics courses, there were some lingering questions about their future use of the MSA curriculum. Hesitations to re-use the MSA curriculum were expressed along with others' plans to continue adapting the curriculum to identify the most appropriate fit into their agricultural mechanics courses. As such, these teachers can be considered to be in the *Decision*, *Implementation*, and *Confirmation* stages of Rogers' (2003) model of the five stages in the innovation-decision process.

The challenges these teachers expressed (e.g., students' reluctance to engage, cost of materials, etc.) were consistent with other research focused on the use of CASE in SBAE settings (Lambert, Velez, & Elliott, 2014). Particular to the MSA curriculum, however, was the tailoring of the small gas engines unit was so particular that teachers who did not have the engines originally used in the MSA curriculum materials were forced to augment their curricula and adjust the depth of the MSA experience for their students. We recommend this issue be addressed by modifying MSA content to be adaptable to other engine types and sizes.

Regarding research, we recommend additional studies be undertaken to further explore the use of the MSA curriculum within SBAE programs. These studies should be qualitative and quantitative in nature and should focus on factors specific to teachers, such as deeper exploration into challenges associated with the MSA curriculum and how teachers overcome adversity and become resilient when trying something new. Studies should also examine factors related to students, such as academic and technical subject matter knowledge retention over time, cognitive engagement in MSA curriculum activities, and perspectives on learning STEM applied through agricultural mechanics courses. Additional research addressing how employing the MSA curriculum within SBAE programs over time impacts stakeholders' perceptions of agricultural mechanics courses would be useful as well. Greater understanding of each of these topics will yield insight into how future MSA curriculum deployment should occur.

We further recommend MSA stakeholders collaborate to continuously modify the MSA curriculum to reflect the changing needs of teachers and students. The teachers in our study were, for the most part, positive about the opportunity to continue using the MSA curriculum as a method to advance the scientific focus of their agricultural mechanics courses, thereby helping to drive home innovation within their program structures. MSA has potential to help further mold the agricultural mechanics instructional philosophies of these teachers. Further refinement of the MSA curriculum could have profound impacts for future adoption by others. Robinson et al. (2018) noted SBAE teachers could positively contribute to STEM education. Innovations begin within the initial step of recognizing that making changes to current practices can create lasting benefits for the future (Rogers, 2003).

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First-year Agriscience Teacher Personal Resilience and Well-being

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Abstract

In this mixed methods study, quantitative data on demographic characteristics, personal resilience, and well-being were collected from first-year agriscience teachers. In the qualitative portion of the study, semi-structured interviews were conducted with four first-year agriscience teachers. On the quantitative measures, respondents had low to moderate levels of resilience across the seven dimensions of personal resilience. Mean well-being scores ranged from moderate to high for the 14 indicators of well-being. Six major themes emerged from the interview data: needing support, shortage of resources, heavy workload, student impact, staying motivated, and time for self. Childhood and adolescence experiences provided useful insight into the respondents' personal resilience and well-being scores. Agriscience teachers should proactively manage their resilience levels and become aware of the impact of personal resilience and well-being on their capacity and motivation for effective teaching. In addition, students graduating from agriscience teacher education programs should be well versed in mindset, personal resilience, and well-being and understand how these constructs can be operationalized in their teaching.

Keywords: mindset, personal resilience, hardiness, well-being, agriscience teacher

Introduction

Public school teachers endure high scrutiny and judgment from numerous sources, particularly policy makers and the strict regulation that accompanies these policies. Low levels of satisfaction with educational quality have become common in the United States (Gallup, 2018). Teachers are largely held accountable for educational quality and often face heavy blame when schools or students underperform (Ingersoli, Sirinides, & Dougherty, 2018). Teachers must adhere to governmental policies and requirements for standardized testing, yet many teachers feel the heavy emphasis on testing is counter to what they believe is best for their students (Glazer, 2018). Correspondingly, students have shifted their focus to simply passing tests at the expense of deeper learning. Additionally, the teacher accountability system has added increased pressure on teachers. (Glazer, 2018).

Across grade levels, teachers face a lack of autonomy. They often receive insufficient administrative support and face tight scrutiny in the beginning stage of teaching (Glazer, 2018). Some districts have adopted the practice of terminating non-tenured teachers at the end of each school year and rehiring them after all tenured teachers have been reappointed. This practice leaves beginning and new teachers with little job security or stability (Glazer, 2018).

Teaching, in general, has been classified as one of the most stressful careers in the 21st century (Kyriacou, 2000). High levels of stress lead to burnout, and burnout can lead to physical, mental,

and psychological exhaustion (Byrne, 1998). Dissatisfaction with other educators, personal strain, work overload, and lack of self-care contribute to teacher stress (Chenevey, Ewing, & Whittington, 2008) and burnout (Brouwers & Tomic, 1999).

Teacher stress may be even more intense for agriscience teachers. These teachers typically have additional responsibilities associated with teaching and managing their school-based agricultural education program. These expectations, compounded by the already stressful nature of teaching, may contribute to attrition among agriscience teachers (Brouwers & Tomic, 1999).

School leadership and classroom teaching have been shown to be inherently stressful (Birkbeck, 2011). High levels of stress can result in ineffective educators. However, personal resilience has been shown to aid in maintaining teacher well-being (Day & Gu, 2014). Teachers across disciplines have shown resilience throughout their daily professional lives, even as their capacity for resilience has risen and fallen. Resilience is not an innate or fixed trait but is instead multi-dimensional and dynamic in its development (Day & Gu, 2014; Beltman, Mansfield, & Price, 2011). However, resilience is unique to the individual (Luthar, Cicchetti, & Becker, 2000).

Teachers develop relationships that can contribute to and influence their resilience over time (Palmer, 1998). Those who establish trust and connection with their students have long-term job satisfaction, contributing to positive well-being. Relationships with other teachers are crucial to the development of collaborative learning and support (McCallum & Price, 2010). Further, teacher relationships with administration influence teacher retention and effectiveness (McCallum & Price, 2010). Thus, personal resilience is a critical dimension of teacher retention and well-being.

Theoretical/Conceptual Framework

The theoretical framework for this study was based on the General Scales of Well-Being (GSWB) developed by Longo, Coyne, and Joseph (2017); Positive Psychology Framework of Well-Being (Seligman, 2018); personal resilience, as described by Hoopes (2017); hardiness, as presented by Maddi (2013); and mindset, as outlined by Dweck (2016).

Longo, Coyne, and Joseph (2017) identified fourteen common factors as lower-order indicators of well-being. These indicators include *Happiness*, *Vitality*, *Calmness*, *Optimism*, *Involvement*, *Self-awareness*, *Self-acceptance*, *Self-worth*, *Competence*, *Development*, *Purpose*, *Significance*, *Congruence*, and *Connection*. Seligman (2018) suggests that well-being is personal to the individual but additionally encompasses the environment, interactions, and external influences that the individual experiences.

Hoopes (2017) described resilience as the "ability to deal with high levels of challenge while maintaining or regaining high levels of effectiveness and well-being" (p.1). Personal resilience is comprised of seven dimensions, or "muscles," which include *Positivity*, *Confidence*, *Priorities*, *Creativity*, *Connection*, *Structure*, and *Experimenting* (Hoopes, 2017). Personal resilience is not a fixed trait, is needed to effectively confront difficult situations, and can be strengthened through intentional effort (Hoopes, 2017).

Maddi (2013) defined hardiness as a pattern of attitudes and strategies that constitute the courage and motivation to turn stressful circumstances into growth opportunities.

Mindset reflects how individuals approach life and their beliefs about individual development, knowledge, and growth. Simply stated, mindset is one's view of oneself (Dweck, 2016). Dweck distinguished between two mindsets: fixed and growth. Growth mindset is the belief that one's most basic abilities can be developed through dedication and hard work. This view leads to a desire to learn and, therefore, a tendency to embrace challenges, persist in the face of setbacks, see effort as the path to mastery, learn from criticism, and find lessons and inspiration in the success of others (Dweck, 2016). A fixed mindset, on the other hand, is the belief that basic characteristics, like intelligence, are fixed. This view leads to a desire to look smart and, therefore, a tendency to avoid challenges, ignore useful constructive feedback, and feel threatened by the success of others (Dweck, 2016). Although Dweck differentiated mindset as either fixed or growth, these are simply the extremes of a continuum. Mindsets are malleable, and a growth mindset can be taught. Continuous progression towards a growth mindset is based on life experiences, perceptions, and learning (Dweck, 2016).

Research has shown a positive relationship between a growth mindset and psychological well-being. In a study involving 1260 primary and middle-school students (Zeng, Peng, and Hou, 2016), data were collected on personal resilience, psychological well-being, growth mindset, and school engagement. Based on the findings, the researchers concluded that high levels of a growth mindset correlate with high levels of psychological well-being. The authors concluded that a growth mindset is the primary foundation for developing and achieving well-being.

Stress can lead to teacher burnout, and this issue has become pervasive in education (Chenevey, et al., 2008). Hardiness allows individuals to remain optimistic and manage stressful situations effectively (Kaur & Sachdeva, 2017). A study was conducted to assess the effect of burnout and personal hardiness on organizational stress. A total of 524 secondary school teachers from both private and public schools were included in the sample. The Organizational Ross Stress (ORS) tool, the Maslach burnout inventory (Maslach & Jackson, 1986), and the personal hardiness scale (Maddi, 2013) were used to collect data. Kaur and Sachdeva concluded that a significant interaction exists between personal hardiness and organizational stress and between personal hardiness and burnout. Hardiness enrichment can aid in the development of effective teachers and can create a more supportive and fulfilling teacher work environment (Kaur & Sachdeva, 2017).

Unmanaged stress can impact well-being and dampen personal life enjoyment, job satisfaction, performance, and personal health (Thieman, Marx, & Kitchel, 2014). Expectations of public-school teachers have continued to rise, and, in turn, stress levels, burnout, and attrition have increased (Thieman, et al., 2014). With strong resilience, educators are able to manage and overcome stressful situations (Thieman et al., 2014). A study in 2011 examined the relationship between resilience, job performance, motivation, stress, and coping behaviors of preservice agriscience teachers. Data were in the form of interviews with student teachers, field notes, and journal entries. Three themes emerged from the data: youth experiences are a key component toward reflection on resilience, the reality of the job can compromise resilience, and the belief that one is doing a good job is key to resilience in teaching (Thieman et al., 2014).

Prompted by calls to reduce teacher stress, Sorensen, McKim, and Velez (2016) conducted a national study on agriscience teacher work/family balance and job satisfaction. Results suggested that secondary agriscience teacher work/family balance is important in overall teacher well-being. However, only moderate levels of work/family balance were reported. In an exploratory case study approach involving 52 early career agriscience teachers, Traini, Claflin, Stewart, and Velez (2019) found that teacher success and balance in life are not compatible in the eyes of teachers, and teaching agriculture brings feelings of guilt, judgment, fear, and pressure.

A conceptual model, based on the key tenets in the theoretical framework, was developed to guide this study (see Figure 1). Although the elements of this model are specific in their support of teacher capacity to confront challenges in teaching, they are also interconnected.

This study addresses Research Priority Area (RPA) 3 of the American Association for Agricultural Education (AAAE) National Research Agenda. RPA 3 focuses on preparing a scientific and professional 21st century workforce and calls for research on methods, models, and practices that are effective in recruiting and supporting teachers and other professionals at all stages of their careers (Stripling and Ricketts, 2016).

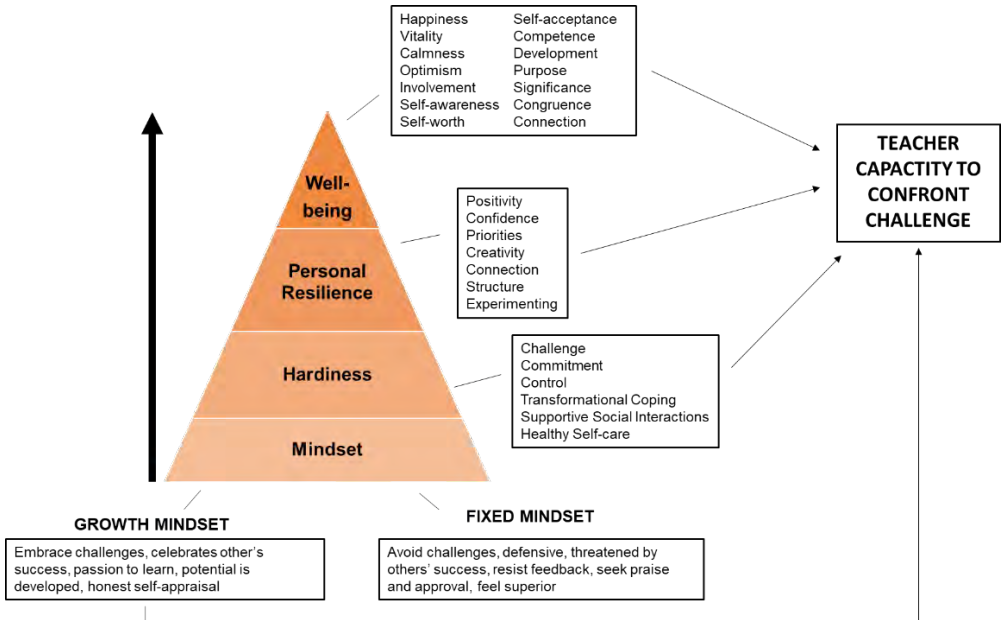

Figure 2-2. Conceptual Model of Teacher Capacity to Confront Challenge (Sources: Dweck, 2016; Day & Gu, 2014; Hoopes, 2017; Maddi, 2014; and Longo, Coyne, & Joseph, 2017).

Purpose and Objectives

The purpose of this study was to examine the personal resilience and well-being of first-year agriscience teachers in Florida. The objectives of the study were to (1) identify the professional and program characteristics of first-year agriscience teachers, (2) describe the personal resilience and well-being of first-year agriscience teachers, (3) examine the relationship

between personal resilience and well-being of first-year agriscience teachers, and (4) identify themes that contribute to personal resilience among first-year agriscience teachers.

Methods

We used a mixed methods sequential design to conduct this study (Ivankova, Creswell, & Stick, 2006). This design was selected because the quantitative data obtained from three instruments guided the research team in developing the teacher interview protocol. We used phenomenology as our approach to the qualitative portion of this research. Phenomenological studies rely on the assumption that multiple realities are rooted in subjects' perspectives. Each individual experiences an event differently. Semi-structured interviews are primarily used to elicit subjects to share their thoughts and feelings related to certain experiences. Phenomenological studies examine what the experience means to the individuals (Ary et al., 2010).

Population

This was a census study of the 49 first-year agriscience teachers in Florida at the beginning of the fall 2018-19 school year. Teachers were identified by contacting county career and technical education coordinators, reviewing postings shared over the state's messaging system, and directly communicating with schools. Four teachers were eliminated from the original list after discovering that they were in their second year of teaching. Fourteen teachers completed the study. External events that occurred in the fall 2018 semester prevented many teachers from participating in the study. Hurricane Michael impacted many schools, especially in the Panhandle.

Instrumentation and Data Collection

The University of Florida IRB Office approved the research protocol prior to beginning the study. Data were collected from agriscience teachers in Florida using both quantitative and qualitative techniques. All identified teachers were invited to participate in the study by email, an announcement at a new teacher workshop hosted by the state agriscience teachers' association, and direct mail letters. Respondents completed a well-being questionnaire, a demographic questionnaire, and the Personal Resilience Questionnaire (PRQ), available from Resilience Alliance, Inc., at the beginning of their first year of teaching. We contacted the selected teachers with an initial email in August introducing the study, followed by a postcard inviting their participation. Paper copies of the well-being instrument and demographic questionnaire were mailed one week later, along with instructions for accessing the online PRQ. We sent three email follow-ups over the next four weeks. Individual interviews were conducted with four teachers over a span of four weeks in November and December. These interviews were held at the teacher's school, with each lasting approximately 50 minutes.

Responses to the 75-item Personal Resilience Questionnaire were used to create a personal resilience profile, which was generated by Resilience Alliance, Inc. Using a sample of 50,000 cases, the internal consistency of the seven sub-scales that comprise the PRQ was estimated in a study conducted by Resilience Alliance, Inc. Cronbach's alpha coefficients for each of the seven dimensions of resilience were reported as follows: *Positivity* (.83), *Confidence* (.81), *Priorities*

(.82), *Creativity* (.71), *Connection* (.74), *Structure* (.68), and *Experimenting* (.65) (Resilience Alliance, 2010). The PRQ gauges an individual's resilience strengths and weaknesses in these seven dimensions of resilience (Hoopes, 2017). An individual's resilience strength in each of the seven areas is shown as a percentile score, based on a national norm group of more than 100,000 cases.

We developed the 14-item well-being questionnaire used in this study, based on the 14 indicators of general well-being, as identified by Longo et al. (2017). Participants rated their current state of well-being, as represented by the 14 statements, using a five-point, Likert-type scale with a range from (1) strongly disagree to (5) strongly agree. This questionnaire was further examined through the use of a pilot study. Paper questionnaires were mailed to 38 purposively selected agriscience teachers in Florida with one or more years of experience. These included experienced agriscience teachers and officers of the state agriculture teachers' association. The mailed questionnaires were accompanied by return envelopes, and 14 responses were received. Reliability statistics were run in SPSS, and Cronbach's alpha was determined to be .80 for the well-being scale.

A 31-item questionnaire was used to gather demographic data, including specific information regarding participants' teaching. Teachers were asked about their school's FFA membership, their school's facilities, the number of courses they taught, their degree(s), their history and connection to agricultural education, and the financial and professional support that they received for their program. The questionnaire used a variety of question formats, including multiple choice, text boxes, and single-choice responses. An expert panel of four agricultural education faculty members reviewed the researcher-designed demographic instrument for validity. Each faculty member had experience teaching in a middle or high school agriculture program, as well as experience in agriculture teacher preparation programs. The panel reviewed the survey for wordiness, clarity, balance, use of jargon, and completeness and also evaluated the effectiveness of the questions in obtaining the desired data.

Semi-structured interviews were conducted with the use of an interview guide. The interview guide was researcher designed and included five sections designed to obtain data on specific aspects of the teacher's personal resilience. The sections were current situation, challenging circumstances and how you have responded, life/career aspirations, childhood/adolescent experiences and home life, your personal resilience profile, and summary comments and other thoughts. The guide had varying numbers of questions and sub-questions within each section.

Data Analysis

Data were analyzed using IBM SPSS© version 24. The individual personal resilience profiles of respondents generated by Resilience Alliance, Inc. included percentile scores for each of the seven resilience dimensions. A summated score was calculated for the 14-item well-being questionnaire. We used Pearson correlations to examine the relationship between well-being and personal resilience. Transcriptions of the audio-recorded teacher interviews were checked for accuracy by the researchers and individual teachers. Two researchers independently coded the interview transcripts and identified the themes that emerged across the four interviews. Key

ideas, sub-themes, and main themes were discussed among the two coders at length until consensus was reached (Lombard, Snyder-Duch, & Bracken, 2002; Tracy, 2010).

Results

Professional and Program Characteristics of First-year Agriscience Teachers

Of the 45 teachers included in the study, 14 completed all survey instruments. Respondents were mostly female (*f* = 13, 93%), white (*f* = 14, 100%), not married (*f* = 10, 71%), and did not hold a bachelor's degree in agricultural education (*f* = 12, 86%). Nearly three-fourths of the respondents (*f* = 10, 71%) held a temporary teaching certificate. Most of the respondents were previously FFA members before becoming an agriculture teacher themselves (*f* = 9, 64%). Half of the participants taught in single-teacher agriculture programs (*f* = 7, 50%). Agriculture student program enrollment varied from 65 to 438 students, and FFA membership ranged from 0 to 120 members. A majority of the participants did not have an assigned mentor (*f* = 8, 57%) and did not have an active FFA Alumni chapter at their school (*f* = 8, 57%). Most of the participants had an active land lab (*f* = 12, 86%).

Personal Resilience and Well-being of First-year Agriscience Teachers

In consultation with Resilience Alliance, Inc., percentile scores for each of the seven resilience muscles were interpreted using the following guide: low $\leq$ 35, moderately low = 36-44, moderate = 45-54, moderately high = 55-64, and high $\geq$ 65. For the group of 14 responding teachers, on average, the strength of the *Positivity* muscle was found to be moderately low (*M* = 40, SD = 27), *Confidence* was moderate (*M* = 46, *SD* = 27), *Priorities* was moderately low (*M* = 37, *SD* = 28), *Creativity* was low (*M* = 32, *SD* = 22), *Connection* was moderately low (*M* = 39, *SD* = 29), *Structure* was moderate (*M* = 49, *SD* = 31), and *Experimenting* was moderate (*M* = 47, *SD* = 24). Although none of the resilience muscles for this group of teachers was found to be moderately high or high, on average, the strongest resilience muscles were *Structure*, *Experimenting*, and *Confidence*. The weakest resilience muscles for this group were *Creativity*, *Priorities*, *Connection*, and *Positivity*. We used a parallel guide for interpreting summative resilience scores as follows: low resilience $\leq$ 245, moderate resilience = 246-454, and high resilience $\geq$ 455. The summative resilience score for the respondent group was moderately low (*M* = 290; *SD* = 103). The overall resilience scores of the 14 respondents ranged from a low of 153 to a high of 517, with a possible range of 7 to 693.

Means for 12 of the 14 indicators of well-being were considered in the moderate to high range. The other two indicators, *Significance* and *Purpose*, had means of 4.6 and 4.5, respectively, placing them in the very high well-being category (see Table 1). *Happiness*, *Optimism*, *Self-awareness*, and *Congruence* were also among the highest scoring indicators. *Vitality*, *Calmness*, and *Self-acceptance* were the lowest scoring indicators. With a possible range of 14 to 70, the summative mean well-being for this first-year teacher group was considered to be high (*M* = 53.0, SD = 7.1), on a scale of ranging from very low to very high, based on the interpretive guide used by the researchers.

Table 1
Means and standard deviations of first-year agriscience teacher well-being indicators

Indicator	Description	*Mean*	*SD*
Happiness	Feeling happy and cheerful	4.07	1.07
Vitality	feeling energetic/full of energy	3.00	0.79
Calmness	Feeling cam/relaxed	3.00	0.95
Optimism	Being optimistic and hopeful	4.00	0.68
Involvement	Feeling completely involved in what you do	3.86	1.03
Self-awareness	Being in touch with how you feel	4.07	0.92
Self-acceptance	Accepting yourself the way you are	3.50	1.02
Self-worth	Liking yourself a lot	3.64	1.01
Competence	Feeling highly effective at what you do	3.62	0.87
Development	Feeling that you're consistently improving	3.93	0.83
Purpose	Having a purpose and mission in life	4.50	0.65
Significance	Feeling that what you do is important and worthwhile	4.64	0.63
Congruence	Feeling that what you do is consistent with how you see yourself	4.43	0.51
Connection	Feeling close and connected with the people around you	3.85	0.99
Summation		53.42	7.14

Note. n = 14. Individual well-being: very low = 1.00-1.49; low = 1.50-2.49; moderate = 2.5-3.49; high = 3.50-4.49; and very high $\geq$ 4.50. Summative well-being: very low = 14-20; low = 21-34; moderate = 35-48; high = 49-56; very high = 57-70. Low resilience $\leq$ 245, moderate resilience = 246-454, and high resilience $\geq$ 455.

Relationship between Personal Resilience and Well-being of First-year Agriscience Teachers

Using the convention recommended by Davis (1971), we found a significant, positive, and substantial relationship between the summative score for personal resilience and the summative score for well-being for this group of first-year agriscience teachers (r = .65, p <.001).

Themes that Contribute to Personal Resilience among First-year Agriscience Teachers

Theme 1: Needing Support.

Each of the teachers faced isolation in her teaching. Three of the four teachers were in single-teacher programs and lacked sufficient support. Each of the four teachers reported hesitation and discomfort in reaching out for help. They felt insecurity about needing help in their teaching, and one teacher experienced unprofessional behavior from her co-teacher, as well as her administration. She said,

> *I have one specific administrator who's very tough on me, and anytime he comes around my kids I just know that he always picks on me. It's hard to deal with that and know that he's always doing that, and I'm being treated like a child.*

Each of the teachers faced harsh criticism from parents, as one teacher stated,

> *I would say the biggest challenges come from parents. Those that are involved in FFA, they want what they want, which is not always the same thing I want, and they'll talk behind your back. They'll talk poorly about you to the principal.*

However, the teachers did not lack support entirely. One of the teachers relied on her community members and family to assist in supporting her agriculture program. Additionally, two of the teachers

expressed being very supported by their principals. One teacher said, “When it’s your first year of teaching and you get called to the principal's office, it really terrifies you, but she's super excited and loves it and is always positive, which really helps, because that's the big boss.”

All four of the teachers reported having influential people in their lives – “champions” who encouraged and supported them. These people offered positive and reassuring messages about who they were and what they could do with their lives. These champions were especially impactful for those who faced significant family dysfunction during the formative years.

Theme 2: Shortage of Resources.

Each of the teachers faced financial challenges within their program. At the time of the interview, one teacher was still facing extreme financial hardship at her school. All four reported having some sort of challenges with their facilities and/or equipment. However, one teacher came into a program with facilities in complete disrepair. The animals were malnourished and much of the equipment did not work properly. One teacher at the time of the interview had been trying to get water for her classroom for months. She said, “I got this job in April or May of last year and started asking for water [in my classroom] then. I was hoping it would be ready to go by the time the school year started in August.”

One of the schools was located near an orphanage and also served hearing impaired students in the county. Many students in this school faced financial hardship. However, by reaching out through her social media account, the teacher was able to secure funds her program and sponsor FFA participation costs for selected students.

Theme 3: The Never-ending Workload.

All four teachers reported feeling overwhelmed in their first year of teaching. They each faced difficulty in handling their workload at various points throughout the year. Two teachers reported having difficulties sleeping, due to responsibilities and racing minds. One said,

> *Well-being, that’s where it gets a little tougher. I did cry once. I think it was on like my third week of school because I'm also the swim coach. With FFA stuff and swimming I was, just… I got home on a Wednesday at 11pm and I just cried.*

Theme 4: Student Impact.

Each of the teachers reported being influenced and motivated by her students. One was able to reach students and engage them when they had been struggling to remain engaged in their other coursework. This boosted her confidence. This teacher enjoyed working with and learning from youth every day. Another teacher was also very inspired by her students. She said, “It’s the kids that are with me now, they are the ones that are my why now. The five months they have been in Ag has had a huge impact on them.”

Although each of the four teachers was focused on her students’ experiences and their learning, student discipline was reported to be an issue among three of the four teachers. One teacher, who had over 20 years of teaching experience in another subject, reported she was well-versed in classroom

management. However, another teacher struggled with some of her students' behaviors. She said, "…classroom disruption is a lot of what my challenges are. Cell phones are one, obviously, and some days it's kind of pick your battles."

Theme 5: Staying Motivated and Committed.

Three of the teachers were not originally interested in being teachers. One teacher was originally interested in a different field but switched to pursue education during her college career. Another teacher wanted to strengthen her program and then pursue graduate school. She said, "I really want to stay [at this] school long enough to build the Ag program back up and get it where it should be and then wrap it up in a box with a bow and give it away."

One teacher was dedicated to continually growing and developing her skills as an agriculture teacher. She described the importance of learning how to repair her own facilities and machinery. She said, "I don't know how to do it, but you know, I want to learn because if I tear up something, I hate to call everybody to help me fix it. I want to learn."
One of the teachers lacked commitment to teaching and was actively seeking alternative employment. Although another teacher was struggling with her teaching position, but she believed she was teaching for a larger purpose. She said, "Even though I don't want to be a teacher right now, there's a reason why I applied for this job. And it just happened to pop up as soon as I was looking." Despite the challenges they faced, all four teachers tried to remain positive about their teaching. One said, "even though you go through struggles, it's definitely worth it." Another said she didn't realize that she would develop such a close relationship with her students.

Theme 6: Finding Time for Self-care.

Due to the heavy workload of an agriscience teaching position, coupled by individual experiences, each of the teachers expressed having challenges keeping up with adequate self-care. Two of the teachers reported difficulty sleeping, and one reported having to turn to sleep-aids. One teacher initially struggled to keep her home life and her work life separate. However, she began dedicating one day a week to spending time for herself. Another teacher described that on certain days she needsto step back from her responsibilities and focus on herself. She said, "Some days I go home, and I just need to eat supper, get a bath and go to bed, because I'm exhausted." Another teacher said, "There's just some days I shake my head and think why do I this, because I'm exhausted."

Conclusions, Implications, and Recommendations

School and life experiences during adolescence provide a beginning base for the personal resilience, well-being, and motivation of first-year agriscience teachers. In this study, the home environments of the interviewed teachers ranged from loving and supportive to highly dysfunctional. In a stable and loving home, children learn about themselves, explore their interests, and simply experience the immaturity associated with childhood. In contrast, in a dysfunctional home, this nurturing lifestyle is not provided. However, individuals who face adversity at a young age may develop a more heightened awareness of resilience and what it takes to overcome challenges and succeed in life. Messages that children and adolescents receive from others impact the development of their views of

themselves and their perceived potential in life. If children receive negative messages and are degraded, they will be prone to self-doubt. These messages are especially influential if they are from meaningful individuals in the child's life – both family and non-family members. As demonstrated by Dweck (2016), one's mindset (growth or fixed) is significantly shaped by these environmental factors.

Teachers interviewed in this study reported having close relationships with numerous teachers at some point during their high school years, viewing their teachers as mentors and motivators. However, they also viewed some of their non-agriculture teachers as bullies who were harmful to their self-esteem and development. Most agriscience teachers have experienced agriculture themselves and were influenced by their relationship with their agriscience teacher(s). Their perceptions of their past agriscience teacher's personal resilience and successes or failures may contribute to the development of their own personal resilience.

First-year agriscience teachers face many significant challenges in teaching, including lack autonomy, support, and understanding, not only from school administrators and their peers, but also from their students and the parents of their students. Teachers often feel unappreciated and are forced to conform to the expectations of those within and outside the school (Gallup, 2018; Ingersoli, Sirinides, & Dougherty, 2018). However, agriscience teachers who experience positive connection and support from peers and administrators are more resilient (Day and Gu, 2014).

Beyond challenges associated with support and understanding, agriscience teachers also face issues involving finances, resources, and other physical constraints. Additionally, agriscience teachers lack adequate time for self-care and for personal time. Teachers in this study often remained at their school long after other teachers to maintain facilities and provide additional support for the FFA. This inability to focus on oneself may, over time, contribute to a decrease in overall well-being and ultimately affect a teacher's motivation to teach.

First-year agriscience teachers often face isolation in their teaching which, in general, is counter to high levels of personal resilience and well-being. The phases of the first year of teaching are anticipation, survival, disillusionment, rejuvenation, reflection, and anticipation (Moir, 1990). Many agriscience teachers face a deep and extended period of survival and disillusionment during their first-year of teaching. This may be due to the isolation that often accompanies agricultural education because of single-teacher programs, separate or distant teaching facilities, and the many extra responsibilities associated with providing a high-quality instructional program.

In this study, only one of the 14 participants had overall high resilience. Respondents, on average, had moderately low levels of resilience, and none of the seven resilience dimensions were in the high or very high range. Teacher workload and isolation may be primary contributors to lower personal resilience among first-year agriscience teachers and may negatively impact the resilience of other agriscience teachers, as well. In addition, resilience is substantially and positively associated with well-being. In this study, the lowest scoring indicators of well-being were *Calmness* and *Vitality.* This supports the common perception that agriscience teachers often are overwhelmed and unsupported during their first-year of teaching. *Calmness* relates to serenity and peacefulness. *Vitality* is a feeling of energy and livelihood. During their survival period, first-year agriscience teachers are often overwhelmed and lack energy. In this study, the highest scoring well-being indicators were

Significance and *Purpose*. Although first-year agriscience teachers face challenges with maintaining their resilience and well-being, they are still positively impacted by what they are doing.

Given the significant challenges faced by first-year agriscience teachers, the role of background school and life experiences in shaping the foundations of personal resilience and well-being, and the conceptualization of teacher capacity to confront challenges in their teaching, as presented in this work, preservice and practicing agriscience teachers should become well attuned to their own personal histories and deeply aware of the constructs addressed in this research. A continuing focus on developing and maintaining a growth mindset, personal resilience, and well-being may position agriscience teachers for greater success in their first year of teaching.

Regarding teacher preparation, honest and open conversations about the stresses of teaching should be held with pre-service teachers. The curriculum for teacher preparation should include personal resilience, growth mindset, hardiness, and well-being. Faculty members and those supporting agriscience teachers in the field should be well versed and well attuned to the constructs of well-being, personal resilience, growth mindset, and hardiness and how they can be operationalized in teaching. In addition, these faculty members should model high levels of awareness and support when working with their students to help them develop supportive, attuned, and nurturing interactions with the middle/high school students they teach.

Based on the findings of this study, several recommendations for further research can be made. A study with a complete census of first-year agriscience teachers should be conducted. A longitudinal study should be conducted to examine resilience and well-being throughout the teaching career of agriscience teachers. This study should be replicated with agriscience teachers in various career stages. A national study examining personal resilience and well-being among agriscience teachers should be conducted. An intervention should be created to aid first-year agriscience teachers in managing and maintaining their well-being during their first year of teaching. Given the workload stress experienced by teachers in this study, research should be conducted to document the hours and activities of agriscience teachers in each career stage.

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Agricultural Literacy in Montana Preservice Elementary Educators

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A major disconnect in a connected world has occurred, creating a knowledge deficiency in agriculture and its global issues. The purpose of this study was to determine Montana State University preservice elementary educators' perceptions toward agriculture, educating about agriculture, and incorporating agricultural topics within their lessons. Researchers used the diffusion of innovations theory and its five communication channels and five degrees of innovativeness as a lens to analyze agricultural literacy awareness. Data included students enrolled in one or more of the following 2019 spring K-8 methods courses: science, math, social studies, and language arts. Regarding barriers, respondents indicated Time and Funding were the most prominent; however, Personal Interest and Reward/Recognition construct items were the most significant benefits. Participants' overall confidence to potentially use agriculture as a context to teach core academics was low compared to their degree of innovativeness. Findings possess significant recommendations and implications for addressing agricultural literacy in nonagricultural educators: first, collaboration between elementary and agricultural education preservice education programs; second, provide agricultural-based workshops and professional development opportunities for nonagricultural education educators; third, expand efforts toward in-service educators; fourth, create an agriculturally integrated K-8 curriculum and standards; fifth, publish research utilizing specific agricultural literacy terminology in nonagricultural education journals.

Introduction & Theoretical Framework

A societal disconnect from agriculture increases significantly as time progresses. Americans are becoming two to four generations removed from ranches and farms. Research has identified the majority of the general population as having no direct contact with agriculture, including rural agricultural states (Powell & Agnew, 2011), resulting in an overwhelming lack of knowledge and appreciation of the food, fuel, and fiber it demands (Brandt, Forbes, & Keshwani, 2017). According to Weiss (1999), this agricultural knowledge deficiency and its global issues could be due in part to a lack of societal interest in agriculture. A major disconnect in a connected world has occurred when America's economy, political culture, and society evolved from an agricultural-industrial to a technological-informational era (DeChristopher, 1993; Knobloch & Martin, 2002).

In the past, a close relationship with a common agrarian society and culture resulted in a mutual sense of agricultural literacy, ensuing from close familiarity with the production, distribution, and use of agricultural commodities (Powell, Agnew, & Trexler, 2008). Ikerd (2001) discussed how the nation's agricultural disconnect is most evident in our systems of food and farming. Most consumers, mainly younger, have no sense of where their food comes from. Genetically modified crops, animal rights, and food safety issues have created controversy in agriculture over the years (Leising, Igo, Heald, Hubert, & Yamamoto, 1998). The agricultural

industry has recently received scrutiny by organizations and special interest groups called the "informed public" (Kovar & Ball, 2013). Since the turn of the century and with the help of social media, there are increasing numbers of consumers showcasing concerns about food safety, environmental conservations, and agricultural sustainability (Brandt et al., 2017; Hess & Trexler, 2011; Trexler & Meischen, 2002). Although consumers have shown an increasing interest in furthering their education in agriculture (Trexler & Meischen, 2002), many of these topics are related to production, not processing and distribution of agriculture.

An agriculturally literate society would be able to see beyond emotional pleas, instead making informed decisions on issues at hand. Overall, challenges facing agriculture would lessen if the population had an understanding of agriculture and current economic, social, and environmental impacts. Agricultural education is too important a topic to be taught only at the secondary and higher education levels. Agricultural literacy is not age bound and should be offered to all students, regardless of their career goals or whether they are urban, suburban, or rural (National Research Council, 1988). An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture (Frick, 1990). Teachings of agricultural literacy requirements need not involve major curriculum reform (National Research Council, 1988). Innovative, classroom-tested materials have been created to enhance the preexisting standard curriculum. The approach to implementing agriculture as a context is flexible to the varying needs and resources in individual schools and states. Understanding the difference between agricultural literacy and being agriculturally literate is vital to efforts promoting agricultural literacy (Clemons, Lindner, Murray, Cook, Sams, & Williams, 2018). Sandlin and Perez (2017) found the public demonstrated the ability to read (literate) agricultural words and phrases but did not accurately exhibit knowledge (literacy) about purchasing local products in relation to the impact on the environment.

In the United States, agriculture is not a focus in most K-12 school curriculum (Brandt et al., 2017). As a result, students possess a restricted understanding and/or harbor misconceptions regarding food and environmental systems (Brandt et al., 2017; Hess & Trexler, 2011; Mabie & Baker, 1996) and associate agricultural education with basic farming practices (Osborne & Dyer, 2000; Talbert & Larke, 1995; Thompson & Russell, 1993). Prior research efforts have revealed elementary school students know relatively little about agriculture (Trexler, Hess, & Hayes, 2013), its economic and social importance, and its links to human health and environmental quality (Brandt et al., 2017; Hess & Trexler, 2011; Mabie & Baker, 1996; Meischen & Trexler, 2003; Swortzel, 1997). Although most research indicates urban citizens lack the most agricultural knowledge, rural nonfarm citizens also seem to struggle with agricultural literacy. It has been recommended that agricultural education should not only be directed to the adult public but also at primary school children, since they are future consumers and leaders (Brandt et al., 2017; Frick, Birkenholz, Gardner, & Machtmes, 1995; Knobloch, Ball, & Allen, 2007; National Research Council, 1988; Trexler & Meischen, 2002; Powell et al., 2008). Research has shown students can gain agricultural content knowledge through core subjects such as math, science, social studies, and language arts, utilizing agriculture as a context (Balschweid, Thompson, & Cole, 1998; Igo, 1998; Knobloch, Ball, & Allen, 2007; National Research Council, 1998; Vellera & Bodsin, 2016).

Currently, only six percent of the school population successfully complete agricultural coursework; therefore, teachers, agricultural groups, and organizations must collaborate to

implement and integrate agricultural-based curriculum for the other 94% of students (Myers & Dyer, 2004). Agricultural education at the secondary level educates grades seven through twelve, while 4-H is only offered outside of school. Therefore, the majority of the student population in grades six and under are not receiving any form of agricultural education. According to agricultural educators, the National Research Council (1998), National Council for Agricultural Education (1999), and National Association for Agricultural Educators (2018), agriculture should be integrated into existing K-12 math, science, literature, engineering, and technology curricula (Balschweid, Thompson, & Cole, 2000; Trexler et al., 2002). Agricultural education has been documented through research to positively influence students' understanding of reading, writing, and math (McKim, Sorensen & Valez, 2016; Park & Osborne, 2005; Parr, Edwards, & Leising 2006; Young, Edwards, & Leising, 2009). However, an educator's background and experience plays a significant role in teaching students within any subject matter, including agriculture. Nonagricultural educators with prior genuine agricultural experience have been documented to showcase more knowledge and accurate perceptions of the topic (Terry, Herring, & Larke, 1992; Humphrey, Stewart, & Linhardt, 1994). Yet, preservice elementary educators were recorded to be the most confident in teaching agriculture (Terry et al., 1992). An educator's knowledge, attitude, and expectations of potentially teaching a new curriculum possess correlating predictors of the amount of new curriculum actually taught (Rudd & Hillison, 1995; Stripling & Roberts, 2013).

Several agricultural-based curriculum materials have been created and dispersed to elementary teachers since the 1998 report from the National Research Council. Curriculum packages have been produced by projects such as (1) Agriculture in the Classroom (AITC), (2) Project Food, Land, and People (1998), (3) Project Learning Tree (2002), (4) Project WET (2005), and (5) Project WILD (2005) to assist educators in integrating agricultural concepts and experienced-based learning for students. Studies have found that even though organizations and workshops are available to assist educators, and they favor impressions of agriculture, acknowledge it would enhance their curriculum, and believe agriculture could be integrated, it is still not present in classrooms (Bellah & Dyer, 2009; Vallera & Bodzin, 2016). By determining commonly held conceptions among groups, curriculum and educational programs can be tailored to meet the needs of learners (Trexler & Meischen, 2002). The challenge facing educators is not a lack of available curriculum resources; rather, the next challenge is how to successfully and seamlessly integrate agriculture into their existing curriculum. However, before integration, educators should possess the content knowledge required for successful implementation. Therefore, what level of agricultural awareness should educators, of all levels, possess to be recognized as qualified and prepared potential graduates equipped to educate students within the context of agriculture?

The process of adopting new innovations or projects has been studied for over 40 years. Rogers' book, *Diffusion of Innovations* (2003), is one of the most popular adoption models (Sahin, 2006; Sherry & Gibson, 2002) and has been used as a lens for investigating the adoption of agricultural literacy within elementary classrooms. According to Rogers (2003), "adoption is a decision of full use of an innovation, and rejection is a decision not to adopt the innovation" (p. 177). Diffusion is how an innovation is communicated among a social system over time (Rogers, 2003). Successful innovation integration starts first with knowledge of the innovation, then persuasion based on the perceived characteristics, then the decisions of either to accept or reject

the innovations, and finally, implementations and confirmation. These stages typically follow each other in order.

Positive innovation adoption starts with the knowledge stage. Within this step, an individual first learns about existence and then seeks information about innovation, the "what," "how," and "why" questions (Sahin, 2006). According to Rogers (2003), there are three subcategories: (1) awareness knowledge, (2) how-to knowledge, and (3) principles knowledge. Awareness knowledge represents the individual's knowledge of its existence. This type can provide motivation to learn more about the innovation and potentially accept it. Further, it may inspire the individual to learn about the other two types of knowledge (Sahin, 2006). How-to knowledge contains information on how to correctly utilize the new innovation. This knowledge was seen as an essential variable in the innovation-decision process as noted by Rogers (2003). To increase the acceptance rate of an innovation or program, an individual should have a sufficient level of how-to knowledge prior to integration (Sahin, 2006). Lastly, principles knowledge contains the principles describing how and why an innovation works. Without this knowledge, an innovation can be accepted, but the misuse of it may cause its inevitable rejection. Therefore, to create a positive application of a new innovation, a how-to experience and a know-why experience should be implemented (Seamann, 2003). An individual may have all the necessary content knowledge, but an individual's attitude also shapes the acceptance or rejection of a potential innovation.

Persuasion to either accept or reject the innovation is based on the individual's negative or positive attitude toward it. After knowledge is developed, either true or false understandings, is when the persuasion stage occurs in the innovation-decision process. If a degree of uncertainty exists, opinions from others affect the individual's opinions. According to Sherry (1997), close peers' evaluations of an innovation are usually more credible to the individual compared to experts and educators. Search for innovation evaluations information is continued through the decision stage (Sahin, 2006). The decision stage is where the individual decides whether to accept or reject the program. Adoption refers to professing "full use"; rejection means to "not adopt" (Rogers, 2003, p. 177). The last two stages are implementation and confirmation. Within these stages, the innovation-decision has already been made. Implementation is when an innovation is put into practice. At the confirmation stage, the individual looks for support for their decision. Attitudes are crucial within this stage. A change in their attitude may be the result of the support the individual receives after acceptance, and later continuing acceptance or discontinuance may occur (Sahin, 2006).

Rogers (2003) defined the adopter categories as innovators, early adopters, early majority, late majority, and laggards. According to Rogers' Adopter Categorization on the Basis of Innovativeness model (2003), each adopter category represents the degree of a participant's innovativeness, an individual's degree of adoption. Individual innovativeness helps researchers understand the desired behavior in the innovation-decision process. Innovators, according to Rogers (2003), are early adopters who are willing to experience new ideas. The conversation expands further to suggest innovators are the gatekeepers bringing the innovation in from the outside. Innovators' adventurous behavior requires them to have a complex technical knowledge (Rogers, 2003). Early adopters, compared to innovators, limit themselves with more boundaries of the social system. However, according to Rogers (2003), early adopters are more likely to hold

leadership roles, whereas others seek advice or information about the innovation. As role models, early adopters' attitudes toward a new innovation, "stamp of approval," are highly important (Rogers, 2003, p. 283). Early majority persons tend to have a good relationship with others of the social system but do not have the leadership role, which early adopters possess. Figure 1 showcases that the early majority adopt just before the other half of their peers will. Late majority are similar to early majority but include one-third of all members who wait until most of their peers have chosen to adopt the innovation (Rogers, 2003). Laggards have a traditional view and are more skeptical about innovations and change compared to the late majority (Rogers, 2003). Their interpersonal networks mainly consist of members within the laggard category. According to Rogers (2003), they do not have a leadership role due to their limited resources and lack of awareness-knowledge. Before they potentially adopt the innovation, they need to see if it works first by their peers.

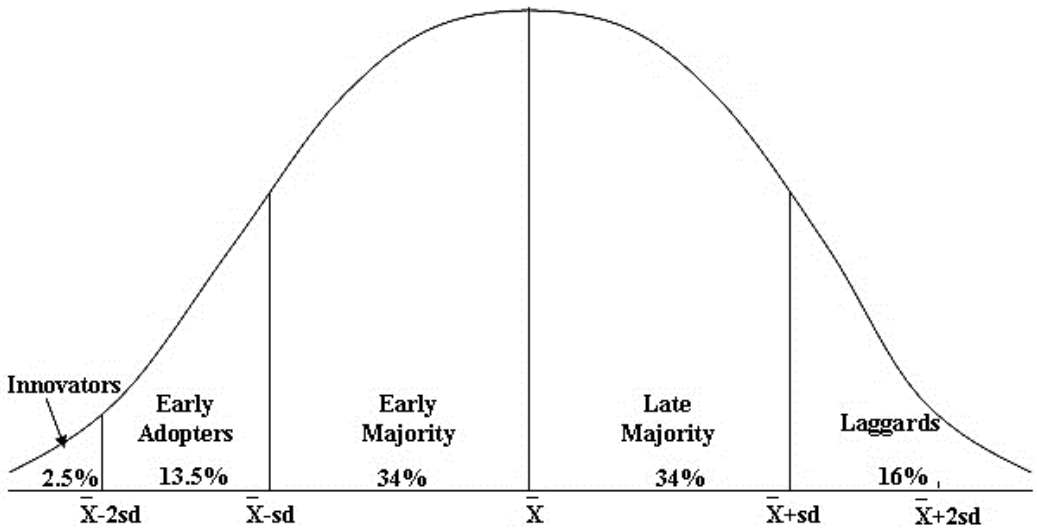

Figure 1. Rogers (2003) Adopter Categorization on the Basis of Innovativeness

Rogers (2003) further describes his five categories of adopters into two main groups: early adopters and later adopters. Innovators, early adopters, and early majority reside in the early adopters, while late majority and laggards comprise later adopters (Rogers, 2003). Possessing the proper understanding and knowledge about agricultural curriculum may influence preservice elementary educators' perceived comfort levels in potentially using it and finally adopting it. Understanding where participants reside on the innovativeness spectrum will help researchers understand educators' willingness toward adopting agriculture within their lessons.

Purpose

The purpose of this study was to determine Montana State University preservice elementary educators' perceptions toward agriculture, educating about agriculture, and incorporating agricultural topics within their lessons. Specific research objectives included:

1. Identify preservice elementary educators' perceived benefits and barriers to using agricultural content to teach core academic subjects.
2. Identify preservice elementary educators' comfort levels about using agriculture as a context to teach core academic subjects.

Methodology

The target population for this study was Montana State University (MSU) preservice elementary education students enrolled in one or more of the following 2019 spring K-8 methods courses: Science, Math, Social Studies, and Language Arts (N = 75). Students enrolled in these courses explore methods of teaching content, skills, and attitudes in the elementary classroom and learn best practices for teaching in each content area. Students enrolled in the previously listed 2019 method courses will complete their student teaching between August 2019 and May 2020. Five university elementary education faculty members dispersed a survey link to their students, which was provided by researchers. Following the recommendations of Dillman, Smyth, and Christian (2009), participants were incentivized to partake by having the opportunity to win a gift card to the MSU Bookstore, which, according to Dillman et al. (2009), should increase response rate. This study was deemed exempt by the Montana State University's Institution Review Board.

Out of the 75 students enrolled across all eight methods courses (two of each in Language Arts, Math, Science, and Social Studies), 22 responded to the survey. When solely looking at the number of students enrolled within all methods courses, it accounted for a sum of 122 students. In our survey, 22 responded, which accounted for 50 out of 122 enrolled students (40.98%). Within the 22 participants, two students were enrolled in only one methods course (9.09 %), twelve were enrolled in two methods courses (54.54%), and eight were enrolled in three methods courses (36.36%). Data collection efforts yielded 22 responses, accounting for a 29.33% response rate, yielding a representative distribution of the 75 students in the various methods courses. For further detail, see Tables 1 and 2.

Table 1
Total Population (N = 75)

Methods Course	*f*	%
Language Arts	28	22.95
Math	27	22.13
Science	23	18.85
Social Studies	44	36.07
Total	122	100

Table 2
Sample Population (*n* = 22)

Methods Course	*f*	%
Language Arts	13	26
Math	10	20
Science	16	32
Social Studies	11	22
Total	50	100

This study utilized both quantitative and qualitative data collected through a researcher-designed Qualtrics survey. The survey instrument was closely edited and checked for content validity and reliability. Validity was evaluated based on the use of the verbiage contained in the

National Agriculture Literacy Outcomes (NALO) document (Spielmaker & Leising, 2019). Reliability was evaluated through a pilot test to undergraduate preservice teachers in agricultural education (N=10). Researchers ensured that the instrument would address the objectives, as well as provide meaningful data that could then be analyzed to address the topic. The instruments included a demographics that recorded sex, age, and ethnicity. Also included were questions regarding their junior high and high school demographics, such as town size; partaking in 4-H; whether their high school had a secondary agricultural education program and, if so, did they partake in it and/or FFA; and lastly what grade they desired to teach after graduation.

For Objective 1, respondents categorized and ranked each of the following as a potential barrier or benefit: time, funding, resources/materials, content knowledge, standard alignment, curriculum alignment, commitment, support/guidance, reward/recognition, and personal interest. Based on the literature review, these benefits and barriers were created based on previous studies (Bellah & Dyer, 2009; Hess & Trexler, 2011; Osborne & Dyer, 2000; Stripling & Roberts, 2013; Swortzel 1997; Talbert & Larke, 1995; Thompson & Russell, 1993). Respondents then rated their knowledge and attitude toward Montana agriculture based on a scale of 1 to 10 (10 being very knowledgeable and positive). Lastly, they were asked to provide a short answer explaining their attitude rating.

For Objective 2, each item in the Likert-type section asked respondents to identify their perceived comfort level in using the NALOs (Spielmaker & Leising, 2019) within their current method course subject area (math, science, social studies, and language arts) on a four-point summated scale (1 = Very Uncomfortable, 2 = Uncomfortable, 3 = Comfortable, and 4 = Very Comfortable). They were then asked to rate their level of confidence to successfully utilize and implement agricultural literacy resources and materials through a multiple-choice question (1 = Highly Unconfident, 2 = Unconfident, 3 = Confident, and 4 = Highly Confident). Lastly, respondents were asked to choose the following likeness toward their tendency in adopting the innovative educational approach through a multiple-choice question (Change is good; I'll go first [Innovators]; I want to see the research first [Early Adopters]; I'll do it once I see it working for a few others [Early Majority]; If it works for most others, it will work for me [Late Majority]; or I really don't like new stuff [Laggards]). Rogers' (2003) five identified adopter categories were not used in the multiple choice question on the survey in order to rule out any nuisance variables/questions from participants.

Results

As a collective group, the 22 respondents were asked to self-identify age, sex, and ethnicity. The average respondent was a twenty-one-year-old (n = 15, 68.18%) white (n = 22, 100%) female (n = 21, 95.45%), from a suburban area (n = 9, 40.91%) with a population between 5,000 and 20,000. Although eight participants responded *yes* (36.36%) and three responded *not sure* (13.64%) to having an agricultural education program at their high school, the majority did not partake in either 4-H (n = 18, 81.81%) or FFA (n = 21, 95.54%) growing up. The majority of the preservice elementary educators indicated wanting a job teaching either third (n = 18, 81.81%), second (n = 16, 72.72%), fourth (n = 16, 72.72%) or fifth grade (n = 14, 63.63%).

Objective 1 sought to identify potential benefits and barriers to using agriculture as a context in teaching core academic subjects. Respondents categorized and ranked each word either in the benefit or barrier box. Respondents indicated *Time* and *Funding* (n = 21, 95.45%) construct items were the most significant barriers to potentially utilizing agriculture as a context to teach core academics. Following closely behind were *Resources/Materials* (n = 19, 86.36%) and personal *Content Knowledge* (n = 16, 72.73%). Preservice elementary educators' perceived barriers to using agriculture as a context in teaching core academics are presented in Table 3. Respondents indicated *Personal Interest* (n = 17, 77.27%) and *Reward/Recognition* (n = 16, 72.73%) construct items were the most significant advantages to potentially using agriculture as a context to teach core academics. *Support/Guidance* (n = 13, 59.09%) was the third most prominent advantage ranked. Preservice elementary educators' perceived benefits to using agriculture as a context in teaching core academics are presented in Table 4.

Table 3
Preservice Elementary Educators' Perceived Barriers (n = 22)

Barriers	*f*	%
Time	21	95.45
Funding	21	95.45
Resources/Materials	19	86.36
Content Knowledge	16	72.73
Standard Alignment	10	45.45
Curriculum Alignment	10	45.45
Commitment	10	45.45
Support/Guidance	9	40.91
Reward/Recognition	6	27.27
Personal Interest	5	22.73

Table 4
Preservice Elementary Educators' Perceived Benefits (n = 22)

Benefits	*f*	%
Personal Interest	17	77.27
Reward/Recognition	16	72.73
Support/Guidance	13	59.09
Standard Alignment	12	54.55
Curriculum Alignment	12	54.55
Commitment	12	54.55
Content Knowledge	6	27.27
Resources/Materials	3	13.64
Funding	1	4.55
Time	1	4.55

Respondents provided a short response to elaborate their overall awareness and attitude about Montana agriculture. First, respondents were asked to define agriculture in their own words.

Recurring themes among respondents included farmers and/or ranchers working with plants and/or animals in order to effectively provide and produce agricultural commodities for consumers. A respondent enrolled in both a Social Studies and Math Methods course stated agriculture is "*anything to do with plants and animals that humans use for any form of resource.*" A Math Methods course student stated, "*Farming. Producing consumable(s) through growing of crops and raising of animals.*" A student enrolled in both a Language Arts and Science Methods course responded that "*agriculture has to do with crop production as well as livestock, working toward sustaining these things in order to protect the planet, while efficiently and effectively provide (and) produce for people*." One Science Methods course student stated, "*Agriculture is the production and harvest of animals and crops.*"

Second, respondents were asked to rate their knowledge of and attitude toward Montana agriculture based on a scale of 1 to 10 (10 being very knowledgeable and positive). Respondents were also asked to provide a short answer explaining their attitude rating. Although preservice elementary educators rated their overall knowledge of Montana agriculture on average as a 3.5, they had a positive attitude toward Montana agriculture (M = 7.4).

Objective 2 was to identify participants' comfort level in potentially using agriculture as a context to teach core academics (language arts, math, science, and social studies) using the NALOs. Members of the Math Methods course (n = 10) indicated they were *Very Comfortable* to *Comfortable* using the following learning outcomes: *Estimate the size and weight of pumpkins, sprouting pumpkin seeds, and making pumpkin pie in a bag* (n = 9, 90%) and *Explain the costs associated with producing and purchasing food* (n = 9, 90%). The learning outcomes identified as *Very Uncomfortable* or *Uncomfortable* to use were: *Explain how prices for agricultural goods are determined* (n = 8, 80%); *Determine the relationship between producers and consumers, and how agricultural supply and demand affects commodity prices* (n = 7, 70%); and *Identify terms solutes, solvents, and parts per million, and learn how fertilizer solution is properly calculated and applied* (n = 7, 70%).

Students in the Science Methods course *(n* = 16) responded to 10 Likert-type items and indicated whether they were *Very Uncomfortable*, *Uncomfortable*, C*omfortable*, or *Very Comfortable* using science-based NALOs. Preservice elementary educators responded they were *Very comfortable* to C*omfortable* using the following learning outcomes: *Identify natural resources* (n = 13, 81.25%) and *Identify the types of plants and animals found on farms and compare with plants and animals found in wild landscapes* (n = 12, 75%). The learning outcomes identified as *Very Uncomfortable* to *Uncomfortable* to use were: *Understand the concept of stewardship and identify ways farmers/ranchers care for soil, water, plants, and animals* (n = 10, 62.5%) and *Explain the harmful and beneficial impacts of various organisms related to agricultural production and processing (e.g., harmful/beneficial insects) and the technology developed to influence these organisms* (n = 10, 62.5%).

Members of the Language Arts Methods course (n = 13) responded to 10 Likert-type items and indicated whether they were *Very Uncomfortable*, *Uncomfortable*, C*omfortable*, or *Very Comfortable* in utilizing the language-arts-based NALOs. Preservice elementary educators responded they were *Very Comfortable* to *Comfortable* utilizing the following learning outcomes: *Students learn about the wide scope of agriculture, explore the variety of agricultural products in*

their daily lives, and discuss the difference between needs and wants (*n* = 9, 69.23%); *Describe a plant life cycle (i.e., almond tree) including tree dormancy, pollination, bloom, and kernel development of the plant through a poem* (*n* = 9, 69.23%); *Create, read, and interpret graphs relating to the economic importance of the dairy industry, and be challenged to understand the economic consequences of a day without dairy* (*n* = 9, 69.23%); and *Using the context of apples, students will apply their knowledge of heredity and genetics to explain how new varieties are developed and propagated to meet the demand for a tasty, uniform, and consistent product* (*n* = 9, 69.23%). The learning outcomes identified as *Very Uncomfortable* to *Uncomfortable* to utilize were: *Students will understand how agriculture influenced and shaped culture, class, and society during the Middle Ages* (*n* = 7, 53.85%) and *Explore heredity concepts by comparing observable traits of apples and onions, collecting data on the traits of different apple varieties, and learning about apple production.* (*n* = 7, 53.85%).

Members of the Social Studies Methods course (*n* = 11) responded to 10 Likert-type items and indicated whether they were *Very Uncomfortable*, *Uncomfortable*, C*omfortable*, or *Very Comfortable* in utilizing the NALOs within the subject of science. Preservice elementary educators responded they were *Very Comfortable* to *Comfortable* utilizing the following learning outcomes: *Recognize that agriculture provides our most basic necessities – food, fiber (fabric or clothing), energy, and shelter* (*n* = 11, 100%) and *Identify animals and plants that are raised locally that are used for food, clothing, shelter, and landscapes* (*n* = 10, 90.9%). The learning outcomes identified as *Very Uncomfortable* to *Uncomfortable* to utilize were *Distinguish the economic value of agriculture in America compared to other countries* (*n* = 5, 45.45%) and *Compare and contrast historical and current food processing and systems* (*n* = 5, 45.45%).

When asked to rate their level of confidence to successfully utilize and implement agricultural literacy resources and materials, none of the respondents were *Highly Confident* (0%), six were *Confident* (27.27%), thirteen were *Unconfident* (59.09%), and three were *Highly Unconfident* (13.63%). However, when asked to choose one adopter category toward their potential tendency in accepting the innovative educational approach, eight participants responded as Innovators – *Change is good; I'll go first* (36.36%); nine were Early Adopters – *I want to see the research first* (40.9%); three were Early Majority – *I'll do it once I see it working for a few others* (13.63%); two were Late Majority – *If it works for most others, it will work for me* (9.09%); and none identified as Laggards – *I really don't like new stuff* (0%).

Conclusions/Recommendations/Implications

Conclusions from this research provide information for those in teacher preparation, professional organizations that help with training, professional development and advocacy for teachers, and for future academic research. This study provides a university-wide view of agricultural literacy within preservice elementary educators toward agriculture, educating about agriculture, and potentially incorporating agricultural topics within their lessons. Stakeholders at all levels of Montana agricultural and elementary education, including current educators, administrators, state staff, teacher educators, and representatives of professional organizations, should continue to examine the reasons presented in this study to effectively recruit, train, and retain elementary education teachers who desire to educate common core academics within the context of agriculture.

Provided the lack of knowledge of and comfort with agriculture, it is recommended that an organized capacity-building process be established. Its goals should be (1) improving teachers' perceptions and (2) increasing their awareness of agricultural concepts to (3) successfully and efficiently utilize agriculture as a context. A variety of approaches can be drawn upon to achieve this goal, such as organizations providing summer programs in local community settings, guest speakers, quarterly in-services with a designated focus group, newsletters, teacher/peer mentoring, and teacher-curriculum development activities. The inclusion and identification of authentic agricultural experience would address stereotypes and misconceptions, potentially improving educators' and students' agricultural literacy in the process. Agricultural-based workshops for nonagricultural education majors need to be resurrected, and professional development opportunities need to be provided either through Extension agencies, MSU, Montana Agriculture in the Classroom, or another designated organization.

Due to the 90% of participants who identified as Early Adopters (Innovators, Early Adopters, and Early Majority) and only two as Late Adopters (Late Majority and Laggards), implications for professional organizations/programs like Montana Agriculture in the Classroom, Farm Bureau, and MSU include taking an active role in educating, advocating, and continued development of preservice teachers. Preservice educators' exposure to the agricultural-based curriculum standards in a collegiate course may contribute to the motivation to use it as a context within the classroom and move more toward the collaborative stages. In order to implement new curricula, teacher professional development should be designed to integrate agriculture as an integral piece of educators' pedagogical content knowledge (Balschweid et al., 2000). A need for collaboration between elementary and agricultural preservice education programs exists at MSU. Preservice elementary educators need to be educated on how to use relevant agricultural contexts to deliver standardized content beginning in practicum courses and continuing through the student teaching experience.

Based on the results of this study, participants were comfortable using the learning outcomes that resided more within their major and had minimal need of in-depth agricultural-based knowledge. Therefore, these organized professional development opportunities should address topics and provide resources to help individuals navigate and understand these more in-depth areas within agriculture. This study identified that each major requires more how-to knowledge in the following areas including, but not subject to, the topics addressed in this study: math majors were in crop and livestock yields, fertilizer calculations, relationship between consumer and producer, and agricultural technology; science majors identified stewardship responsibilities of ranchers and farmers, as well as harmful and beneficial impacts of insects on farm and ranchland; language arts majors were in agricultural influences on culture, class, and society, heredity concepts through observable traits, and crop production; and social studies identified distinguishing the economic value of agriculture and food processing techniques as their least area of comfortability.

Identifying degrees of innovativeness toward agricultural education with other universities' students and teacher educators as well as in-service educators would showcase a positive trend of curiosity. Identifying potential early adopters (Innovators, Early Adopters, and Early Majority) would assist organizations, programs, and future researchers to establish focus areas for potential development. Having an early adopter's stamp of approval on teaching core

academics through the context of agriculture enhances the opportunity for others to adopt it. The first step in successfully implementing agriculture in the classroom is creating a focus group of early adopters to demonstrate its effectiveness in enhancing standard curricula.

There is a significant importance of having an individual or organization within every state to educate, advocate, and provide professional development for educators within the context of agriculture. Every state should have at least one group or organization to take on this responsibility. Organizations need to examine avenues and platforms for elementary educators to find resources and/or guidance to help educate and assist in teaching core academics in the context of agriculture within their classrooms.

In the development of the next generation of curriculum and standards, it is important that developers design programs to integrate agriculture in a coherent, organized fashion rather than leaving it to agricultural-based organizations alone. Encouragement toward agricultural educators and experts within each core academic subject must work together to build a more agriculturally integrated K-8 curriculum. Further research should include deeper investigation within each core academic field to support findings regarding agriculture's absence in elementary curricula.

Further research recommendations include conducting additional, in-depth studies to track how these new teachers would progress through the stages of communication (knowledge, persuasion, decision, implementation, and confirmation) if provided professional development with using agriculture as a context in their classrooms. For high success rates, professional development opportunities would need to exist with a quarterly check to address any concerns with the content.

A lack of research on agricultural literacy prevents educational programs from expanding. In order to reach a broader audience, it is recommended that agricultural education researchers place a high priority on publishing research using specific agricultural literacy terminology in nonagricultural education sites to increase awareness of agricultural literacy outside the field of agricultural education and to promote their findings (Kovar & Ball, 2013; Mercier, 2015). Also, when creating research questions, researchers should focus on explicit antecedents of specific behaviors (e.g., attitudes toward implementing agriculture as a context within their core subjects) in order to receive sufficient and relative data.

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A Typology of University Agriculture Students' Projected Motivations to Study Abroad: An Application of Q Methodology

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Abstract

The study's purpose was to understand Louisiana State University freshman agriculture students' projected motivations to study abroad. To achieve this, we used a Q methodological approach. When viewed through the lens of the expectancy-value model of achievement motivation, findings suggested students' motivations could be interpreted through three typologies: (1) Goal-Oriented Students, (2) Social-Oriented Students, and (3) Learning-Oriented Students. In particular, the Goal-Oriented Students expressed they were motivated to enroll in a study abroad course because they perceived it could enhance their educational and career-related ambitions through personal growth. Meanwhile, Social-Oriented Students articulated that the social dimensions of study abroad courses, i.e., networking, relationship building, and opportunities to experience a new culture, served as their primary motivation. Finally, the Learning-Oriented Students reported their desire to gain more agricultural knowledge, experience an alternative method of instruction, and learn to work with diverse populations provided intrinsic value and encouraged them to study abroad in the future. As a consequence, this study's findings not only broaden the study abroad literature but also provide implications for university administrators and faculty to better accommodate students through recruitment and programming tailored to their motivational needs.

Introduction and Review of Literature

A fundamental role of institutions of higher education is to provide students opportunities to engage in high-impact educational experiences that foster personal and professional development (Kuh, 2008). In light of the growing impact of globalization on the behaviors and characteristics of colleges and universities (Mitchell & Nielsen, 2012), high-impact learning practices that support global learning and diversity education have been identified as an essential tenet of the core mission of universities (Kuh, 2008). Efforts to internationalize the college experience have, therefore, gained momentum across the higher education landscape, particularly in areas of developing and promoting education abroad. For example, findings from the most recent survey conducted by the American Council on Education ([ACE], 2017) revealed growth in the number of U.S. institutions implementing policies and practices to foster internationalization efforts. Moreover, the number of students enrolling in study abroad programs has continued to increase over the past decade, with roughly one in 10 students studying abroad in the 2017-2018 academic year (Institute of International Education [IIE], 2019a).

Recent calls to provide more educational opportunities abroad are supported by an extensive body of academic literature, in which myriad student benefits have been documented. In particular, the primary reported outcomes for students who studied abroad include: (a) enhanced cultural competence; (b) a more developed global perspective; (c) deeper understanding of

international issues; (d) increased abilities to communicate and collaborate with diverse groups; (e) the development of international networks beneficial to students' future careers; and (f) increased self-efficacy and self-confidence when working in unfamiliar situations (Bunch, Rampold, Cater, & Blackburn, 2018; Conner, Milius, Stripling, Loizzo, & Doerr, 2019; Conner & Roberts, 2015; Foster, Sankey Rice, Foster, & Barrick, 2014; Hainline, et al., 2018; Roberts & Edwards, 2016). Students who participated in a study abroad course in college were also found to be more likely to continue to engage in intercultural activities in the future than students who had not participated (Murphey, Sahakyan, Yong-Yi, & Magnan, 2014).

The benefits students obtain through study abroad courses is also critical to the success of colleges of agriculture in producing high-caliber graduates prepared to enter the agricultural career pipeline (Alston, Roberts, & Warren English, 2019). As an illustration, today's graduates must be prepared to navigate an interconnected global economy, increased competitiveness in the world market, and more accessible borders that have improved access to commodities and services (Lewis & Gibson, 2008). Colleges of agriculture have, therefore, been tasked with producing globally minded and skilled professionals (National Association of State and Land-Grant Colleges [NASULGC], 2004). In response, recent literature has primarily focused on identifying the best practices for creating effective study abroad courses in agriculture (Bunch et al., 2018; Conner et al., 2019; Conner & Roberts, 2015; Fabregas-Janeiro, Kelsey, & Robinson, 2011; Lamm et al., 2011; O'Malley, Roberts, Stair, & Blackburn, 2019; Roberts & Edwards, 2016; Rodriguez & Roberts, 2011). However, well-designed programs may provide little value if university agriculture students continue to choose *not* to enroll. For example, less than 3% of the undergraduate students who studied abroad in the 2017-2018 academic year were enrolled in an agriculture major (IIE, 2019b). As a result, it is necessary for additional work to be dedicated to examining the best practices for the design and delivery of study abroad experiences while also more intimately distilling a profile of agriculture students' projected motivations to participate.

Theoretical Framework

This study was grounded in Eccles and colleagues' expectancy-value model of achievement motivation (Eccles et al., 1983; Wigfield & Eccles, 2000). Using a similar lens, Raczkoski, Robinson, Edwards, and Baker (2018) investigated relationships among agricultural and life sciences students' overall motivation to study abroad and their perceived expectations of success, subjective-task value, and self-efficacy. A statistically significant and positive relationship was reported among each of the motivational factors and students' overall motivation to study abroad (Raczkoski et al., 2018). Although some of the other evidence in the relevant body of work has not examined motivational constructs using the expectancy-value model, several investigations (Beseli, Warner, Kirby, & Jones, 2016; Murphey et al., 2014) have more broadly examined indicators of study abroad participation, and their findings suggest students are more likely to participate if they are motivated, self-efficacious, and perceive the associated costs do not exceed the value they assign to the experience. Therefore, much of the existing literature on study abroad in agriculture aligns with key features of the expectancy-value model.

Conceptually, the key outcome of the expectancy-value model is the ability to describe individuals' *achievement-related choices and performance*. Eccles et al. (1983) theorized this outcome was directly influenced by individuals' (a) expectations of success and (b) subjective task-values (Eccles et al., 1983; Wigfield & Eccles, 2000; see Figure 1). *Expectations of success*

represent individuals' beliefs about how well they will perform a task in the future. As such, students who have lower expectations of their abilities to succeed are less likely to enroll in a study abroad course. For example, Calliouet and Wood (2019) examined agricultural students' perceived barriers to participate in an international experience. They found concerns about language skills were among the top five barriers to enroll in a study abroad course (Calliouet & Wood, 2019). When interpreting this finding through the expectancy-value model, students with such concerns would be unlikely to study abroad. *Subjective task value* refers to how the value assigned to a task influences an individual's desire to actualize it in practice. Therefore, task value is subjective because individuals can attribute a range of values to the same task or activity based on their personal goals, beliefs, and memories (Wigfield, Tonks, & Klauda 2009). When applied to study abroad, subjective task value suggests students' motivations to enroll can be explained, in part, by examining four key values they assign to the experience: (1) attainment value; (2) intrinsic value; (3) utility value; and (4) cost value. To investigate students' projected motivations to study abroad, we emphasized the four aforementioned values during this study's design (Eccles et al., 1983; see Figure 1).

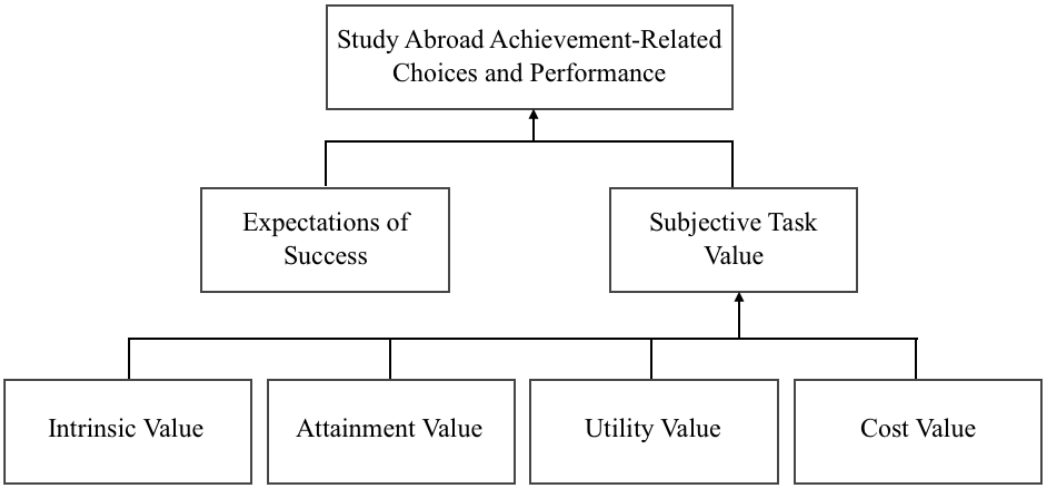

Figure 1. Expectancy-value model of study abroad achievement motivation. Adapted from "Expectancy-Value Model of Achievement Motivation" by J. S. Eccles, T. F., Adler, R. Futterman, S. B. Goff, & C. M., Kaczala, J. L., Meece, and C. Midgley, 1983, *Achievement and achievement motivation*, p. 75.

Attainment value is the personal importance students place on doing well on a task in terms of their core values (Eccles et al., 1983). Therefore, attainment value incorporates aspects of self-identity because individuals may perceive a task or activity as important if they view success as central to their sense of self (Wigfield et al., 2009). Consequently, students who maintain that studying abroad aligns with their interests, or how they wish to view themselves, may assign a higher value to enrolling in a study abroad course and be more likely to engage. To demonstrate, Beseli et al. (2016) reported the influence of attainment value on motivation to study abroad by describing how some students were motivated because they were from a small town and desired to see the world. The second value, *intrinsic*, refers to the personal enjoyment individuals' gain from performing a task. If an individual intrinsically values an activity, he or she will be more likely to participate and sustain engagement in the activity in the future (Wigfield et al., 2009). For example, students may assign a higher degree of value to studying abroad if the intended

outcomes align with their interests. Examples of intrinsic value identified in previous research include: (a) gaining overall life experience and life-changing opportunities; (b) experiencing other cultures; and (c) understanding how they can use their education to create a positive change in the world (Bunch et al., 2015; Caillouet & Wood, 2019; Danjean et al., 2015; Edgar, Edgar, & Hansen, 2018).

Utility value refers to the perceived usefulness of a task and how it fits within an individual's future goals or plans (Eccles et al., 1983). Students who believe studying abroad will enhance their employability may perceive participating in such a program as more valuable than students who do not (Bunch et al., 2015; Danjean et al., 2015; Edgar et al., 2018). Lastly, *cost value* refers to what individuals must give up to perform a task, as well as the anticipated effort needed to complete the task (Eccles et al., 1983; Wigfield et al., 2009). Program cost, being too busy with school or work, and time away from home and friends have been identified consistently across prior literature as barriers to study abroad participation (Briers, Shinn, & Nguyen, 2010; Bunch et al., 2015; Caillouet & Wood, 20019; Danjean et al., 2015; Edgar et al., 2018). Therefore, students with concerns regarding the time and the effort required to study abroad may not perceive the value of the experience outweighs the associated costs and will be less motivated to enroll. As a consequence, the expectancy-value model's four values – attainment, cost, intrinsic, and utility – served as a critical lens in this investigation to examine students' motivations to study abroad.

Statement of Purpose, Rationale, and Research Question

The study's purpose was to understand freshman agriculture students' projected motivations to study abroad at Louisiana State University. Existing evidence (Briers et al., 2010) has demonstrated that study abroad courses can help instill key employability skills in students, which is critical to their success as they enter the career pipeline. As a result, this study addressed the American Association for Agricultural Education's Research Priority Area 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016). One research question guided the investigation: What patterns (i.e., the Q-sort factor load) emerged regarding freshman agriculture students' projected motivations to study abroad?

Methodology

In this study, we used Q methodology (Brown, 1980; McKeown & Thomas, 2013). Q uses both quantitative and qualitative approaches through a unique data collection technique, called a Q sort, to understand the collective views of individuals on a phenomenon of interest (Watts & Stenner, 2013). In Q, McKeown and Thomas (2013) argued that small sample sizes are preferred since individuals' observational perspectives are unique and should not be used to infer generalizability. Because of this, it is critical to ensure that participants' perspectives emerge through analysis, using a blend of quantitative and qualitative techniques, rather than imposing researchers' secondary interpretations (Brown 1980). Therefore, unlike the quantitative paradigm, validity and reliability are not major concerns in Q (Brown 1980; McKeown & Thomas, 2013). Instead, Q researchers place value on *replication*. As an illustration, rather than attempting to yield consistent internal factor structures, a Q researcher would place emphasis on understanding if, using a similar condition of instruction, comparable factors would emerge. Therefore, Q

researchers do not attempt to generalize; rather, they offer an interpretation of participants' subjective views at a moment in time (Brown, 1980; Watts & Stenner, 2013).

Instrumentation

In the instrument development phase, the researchers conducted a synthesis of the literature to understand how students' motivations to study abroad have evolved over time. Using the themes from the literature, we then created an open-ended questionnaire in which we purposefully selected 60 freshman students, equally male (n = 30) and female (n =30), from each academic department in the college of agriculture. In particular, we asked these individuals to reflect on their motivations to study abroad by providing narrative responses to three open-ended items: "*What aspects of study abroad courses interest you the most?" What aspects of study abroad courses have prevented you from enrolling before?*" and "*What aspects of study abroad courses concern you the most?"* Students' narrative responses were then analyzed using thematic analysis (Merriam & Tisdell, 2016). Through this strategy, we created 154 initial statements from participants' words, which represented this investigation's *concourse* (Watts & Stenner, 2013). However, because we perceived using all 154 statements would be too taxing on participants, we developed theoretical categories using expectancy-value theory to facilitate a sampling of 36 statements, i.e., the study's Q set. Of note, the statements were organized to reveal four homogenous theoretical categories: (1) attainment value, (2) cost value, (3) utility value, and (4) intrinsic value. However, we also emphasized heterogeneity within each category by presenting the concept in different ways. A description of each theoretical category is provided in Table 1.

Table 1
Theoretical Categories of the Q-Set

Category	Description of Category	# of Statements
Attainment Value	Statements that relate to the personal importance students place on doing well as a result of study abroad and how it speaks to their self-identity.	8
Cost Value	Statements that include negative aspects of engaging in study abroad, such as time, effort, and more.	8
Intrinsic Value	Statements related to the personal enjoyment that students attain from participating in a study abroad.	8
Utility Value	Statements revolved around how study abroad may relate to students' goals, such as their future career.	8

Q Set and Data Collection

For this investigation, we sought to understand the dominant perspectives that emerged in regard to freshman undergraduate agriculture students' motivations to study abroad. To accomplish this, we purposefully sampled 20 sorters who (a) were a freshman in the college of agriculture at Louisiana State University, and (b) had not participated in a study abroad course. Further, to

ensure a diversity of perspectives were represented, we prioritized recruiting sorters from each academic department in the college of agriculture at Louisiana State University with an undergraduate program. As a result, we successfully recruited 12 females and eight males sorters. Next, we asked our 20 participants, i.e., our Q set, to sort 36 randomized statements into three separate categories: (1) most like me, (2) neutral, and (3) most unlike me (McKeown & Thomas, 2013). Thereafter, they placed the individual statements onto a forced distribution (see Figure 2) ranging from -4 to +4 using the condition of instruction: "*What are your motivations to study abroad?*

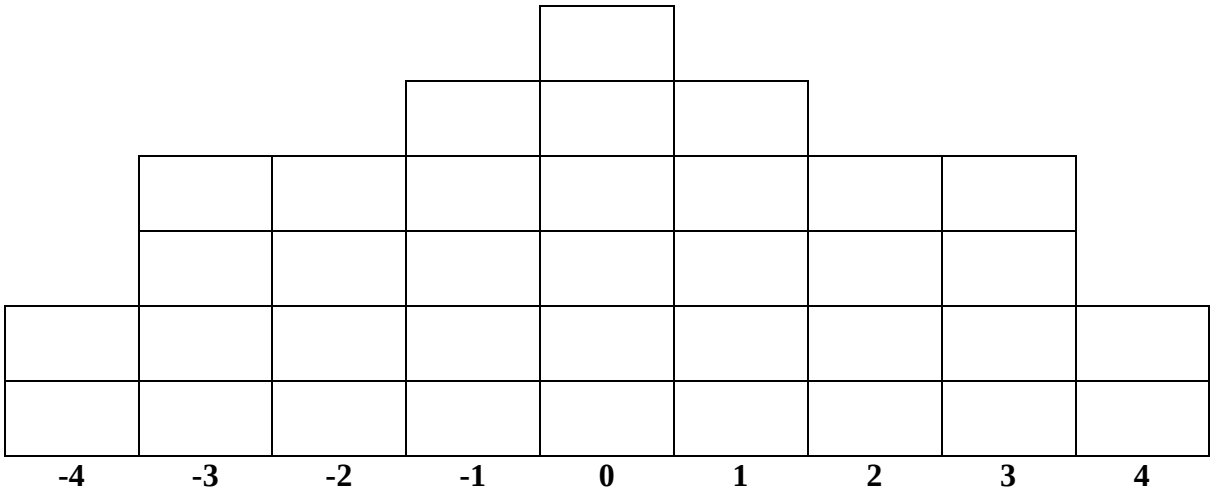

Figure 2. Forced distribution used to collect data during the Q-sort.

Data Analysis

After sorts were completed, we then used PQMethod version 2.35 to analyze our data (Schmolck, 2014). Three statistical tests were conducted: (a) correlation, (b) factor analysis, and (c) a summated computation of factor scores. Of note, we did not correlate items, or statements, using the traditional factor analysis approach. Instead, we correlated individual sorts following the conventions advanced by Brown (1980). Then, to extract factors, we used principle component analysis (PCA) by which we compared one, two, three, four, and five-factor solutions (Schmolck, 2014). After this procedure, we elected to use a three-factor solution to represent our findings because it captured (a) the largest number of total participants and (b) the great amount of explained variance, i.e. 62%. After identifying three factors, we analyzed (a) eigenvalues, (b) factor arrays, (c) factor loadings, (d) factor scores, and (e) each factor's unique consensus and distinguishing statements. Further, we also identified defining sorts by analyzing the factor matrix (see Table 2), using a significance level of .042 in which all 20 sorts were identified as defining. It should also be noted that correlations among factors were negligible (r = -0.02 $_{(1\text{-}2)}$; 0.07 $_{(1\text{-}3)}$; and 0.08 $_{(2\text{-}3)}$), which indicated that our selected factor solution was quality and reflected the diverse perspectives of participants (Brown, 1980).

Table 2

Factor Matrix with Freshman Agriculture Students' Personal Characteristics

P Number/ Gender	Age	Race	Academic Department	Factor Loadings		
				1	2	3
2-male	18	White	Ag Econ/Business	0.74[a]	-0.04	0.23
5-female	19	White	Nutrition/Food Science	0.81[a]	0.15	0.01
8-male	19	White	Natural Resources	0.73[a]	0.11	-0.02
10-female	18	Black	Textiles & Merchandising	0.85[a]	-0.05	0.12
11-male	18	White	Plant Science	0.71[a]	0.21	-0.21
12-male	18	White	Animal Science	0.80[a]	-0.01	-0.05
17-female	20	White	Ag Econ/Business	0.79[a]	-0.13	0.31
19-female	20	Mixed	Plant Science	0.77[a]	0.02	0.24
1-female	19	White	Plant Science	0.01	0.71[b]	0.11
3-male	19	White	Textiles & Merchandising	0.18	0.77[b]	-0.23
14-female	18	Native American	Textiles & Merchandising	0.07	0.53[b]	-0.01
15-female	18	White	Natural Resources	-0.01	0.79[b]	-0.16
13-male	18	Black	Ag Econ/Business	0.21	0.57[b]	0.20
18-male	19	White	Agricultural Education	-0.11	0.61[b]	0.09
20-male	19	White	Animal Science	0.17	0.59[b]	0.04
4-female	19	Other	Plant Science	0.05	0.10	0.53[c]
6-female	18	Black	Nutrition/Food Science	-0.09	-0.02	0.74[c]
7-male	18	White	Agricultural Education	0.14	0.05	0.78[c]
9-female	18	Black	Natural Resources	-0.01	-0.07	0.85[c]
16-female	18	White	Agricultural Education	0.13	0.12	0.49[c]
Defining Sorts				8	7	5
% Explained Variance				39%	10%	13%

Note. [a]Indicates a defining sort for Factor 1. [b]Indicates a defining sort for Factor 2. [c]Indicates a defining sort for Factor 3.

To help interpret the study's findings, we conducted follow-up interviews with three individuals from each factor who loaded high on the factor but did not load significantly on the other two factors. Then, using NVivo® qualitative analysis software, we analyzed the high and pure loaders' responses using the constant comparative method (Corbin & Straus, 2015). After qualitative analysis, we employed Mauldin's (2012) Q interpretation procedures and compared the qualitative data against (a) participants' demographic information, (b) array positions of statements on each factor, (c) correlations between factors, (d) Z-score differences, (e) distinguishing statements, and (f) consensus statements. Through this comparison of existing divergences and convergences among the data sources, we created a profile of each factor (Mauldin, 2012). Finally, we interpreted each profile through our theoretical framework, a process that helped emerge three diverse perspectives: (a) *Goal-Oriented Students*, (b) *Social-Oriented Students*, and (c) *Learning-Oriented Students*. Each perspective represents the

motivational viewpoints freshman undergraduate agriculture students at Louisiana State University held in regard to studying abroad. Using key data from this investigation, we next narratively describe each emergent perspective in the presentation of findings.

Findings

Through our analysis, we operationalized the emergent patterns, i.e., the significant Q-sort factor loadings, as typologies. A typology is the classification of individuals based on empirical evidence (Watts & Stenner, 2013). We identified three typologies that explained 62% of the total variance regarding freshman university agriculture students' projected motivations to enroll in a study abroad course: (1) *Goal-Oriented Students*, (2) *Social-Oriented Students*, and (3) *Learning-Oriented Students*. To discern each typology, we used significant statements from the concourse, with accompanying statement numbers and factor array positions noted in parentheses, as well as qualitative responses captured during follow-up interviews to provide a rich narrative of the study's findings. A description of each typology follows.

Typology #1 – *Goal-Oriented Students*

Eight participants, equally male and female, loaded significantly on the first typology, which accounted for 39% of the total variance. From *Goal-Oriented Students*' perspectives, their motivation to enroll in a study abroad course was primarily to further their educational and career-related aspirations (24, +4), i.e., it held *utility value* (Eccles et al., 1983). For example, they perceived including their experiences abroad on a résumé could help them be more attractive to potential employers (20, +4). As an illustration, one male high and pure loader shared: "My professors have said that international experience can make you more marketable for internships and other jobs, so that made me realize that I should probably plan to study abroad before I graduate." The *Goal-Oriented Students* were also motivated to enroll in a study abroad course in the future because they perceived it could help them achieve growth in key dimensions of their personal lives (4, +3). For instance, individuals holding this perspective reported they sensed study abroad courses might help them expand their horizons (28, +3) and learn to work with individuals from diverse backgrounds (19, +3). When probed during a post-sort interview about how a study abroad course might foster their personal development, one female high and pure loader revealed: "I have friends who have studied abroad and they talked about how the experience changed them. So, I think it would really push me to make me think differently." Table 3 offers statements from the concourse central to this typology.

Table 3
Array Positions for Goal-Oriented Students Statements

No.	Statement	Array Position	Theoretical Category
24[a]	Study abroad courses interest me because I believe it could help me develop employment skills.	+4	Utility Value
20[a]	Study abroad interests me because it could enhance my résumé.	+4	Utility Value
28	Studying abroad would help to expand my horizons and encourage personal development.	+3	Intrinsic Value

No.	Statement	Array Position	Theoretical Category
19[a]	A study abroad experience could help me better understand how to work with diverse populations.	+3	Utility Value
4[a]	Participating in study abroad course could help me be a better person.	+3	Attainment Value
10	The financial cost of study abroad discourages me.	-3	Cost Value
27	I'm afraid participating in a study abroad might distract me from other commitments and responsibilities.	-3	Utility Value
26	I worry that the credits obtained from studying abroad will not apply towards my degree plan.	-3	Utility Value
11[a]	The time away from my family and friends discourages me from participating in a study abroad.	-4	Cost Value
7	I am not interested in studying abroad because I do see value in the experience.	-4	Attainment Value

Note. [a]Indicates distinguishing statements for the *Goal-Oriented Students* typology.

Typology #2 – *Social-Oriented Students*

Driven by the social dimensions of study abroad courses, seven individuals represented the *Social-Oriented Students* typology. Of note, the *Social-Oriented Students* exhibited the most racial diversity of the identified typologies with four reporting they were white, one black, one Native American, and the other student identifying as mixed race. Further, the *Social-Oriented Students* were nearly equally divided between males (*n* =3) and females (*n* = 4). Individuals representing this typology maintained they were motivated by the potential to meet and network with new contacts (35, +4) and study abroad with friends and others in their social network (2, +4). Nevertheless, the financial cost associated with the experience served as a major deterrent to their decision enroll (10, +3). Case in point, one male high and pure loader revealed: "I have talked about it with some of my friends, but most of them [study abroad courses] were too expensive for me right now." *Social-Oriented Students* also reported they were driven by the opportunity to experience new food and culture (30, +3), which could help them expand their horizons and begin to think differently in the future (6, +3). As a result, from the perspective of individuals comprising this typology, study abroad courses were a valuable use of their time (7, -3). During a follow-up interview, one high and pure loader expanded on this notion: "Study abroad courses seem really fun but also seems like they could help you grow as a person." *Social-Oriented Students'* significant statements are presented in Table 3.

Table 4
Array Positions for Social-Oriented Students Statements

No.	Statement	Array Position	Theoretical Category
35[a]	Study abroad interests me because I enjoy meeting and networking with new people	+4	Intrinsic Value

No.	Statement	Array Position	Theoretical Category
2[a]	I am interested in study abroad because I have friends that will go with me.	+4	Attainment Value
10	The financial cost of study abroad discourages me.	+3	Cost Value
30[a]	I am interested in study abroad because I want to experience different types of food and culture.	+3	Intrinsic Value
6	A study abroad course interests me because meeting different types of people will help me think differently.	+3	Attainment Value
22	I am interested in studying abroad because I want to be more competitive for university level awards.	-3	Intrinsic Value
13	Concerns about my safety in a different country are a barrier to my participation in a study abroad.	-3	Cost Value
7	I am not interested in studying abroad because I do see value in the experience.	-3	Attainment Value
17[a]	The emotional toll of study abroad courses is a barrier.	-4	Cost Value
14	Concerns about communication barriers discourage me from studying abroad.	-4	Cost Value

Note. [a]Indicates distinguishing statements for the *Social-Oriented Students* typology.

Typology #3 – *Learning-Oriented Students*

The final typology, *Learning-Oriented Students*, represented students who were primarily female (4/5). From this perspective, motivation to enroll in a study abroad course was grounded in their curiosity to acquire new insights through global engagement, i.e., it held intrinsic value (Eccles et al., 1983). In particular, the *Learning-Oriented Students* desired to learn more about agricultural production practices in another country (31, +4). Further, they viewed study abroad courses as an attractive option because of its design, experiential nature, and because it served as an alternative method of instruction (32, +4). The *Learning-Oriented Students* also perceived that study abroad courses could help them learn to work with diverse and underprivileged populations (19, +3; 8, +3) as well as to create a positive change in the world (5, +3). Or, as one high and pure loader explained: "I want to make an impact on the world so I think a study abroad course could help me understand how I can impact agriculture in other countries."

Table 5
Array Positions for Learning-Oriented Students Statements

No.	Statement	Array Position	Theoretical Category
31[a]	Studying abroad interests me because I would like to see how agriculture is practiced in different countries.	+4	Intrinsic Value
32[a]	I am interested in study abroad because I want to experience a different teaching approach.	+4	Intrinsic Value

No.	Statement	Array Position	Theoretical Category
5 [a]	I am interested in studying abroad because I want to learn how to create positive change in the world.	+3	Attainment Value
19[a]	A study abroad experience could help me better understand how to work with people from diverse backgrounds in my future career.	+3	Utility Value
8	I want to study abroad because I want to expand my understanding of what it means to be underprivileged.	+3	Attainment Value
1	I'm not been interested in studying abroad because the courses do not align with my interests.	-3	Attainment Value
12	I am not interested in participating in a study abroad because being in an unfamiliar culture scares me.	-3	Cost Value
13	Concerns about my safety in a different country are a barrier to my participation in a study abroad.	-3	Cost Value
2[a]	I am interested in study abroad because I have friends that will go with me.	-4	Attainment Value
17	The emotional toll of study abroad courses is a barrier to my participation.	-4	Cost Value

Note. [a]Indicates distinguishing statements for the *Learning-Oriented Students* typology.

Conclusions

The purpose of this study was to understand freshman undergraduate agriculture students' projected motivations to study abroad. When viewed through the lens of the expectancy-value model (Eccles et al., 1983), findings suggested that students' motivations could be interpreted through three typologies: (1) *Goal-Oriented Students*, (2) *Social-Oriented Students*, and (3) *Learning-Oriented Students*. In particular, the *Goal-Oriented Students* expressed they were motivated to enroll in a study abroad course because they perceived it could enhance their educational and career-related ambitions through personal growth – a notion Eccles et al. (1983) described as utility value. This finding also aligns with those reported by Briers et al. (2010) that one of the primary motivations for university agriculture students to engage in international experiences is to enhance their competitiveness in their future careers.

Social-Oriented Students, the most racial diverse typology, articulated that the social dimensions of study abroad courses, i.e., networking, relationship-building, and opportunities to experience a new culture, served as their primary motivation – a notion that somewhat supports Eccles et al., (1983) description of intrinsic value. However, literature on the role social influences play in serving as a primary motivation for agriculture students, especially regarding racial minority groups, to study abroad is scant. Finally, the *Learning-Oriented Students*, who were primarily female, reported their desire to gain more agricultural knowledge, experience an alternative method of instruction, and learn to work with diverse populations provided intrinsic value (Eccles et al., 1983) to encourage them to enroll in a study abroad course in the future, which is supported by literature reported in agricultural education (Danjean, et al., 2015; O'Malley et al., 2019; Raczkoski et al., 2018). Our findings, therefore, provided important insights into

expectancy-value theory and practice regarding the design and delivery of study abroad courses. For instance, this study's findings could be used as a basis to explore new dimensions of expectancy-value (Eccles et al., 1983; Wigfield et al., 2009) regarding the need to more intimately understand the role that social dimensions play in foregrounding motivation. Finally, we conclude that cost value – financial, safety, and time related concerns – did not appear to profoundly influence the typologies distilled in this investigation (Eccles et al., 1983). As a consequence, our findings conflict with those reported by Raczkoski et al. (2018).

Implications, Recommendations, and Discussion

As the blurring of borders between nations threatens to intensify, agricultural capital, labor, and trade will likely become more globally integrated in the future (Mitchell & Nielsen, 2012). Such trends present daunting challenges for U.S. colleges of agriculture that have, historically, struggled to motivate students to enroll in educational opportunities abroad (IIE, 2019b). As a result, today's graduates appear ill prepared to tackle a world fraught by increasingly complex agricultural issues and problems (Alston et al., 2019). In response, the current study identified three typologies that represented freshman university agriculture students' projected motivations to enroll in a study abroad course. Moving forward, we recommend that university administrators and faculty consider carefully the motivational characteristics of agriculture students identified in this investigation and use this knowledge to create recruitment and communication campaigns intended to target students' diverse interests. We also recommend that future research explore the types of recruitment strategies that influence students' intentions and actualized behaviors (Ajzen, 1991) to participate. Further, because students reported that cost value (Eccles et al., 1983) was not a primary factor influencing their motivation, we recommend that colleges of agriculture emphasize the value-added characteristics of study abroad courses to increase the likelihood of student enrollment moving forward.

A unique aspect of this study was that we analyzed indicators of students' motivation to enroll in a study abroad course by interpreting how such coalesced holistically to form patterns of thought (i.e., the Q-sort factor loadings). As a result, this approach offered a more granular profile of freshman agriculture students' motivations. For example, much of the previous research on student motivation to study abroad has focused on assessing the contribution of individual variables (Beseli et al., 2016; Danjean, et al., 2015; Raczkoski et al., 2018). However, through the use of Q methodology, we demonstrated how key motivational factors combined, clashed, and fomented to form three dominant perspectives or typologies. By providing this gestalt level view, students' motivational needs can now be better accommodated through tailored programming. As such, we recommend that faculty who lead study abroad courses not only dedicate curricular space to engage students in agriculture-related content but also provide opportunities for students to reflect, individually and socially, on career advancement, being more inclusive of diverse groups and perspectives, networking, relationship-building, and the integration of their learning abroad into their daily lives.

Although our intent was not to generalize from the study's findings (Brown, 1980), the demographic composition of typologies, particularly the *Social-Oriented Students'* and *Learning-Oriented Students'* perspectives, warrant further study to examine whether such dimensions are transferable across contexts. Also, because of students' emphasis on aspects of attainment, intrinsic, and utility values (Eccles et al., 1983) in this study, more research is needed

to describe how these variables converge and diverge to shape motivation. Perhaps more intimately defining students' motivational schemas can attain a better understanding of how to foster students' perspective transformations (Mezirow, 2000) on global agricultural issues during their experiences abroad. Further, future research should also explore the specific programmatic aspects that significantly affect student motivation. This study's findings also opened up additional questions that warrant future consideration. First, what are the effects of recruitment strategies that target students' motivational interests over time in comparison to individual course-focused campaigns that are more short-term in form and function? And finally, which academic, career, cultural, and personal experiences most profoundly contribute to motivating and deterring students from studying abroad?

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Job Satisfaction, Stress, Work Engagement, Work-life Balance, and Occupational Commitment of Extension Professionals

Abstract

The purpose of this study was to identify and determine factors related to career retention and to explore the relationships between work engagement, work-life balance and occupational commitment of early and mid-career county Extension agents in Texas. This study included a census of all county Extension agents with zero to 10 years of service (N=268), with a response rate of 90.85%. The survey instrument was constructed from previously authored instruments to measure the variables of interest. The study included a self-reported level of stress and a self-reported level of job satisfaction, using a Likert-type scale. The combined instrument evaluated work engagement, occupational commitment, work family balance, stress, and job satisfaction. Independent samples t-tests proved no significant differences in stress or job satisfaction based on educational background. Agents who had previously experienced student teaching had a slightly higher level of job satisfaction. The results revealed relationships of noteworthy magnitude between stress and occupational commitment; stress and perceptions of work family balance; and stress and work interfering with family. Lastly, relationships with magnitude of interest between job satisfaction and occupational commitment; job satisfaction and vigor; job satisfaction and dedication; and job satisfaction and absorption, were observed.

Introduction/Theoretical Framework

Cooperative Extension educates clientele in the areas of agriculture, environmental stewardship, youth and adult life skills, human capital and leadership, and community economic development. The Texas A&M AgriLife Extension Service has a county program in all counties within the state. The Extension program educates clientele in the areas of agriculture, environmental stewardship, youth and adult life skills, human capital and leadership, and community economic development. According to Safrit and Owen (2010), keeping county extension agents in their positions is challenging. When professionals leave positions vacant, the needs of the citizens are unmet, educational programs suffer and countless agency dollars are wasted. Several previous studies have indicated county agents leave their positions for various reasons. Cooper and Graham (2001) identified 57 competency areas the Extension agents need to be successful in their jobs. This confirms that the job of the agent is diverse and difficult.

Extension programs have struggled with employee retention for more than three decades. Poor morale, job dissatisfaction, burnout, and turnover concern Extension administrators and agent professional associations (Whaples, 1983). Church and Pals (1982) reported Idaho agents left their positions partly because their jobs required evening and weekend work. Church and Pals (1982) also reported that agents retained their positions because of job flexibility, diversity, freedoms, and relationships with the public.

It was reported 21 Extension agents with five years of experience of less separated from the Texas Extension System in 2011. This number increased 61.99% to 34 in 2012 and that same year, agents with five years or less accounted for 72.34% of the agencies non-retirement separations. The total agency turnover for 2012 was 8.5% within the state (Dromgoole, 2013).

Dromgoole (2013) also reported in 2012, the average tenure for agents departing from the agency was 5.53 years.

This study was guided by the Herzberg's motivation-hygiene theory, also known as the two-factor theory (Herzberg, Mausner, & Snyderman, 2010). The theory states there are certain factors in the workplace that cause job satisfaction, while a separate set of factors cause dissatisfaction. The theory indicated the factors that contributed to satisfaction were different from those which caused dissatisfaction. Herzberg developed the motivation-hygiene theory to explain his results. The factors which satisfy an employee are deemed *motivators* and factors which lead to dissatisfaction are coined *hygiene factors* or may also be termed *maintenance factors*. Herzberg's separation of the two domains is based on Maslow's hierarchy of needs (Maslow, 1943).

Herzberg et al. (2010) indicated the division between the two domains of job satisfaction is closely related to Maslow's hierarchy of needs, where physiological basic needs, safety, belonging, and self-actualization are met but they are on different levels of the phenomena (Maslow, 1943). Herzberg et al (2010) contended that the factors leading to one's physiological needs are met through working conditions, pay, and other factors that allow one to function. The external or extrinsic characteristics trigger one to be dissatisfied if working without the basic requirements while on the job. An example of a working condition, which is an external factor, was an employee's parking place.

The intrinsic characteristics of an individual are the motivators, which lead to one's satisfaction (Herzberg et al., 2010). Maslow's (1943) explained self-actualization; the work responsibility, achievement, and advancement cannot be met by the external factors, according to Herzberg et al. (2010). The level of success one senses of work accomplishment comes from within, and is what leads to an employee's professional growth.

Maslach (1982) defined stress as the reaction of the body to physical or environmental change. Maslach identified three categorical stages one experiences: emotional exhaustion, depersonalization, and reduced personal accomplishment. Maslach indicated working with people is a prominent job related stressor. Much of Maslach's work involved professionals emotionally involved with their clientele (e.g. teachers and policemen). More specific explanation from Maslach detailed the inability of the professional unable to emotionally leave work behind when going home at the end of a work day. County Extension Agents, for example, may endure the consequences of the stress due to the emotional demands of the job. According to Maslach, elimination of the stress is not achievable. Consequently, prevention and control of stress can lead to the prevention of becoming overstressed. The condition of burnout is believed to be a result of unrelieved stress, leading to the lack of experiencing personal accomplishment.

Purpose and Objectives

The purpose of this study was to measure job satisfaction and stress of county Extension agents in Texas and to explore the relationships between work engagement, work-life balance and occupational commitment of early and mid-career county Extension agents in Texas. The research objectives guiding this study were:

1. Compare stress and job satisfaction of all respondents regarding education type and formal teaching experience.

2. Compare work life balance, work engagement, and occupational commitment of early and mid-career Extension professionals.

3. Determine if there is a relationship between a county Extension agent's work life balance and their work engagement in regard to occupational commitment based on level of stress.

4. Determine if there is a relationship between a county Extension agent's work life balance and their work engagement in regard to occupational commitment based on level of job satisfaction.

Methods/Procedures

This study was a descriptive and correlational research investigation to measure the relationships which may exist between: job satisfaction, stress, work engagement, occupational commitment, and work life balance of county Extension agents in Texas. This study was conducted using descriptive correlational research procedures to explore the relationships which may exist between one or more variables, without any attempt to influence them. This work conducted in this investigation did not attempt to establish cause and effect, but identify relationships which may make it possible to predict the score of one variable based on the score of another (Fraenkel & Wallen, 2006).

The variables of interest for this study were: the degrees of work engagement, work-life balance, occupational commitment, stress, and job satisfaction experienced by early and mid-career county Extension agents in Texas. Agents with zero to five years of experience were classified as early career; and agents with five to 10 years of experience were classified as mid-career agents. The correlational design allowed the researcher to measure the magnitude of the relationships possibly influencing the agents' levels of stress and job satisfaction.

This study included a large geographical area; therefore, an electronic (web-based) questionnaire was the most reasonable means of dissemination and data collection. The instrument utilized in this study was assembled in the online system, Qualtrics. The questionnaire was ubiquitous, and all participants were asked the same questions. The accessible population was 298 professionals in the Texas Extension system. The procedures in the data collection effort generated a response from $N = 268$ participants, a response rate of 90.85%.

The research team employed sections from four instruments which had been previously been used to study agricultural science teachers (Cheney, 2007). Ricketts and Bruce (2009) disclosed t agricultural teachers and Extension agents seem to have similar ideas concerning personal perceptions, motivations, and experiences regarding cooperation between the fields. Combined, the instrumentation used for this study was comprised of pieces from four different instruments and used independently by the researcher to measure the independent variables of concern.

Work engagement was measured with the Utrecht Work Engagement Scale (UWES) authored by Schaufeli et al. (2006). The UWES also measured three variables of work engagement: vigor, dedication, and absorption. Work-life balance was measured using two previously authored instruments. Five questions from Chaney (2007) were used to measure perceptions of balance. Chaney categorized the items to measure: balance achievement and belief in balance. Eight items from Gutek et al. (1991) were utilized to measure work interfering with family and family interfering with work. Items from Chaney (2007) and Gutek et al. (1991) were combined to provide an overall score for work-life balance. Lastly, occupational commitment was measured using 11 items from an instrument authored by Blau et al. (1993). The alpha level for determining statistical significance was established a priori at 0.05 ($\alpha = .05$).

Results/Findings

Regarding stress, there was no statistical difference between county Extension agents who had previously served as a classroom teacher and those who had not ($p > .05$). There were also no significant differences in stress when comparing county Extension agents who have a degree related to education ($p > .05$). Lastly, there was no significant difference in stress of agents that had completed student teaching as compared to those who had not student taught (see Table 1).

Table 1
Summary of Independent Samples T-Tests and Mean Scores of County Extension Agent Stress

Treatment	*N*	*M*	*SD*	*t*	*P*	*r*
Previous Classroom Teacher	95	55.35	23.75	-1.04	0.30	0.06
Never a Classroom Teacher	169	58.25	20.69			
Degree Related to Education	112	57.76	20.32	0.35	0.73	0.02
Degree Not Related to Education	152	56.80	22.95			
Completed Student Teaching	88	58.23	22.03	0.55	0.59	0.03
Did not Student Teach	176	56.70	21.79			

Note. Data was collected on percentage scale from zero to 100. Potential scores range from 0 to 100.

Regarding job satisfaction, participants who did complete student teaching had a slightly higher level of job satisfaction ($p < .05$). There were no significant differences in job satisfaction of county Extension agents based on education type and previous experience as a classroom teacher ($p > .05$) (see Table 2).

Table 2

Summary of Independent Samples t-test and Mean Scores of County Extension Agent Job Satisfaction

Treatment	*N*	*M*	*SD*	*t*	*P*	*r*
Previous Classroom Teacher	95	74.52	21.26	1.32	0.19	0.08
Never a Classroom Teacher	169	70.89	21.39			
Degree Related to Education	112	74.69	20.80	1.63	0.10	0.10
Degree Not Related to Education	152	70.36	21.67			
Completed Student Teaching	88	77.10	20.78	2.65	0.01	0.17
Did not Student Teach	176	69.76	21.30			

Note. Data was collected on percentage scale from zero to 100. Potential scores range from 0 to 100.

Lastly, the researcher calculated mean scores and descriptive statistics of job satisfaction and job stress across all the participants. The results are shown in Table 3.

Table 3

Mean Scores for Total Job Satisfaction and Job Stress of county Extension agents in Texas (N=264)

Characteristic	*M*	*SD*	Range
Job Stress	57.21	21.84	3 - 100
Job Satisfaction	72.20	21.37	3 - 100

Note. Data was collected on percentage scale from zero to 100. Potential scores range from 0 to 100.

An independent sample *t*-test was conducted to determine if there were differences in overall occupational commitment based on career phase of the participant. On average, mid-career agents had a slightly higher level of occupational commitment (M=3.68, SE=.10) than early career agents (M = 3.53, SE = .07) but this difference was not statistically significant (p > .05, r = -0.09).

The overall results for independent *t*-tests comparing the overall work-life balance, work engagement and occupational commitment for early career and mid-career county Extension agents is displayed in table 4.

Table 4

Independent Samples T-Test - Mean scores of county Extension agent Work-Life Balance, Work Engagement, and Occupational Commitment

Treatment	*N*	*M*	*SD*	*t*	*P*	*r*
Early Career-Work-Life Balance	129	2.99	0.39	-0.14	0.89	-0.01
Mid-Career- Work-Life Balance	65	3.00	0.32			
Early Career- Work Engagement	129	4.91	0.82	-.40	0.67	-0.03
Mid-Career- Work Engagement	67	4.96	0.65			
Early Career- Occupational Commitment	134	3.53	0.85	-1.2	0.23	-0.09
Mid-Career- Occupational Commitment	64	3.68	0.84			

A Pearson Product Moment correlational analysis was conducted between all of the factors of work engagement (vigor, dedication, and absorption), the factors of work life balance (perceptions of work life balance, work interfering with family, and family interfering with work), occupational commitment, and job stress. In an effort to better explain the results, professional life phase was included in the analysis, to determine if any relationships might exist. This correlational analysis was used to find more specific areas where relationships may exist among the variables. The analysis revealed a correlation (r = .47) of moderate magnitude (Davis, 1971) between job stress and work interfering with family. The analysis also revealed a negative correlation (r = -.52) of substantial magnitude between job stress and perceptions of work life balance. The results are displayed in Table 5.

Table 5

Pearson-Product Moment Correlations (r) Between Professional Life Phase, Occupational Commitment, Factors of Work Family Balance, Factors of Work Engagement and Stress

Variable	1	2	3	4	5	6	7	8	9
1) Professional life phase	-	.09	-.17	.17	.04	.23	-0.2	.04	.12
2) Occupational commitment	-	-	.33	.17	.04	.65	.69	.51	-.32
3) Perceptions of work family balance	-	-	-	.60	-.09	.31	.22	.10	-.52
4) Work interfering with family	-	-	-	-	.22	-.06	.00	.17	.47
5) Family interfering with work	-	-	-	-	-	.26	.21	-.13	.13
6) Vigor	-	-	-	-	-	-	.80	.80	.23
7) Dedication	-	-	-	-	-	-	-	.75	-.15
8) Absorption	-	-	-	-	-	-	-	-	-.03
9) Job Stress	-	-	-	-	-	-	-	-	-

$p < .05$ a priori

Based on the magnitude of the correlations between job stress and occupational commitment (-.32), job stress and perceptions of work life balance (-.52), and job stress and work interfering with family (.47), a regression analysis was performed to determine the amount of variance in job stress that could be attributed to occupational commitment and two factors of work life balance.

The coefficient of determination yielded 34% variance of stress as explained by the influence of occupational commitment, perceptions of work family balance and work interfering with family ($R^2 = .34$, $p < .05$). Table 6 summarizes the relationship between stress and the independent variables.

Table 6

Regression Analysis Between Occupational Commitment, Perceptions of Work Family Balance and Work Interfering with Family on Job Stress

Variable	*R*	R^2	*B*	*SE*	β
Model	0.58	0.34			
Occupational Commitment*			-3.54	1.55	-0.14
Perceptions of Work Family Balance*			-7.84	1.87	-0.32
Work Interfering with Family*			6.04	1.75	0.25

Note: Adjusted R^2=.33. For Model: $F_{(2,216)}$=36.40; p<.05. *p < .05

In an effort to better understand the relationships between the variables, the researcher conduced a Pearson Product Moment correlation between job satisfaction, and the variables of work engagement (vigor, dedication absorption), variables of work life balance (perceptions for work like balance, work interfering with family, family interfering with work), and occupational commitment. The more in-depth correlational analysis revealed correlations of substantial magnitude (Davis, 1971) between job satisfaction and occupational commitment (r = .67), vigor (r = .61) and dedication (r = .57). The correlation results are displayed in table 7.

Table 7

Pearson-Product Moment Correlations (r) Between Professional Life Phase, Occupational Commitment, Factors of Work Family Balance, Factors of Work Engagement and Job Satisfaction

Variable	1	2	3	4	5	6	7	8	9
1) Professional life phase	-	.08	-.17	.17	.04	.02	-.02	.04	.05
2) Occupational commitment	-	-	.33	-.27	-.29	.65	.69	.51	.67
3) Perceptions of work family balance	-	-	-	.60	-.09	.31	.22	.10	.39
4) Work interfering with family	-	-	-	-	.22	-.06	.00	.17	-.12

5) Family interfering with work	-	-	-	-	-	-.26	-.21	-.13	.08
6) Vigor	-	-	-	-	-	-	.80	.80	.61
7) Dedication	-	-	-	-	-	-	-	.75	.57
8) Absorption	-	-	-	-	-	-	-	-	.49
9) Job Satisfaction	-	-	-	-	-	-	-	-	-

$p < .05$ a priori

Based on the magnitude of the correlations between job satisfaction and occupational commitment and factors of work engagement a regression analysis was performed to determine the amount of variance in job satisfaction that could be attributed to work engagement factors and occupational commitment. The coefficient of determination yielded 47% variance of job satisfaction as explained by the influence of occupational commitment and factors of occupational engagement ($R^2 = .47$, $p < .05$) (See Table 8).

Table 8

Regression Analysis Between Occupational Commitment and Factors of Work Engagement on Job Satisfaction

Variable	*R*	R^2	*B*	*SE*	β
Model	0.69	0.47			
Occupational Commitment*			10.25	1.74	0.42
Vigor*			6.47	2.38	0.26
Dedication			2.88	2.17	-0.06
Absorption			-1.39	2.00	-0.06

Note: Adjusted R^2=.46. For Model: $F_{(4,215)}$=38.27; $p < .05$. *$p < .05$

Conclusions/Recommendations/Implications

Most of the participants in this study had never served as a classroom teacher, not completed student teaching and did not have a degree related to education. There were more than 50% of the participants who did not prepare for a job in education during college or their previous career. There were no differences in job satisfaction or stress between those who had a degree in education and those who did not. There were no differences in job satisfaction or stress between those who had previously served as classroom teachers and those who had not. Those who had completed their student teaching did have slightly higher job satisfaction rate

Participants' vigor, dedication, absorption, and work engagement are not related to their professional life phase. Participants who have served as agents for five years or longer do not have higher vigor, dedication, absorption, or work engagement than those who have served less than five years. These findings imply years of experience are not necessarily related to the job

factors involving work and personal life balance. These results vary from Chaney (2007) where other secondary agricultural educators experience did appear to lead one to leave the profession due to a lack of work and family balance. The results of this investigation displayed indication there was not a strong relationship between professional life phase and work life balance.

There were no indications from these data implying those who have a degree in the field of education or have previously served as a classroom are less stressed or have a higher level of job satisfaction than agents who did not have those previous experiences. Agents who completed student teaching did have a slightly higher job satisfaction rate than agents who did not student teach or graduate from a teacher education preparation program. This reveals that Extension agents who prepared for a career as a county Extension agent did not see significant benefit in terms of reduced stress or increased job satisfaction. According to the Texas Extension website, "a county Extension agent's primary role is to inform and teach" (Texas A&M AgriLife Extension Service, 2019). The Texas A&M AgriLife Extension Service may want to consider this finding when recruiting potential professionals with diverse degrees in other areas of agriculture and not limiting them to an educational background.

There were relationships of notable magnitude between stress and perceptions of balance, occupational commitment and work interfering with family. The levels of stress indicated among the early career Extension agents regarding connections to commitment and conflicts with personal lives should be explored further. Some stress is good stress, but an accurate measure of potential attrition should be identified.

There was no relationship between job satisfaction, stress, work engagement, occupational commitment, and work life balance and professional life phase. Ensel (2005) suggested that job satisfaction is one of the most important keys to being a successful agent. On a scale from zero (extremely dissatisfied) to 100 (extremely satisfied) the average score of 72.2 represents that the overall job satisfaction is above 70% satisfied. More participants are satisfied with job than dissatisfied. The summated for total job satisfaction for county Extension agents in Texas aligns with the findings from Harder, Gouldthorpe and Goodwin (2014), approximately 80% of Extension employees find some level of satisfaction with their job.

The overall stress level of the participants was 57.21. This somewhat differed from findings reported by Fetsch, Flashman, and Jeffers (1984) reflecting that Extension was a high stress occupation. Lakai et al. (2014) emphasized the need for additional training for Extension agents to manage stress while balancing their job and personal life. As an agent's perception of balance increases their stress is reduced. As work interferes with family less, stress is reduced. As an agent's stress is reduced, their occupational commitment is increased. An agent's job satisfaction decreases as stress increases. An agent with less stress has a higher level of job satisfaction. When an agent has high job satisfaction they also have high commitment to their occupation, dedication, vigor and absorption.

There is a need to study causation and factors specific to agricultural educators involving the research areas of job stress, job satisfaction, work engagement, occupational commitment, and work life balance. Ensle (2005) pointed out young Extension agents with childcare or adult daycare needs have a serious need for flexible work schedules. Ensle (2005) also noted when Extension work takes precious time away from family, agents experience higher levels of stress

and burnout. Interestingly, work interfering with family only had a negligible relationship with job satisfaction.

These results indicate a moderate linear relationship, when an agent's work interferes with family stress level is increased. A qualitative study could be useful in determining what is contributing to agents' overall stress and job satisfaction. What factors are contributing to high and low job satisfaction and what agency factors are contributing to high and low stress? What specific factors are causing agents to sacrifice their families for their jobs? Chandler (2005) found that increased job stress is one reason why Texas county Extension agents may choose to leave the profession. The Texas A&M AgriLife Extension Service should continue to seek an environment where agents can achieve balance between their professional and personal responsibilities. Herbert & Kotrlik (1990) found a direct correlation with Extension agents' spouses' satisfaction and agents' stress level. It is further recommended to study the relationship and factors influencing agent spousal satisfaction.

As a result of the findings within this study regarding the county agents, an investigation to further analyze the relationship between work interfering with family is recommended. What kind of more accurate interferences can be obtained regarding what professionals may be sacrificing at home to do their jobs? A more intensive study could possibly allow for further training opportunities for Extension professionals to change to moderate the level of work interfering with family and personal interests. Do those who leave the agency do so as a result of a poor work life balance?

The researcher further recommends a study be conducted to determine if local leadership and Extension administration have an effect on work engagement, occupational commitment, work life balance, stress, and job satisfaction. If differences are found, further research should be conducted to find what attributes local administration have that are causing extreme high or low values for the variables. Future studies should investigate job satisfaction and stress of county Extension agents based on military experience or other pre-employment variables such as education. Additional recommendations for practice include research and data collection with employees who have departed the agency early in addition to retired professionals. Further discovery could determine the level of job satisfaction and stress at the time of departure and link those factors to the retention of county Extension agents in Texas.

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Understanding the Phenomenon of Undergraduate Leadership Experiences in Student Organizations

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Leaders are needed to address the agriculture industry's increasingly complex and interconnected problems. Colleges of agriculture who offer leadership development coursework and degree programs also often support student organizations to provide critical everyday opportunities for students to practice leadership in an authentic environment. This qualitative case study examined undergraduate students' perceptions of, and experience with, leadership in student organizations in one Midwestern college of agriculture. Results indicated that students participated in student organizations to find students with similar interests, connect with potential employers, and improve their own employability. Results also indicated that leadership was typically conflated with position, and that transactional approaches to leadership were most common. This study has implications for administrators and faculty responsible for advising student organizations, and, more broadly, for leadership development programs in colleges of agriculture.

Gradually, since the late 20th century, people have begun to recognize the interconnectedness and interdependence of the complex problems we face (Rost, 1993, 1997). Today, the accelerated pace of technological change has, for better or worse, only served to increase those interdependencies and interconnectedness, and created truly complex and wicked problems (Grint, 2005; Western, 2019).

Agriculture has its own set of complex problems. The most pressing stem from global population growth, which is expected to top 9.725 billion people in 2050 (Andenoro, Baker, Stedman, & Pennington Weeks, 2016; United Nations, 2015). Aside from the basic how-will-we-

feed-all-these-people question, there are also questions of space, natural resource management, energy consumption, and the all-pervasive issue of climate change (Andenoro, et al., 2016).

The need for understanding these complex problems, and how to begin to resolve them, is such that the American Association for Agricultural Education (AAAE) has identified "Addressing Complex Problems" as one of seven research priorities in its most recent National Research Agenda (Roberts, Harder, & Brashears, 2016). Though technological solutions will certainly be used to combat these problems, the underlying issues are often of human values, priorities, and behaviors. Andenoro and colleagues (2016) write, "While technology may play a role in development of solutions that can address these challenges, without mass attitude shifts leading to widespread behavioral change, we will not sustain our global population" (p. 59).

Inciting mass attitude shifts and widespread behavior change is usually considered the domain of leadership. Indeed, evolutionary biologists postulate that one of the reasons for the principle of the universality of leadership (Bass & Bass, 2009) is that leadership is an evolutionary advantage innate to humans that affords us some measure of social coordination when we are forced to adapt to environmental challenges (Van Vugt, Hogan, & Kaiser, 2008). Complex adaptive systems theorists similarly classify leaders and leadership as a kind of catalyst or facilitator of change in complex adaptive systems (Uhl-Bien, Marion, & McKelvey, 2007). More applied leadership scholars believe that the primary purpose of leadership is to help organizations, communities, and societies make adaptive social changes in the face of environmental dangers. Leadership becomes necessary when logical argument fails to sway people to change their values and behaviors (Heifetz, 2009).

Not surprisingly, leadership is recognized by employers in the agriculture sector as a critical applied skill for college graduates to possess in order to begin to address these complex problems in the workplace (Crawford, Lang, Fink, Dalton, & Fielitz, 2011). Leadership skills, according to Crawford and colleagues (2011), encompasses the following: (a) seeing the big picture, (b) recognizing when to lead and when to follow, and (c) recognizing when change is needed and being willing to lead that change effort, among others.

Colleges of agriculture have long had an interest in the development of leadership skills and abilities among those bound for the agriculture industry (Astin, 1996). The sharp increase in leadership development programs on college campuses can be seen as evidence of both the perceived need for leadership development in graduates and, ultimately, the importance of leadership in society (Engbers, 2006; Ewing, Bruce, & Ricketts, 2009).

While we typically think of leadership development in college as taking place inside the classroom, colleges often use informal opportunities (e.g., student organizations) to grow students' leadership capabilities (Boatman, 1999; Ewing, Bruce, & Ricketts, 2009). Layfield, Radhakrishna, and Andreasen (2000) found that one of the most important aspects of developing leadership skills is the opportunity for students to practice leadership in their everyday lives, particularly in college or departmental organizations. Layfield et al. recommend college students "be provided with opportunities for involvement in community activities and college departmental organizations" (2009, p. 62).

However, despite this sustained effort among colleges of agriculture to prepare graduates with leadership skills to face complex problems in the agriculture industry, employers across many sectors, including agriculture, report "an increasing gap between the content and skills

taught in educational institutions and the needs of industry" (Finch, Hamilton, Baldwin, & Zehner, 2013, p. 696). "Employers report hiring substantial numbers of new entrants who are poorly prepared, requiring additional company investment to improve workforce readiness" (Casner-Lotto, Rosenblum, & Wright, 2009, p. 4). This is particularly the case for applied (soft) skills, leadership among them.

This leads us to generally question the nature of leadership education experiences in colleges of agriculture — particularly those related to student involvement in student organizations. Students' perceptions of campus organizations' abilities to enhance their leadership skills may well be negative (Ewing, Bruce, & Ricketts, 2009). Our limited understanding of students' experiences in these organizations, and their perceived impact on students' leadership development, prevents us from making meaningful changes, or additions, to the student organization experience in order to better prepare tomorrow's leaders to combat complex problems.

Theoretical Framework

This study utilizes the Leadership Identity Development (LID) Model (Komives, Owen, Longerbeam, Mainella, & Osteen, 2005; Komives, Longerbeam, Owen, Mainella, & Osteen, 2006;), developed through a grounded theory qualitative study of college students' perceptions of their own leadership development. The LID model is derived from the grounded theory of the same name, and includes six stages that would-be leaders might progress through during their lifetimes. Stage 1 is "Awareness." In this stage, individuals become gradually aware that leadership is a phenomenon, but it is generally understood as something that others do. Stage 2, "Exploration/Engagement," occurs when individuals seek to become intentionally involved in group activities, such as clubs or sports; they become active followers or members in a group. Stage 3, "Leader Identified," is a critical point in leadership development. Individuals in this stage will explore new roles, take on greater responsibility, and begin to recognize their own leadership potential. Indicators of stage 3 are: (a) seeing leadership as being tantamount to position, (b) dichotomous leader-follower roles, and (c) authoritarian approaches to leadership. Stage 4, "Leader Differentiated," is a major shift in leadership development. In contrast to stage 3, indicators of stage 4 include: (a) belief that leadership can and should come from anywhere in the group and be non-positional, (b) seeks to engage a wide variety of group members, positional or non-positional, to accomplish group tasks, and (c) employs more democratic leadership styles. Stage 5, "Generativity," is typified by individuals accepting responsibility for the development of others and self, and responsibility for sustaining the organization by developing a leadership pipeline. Finally, in stage 6, "Integration/Synthesis," individuals recognize and embrace the following: leadership is a lifelong developmental process; organizations exist in complex interconnected ecosystems; and a need to leave things better (Komives, et al., 2006).

Problem Statement

Our limited understanding of students' leadership experiences in student organizations, and their perceived impact of those experiences on their own development, prevents us from making meaningful changes, or additions, to the student organization leadership experience in order to better prepare tomorrow's leaders to combat complex problems. This qualitative case study will investigate undergraduate students' leadership experiences and perceptions in The University of Missouri's College of Agriculture, Food & Natural Resources' clubs and organizations.

Purpose & Objectives

This purpose of this case study is to explore the University of Missouri's College of Agriculture, Food & Natural Resources (CAFNR) undergraduate students' perceptions about and engagement in leadership through student organizations. The study was guided by the following objectives:

1. Describe CAFNR undergraduate students' participation and engagement in CAFNR student organizations.
2. Describe CAFNR undergraduate students' perceptions of their leadership experiences in CAFNR student organizations.

Narratives from CAFNR students involved in this study will be valuable in helping educators and administrators gain understanding of the phenomenon of undergraduate leadership experiences within the CAFNR student organizations. This study may provide perspective about the leadership experiences of undergraduates in student clubs and organizations in other colleges of agriculture. This would help to fill the knowledge gap identified by Ewing et al. (2009), and aid colleges of agriculture in better preparing graduates to address complex problems (Andenoro, et al., 2016) through the highly impactful learning experience of student organization participation (Layfield, Radhakrishna, and Andreasen, 2000).

Methods

This study stems from a social constructivist interpretive framework, which states that meaning is constructed through interactions with other people, the world, and interpretations of those shared interactions (Berger & Luckman, 1966). As researchers and authors, it is important for us to unpack the philosophical beliefs that form the foundation of this framework. From an ontological perspective, social constructivism is built on the belief that multiple realities are constructed through those interactions and experiences. This study relied on co-construction of reality between the researchers and participants. Additionally, participants' individual values were honored. A literary style of writing using rich, thick description was used to paint the multiple (sometimes contrasting) realities and values of the study participants (Creswell, 2013).

Our five-member research team are faculty members of Agricultural Education & Leadership at the University of Missouri's (Mizzou) College of Agriculture, Food & Natural Resources. Three of the team members received their undergraduate and/or graduate degrees from the University of Missouri. Each member of the research team is involved in teaching CAFNR undergraduate students. Two of the four are undergraduate advisors, and four advise CAFNR clubs or organizations.

Research Design

Case study research allows for detailed, rich description of a case due to triangulation of multiple forms of data (Creswell & Poth, 2018). A single intrinsic case study approach was used to explore a bounded system (CAFNR clubs and organizations at Mizzou) over time through multiple in-depth data collection methods (Creswell, 2013). The intrinsic case study design was utilized since we were interested in exploring and detailing the unique situation of participation, engagement, and leadership in CAFNR clubs and organizations.

Data Sources and Collection

We collected three unique kinds of data: focus group interviews, observations, and documents.

Focus Group Interviews

Researchers conducted two rounds of semi-structured focus group interviews with officers in CAFNR organizations who attended the October and November CAFNR Student Council meetings. Focus groups allow participants to hear each other's responses and add their own comments to those responses (Patton, 2002). The first round included three focus groups, each comprised of 10-12 undergraduate students. The second round included two focus groups, each comprised of 7-10 undergraduate participants. Questions for the focus groups included background questions, experience and behavior questions, opinion and value questions, feeling questions, hypothetical questions, and ideal position questions (Patton, 2002). The second round of focus group interviews was designed to obtain deeper insight about issues that arose during the first round of interviews, observations, and document analysis. Each focus group interview was 25-35 minutes in length.

Observations

A total of six hours of observations were conducted at three different events. These observations helped to further inform key concepts that surfaced during document analysis and initial focus group interviews (Stake, 1995).

Two members of the research team observed the CAFNR Fall Round-Up, which is held annually in September. The purpose of the event is to provide an opportunity for all students to come together in one place and showcase their respective CAFNR organizations. Next, the same researchers observed two CAFNR Student Council business meetings; the first was held in October, and the second in November. Each CAFNR student organization is required to have two representatives (usually officers) at the Student Council meetings; thus, observing these meetings allowed researchers to view officers from each separate CAFNR organization simultaneously. Observations of CAFNR Fall Round-Up and CAFNR Student Council meetings specifically focused on gathering further information about issues that were emerging in focus groups and document analysis, interactions among students, and subtle factors such as dress and body language. As suggested by Patton (2002), researchers also considered "what did not happen, especially if it ought to have happened," during these observations (p. 295). Researchers spent time immediately after the observations writing reflective memos about what they had observed.

Document Analysis

The research team analyzed the CAFNR website for information about the 50 organizations that are associated with the college. Additionally, the team viewed CAFNR social media posts and flyers advertising events from the various CAFNR organizations over a three-month period. Researchers considered the purpose of the documents, as well as how the documents could provide deeper understanding of CAFNR organizations. Documents were used to help provide context about clubs and organizations that could not be observed. Additionally, documents helped the research team confirm or disconfirm data through focus group interviews and observations (Stake, 1995).

Data Analysis

The research team chose to use the constant comparative method for data analysis (Glaser & Strauss, 1967). Data analysis was an ongoing process during the three months this study was conducted. Focus group interviews were sent to a transcription service immediately after researchers conducted each round of focus group interviews. Each member of the research individually read the first round of focus group interview transcripts, the first set of field notes and reflective memos, and viewed the CAFNR websites, flyers, and social media posts.

Researchers began with following steps: (a) identifying the phenomenon of interest, the student leadership experience in CAFNR clubs and organizations; (b) identifying key concepts of the phenomenon; (c) making data collection decisions based on our initial understanding of the phenomenon; (d) engaging in purposeful and relevant sampling of groups and subgroups to allow categories to emerge (Glaser & Strauss, 1967, pp. 28-52).

Data were coded using open, axial, and selective coding (Corbin & Strauss, 2007). During open coding, relevant data were tagged. Open coding was performed by each member of the research team individually. During axial coding, the team related categories of data to each other. Core categories of data were identified during the selective coding phase. The research team worked together to conduct the axial and selective phases of data analysis, transforming data into categories and themes. This process continued throughout the duration of the study as a deeper understanding of the phenomenon occurred (Strauss & Corbin, 1990).

Case Description

We selected a bounded single case study to explore the phenomenon of interest: undergraduate leadership experiences in student organizations. We purposefully selected the CAFNR at Mizzou because of its claims of developing student leadership ability and expressed intention to prepare students for a complex, interconnected world.

CAFNR is a land grant institution located in a Midwestern state in a town of approximately 110,000 people. The university enrolls nearly 30,000 students; approximately 2,400 are pursuing undergraduate degrees in CAFNR. The college is comprised of six divisions and offers 12 different undergraduate degrees. More than 50 student organizations are associated with the AFNR college. Ranging from six members to over 100, these organizations provide opportunities for students to get involved outside of the formal classroom. There are a broad range of experiences available, including those that focus on skill development (e.g., Agricultural Communicators of Tomorrow), social development (e.g., agricultural sororities and fraternities), policy (e.g., Farm Bureau), and special interests (e.g., Wildlife Society).

Trustworthiness

Guba (1981) suggests four constructs that contribute to trustworthiness in qualitative research: credibility, transferability, dependability, and confirmability. Data source triangulation, methodological triangulation, and investigator triangulation contribute to credibility. Findings are communicated with rich, thick descriptions, contributing to the transferability of this study. Keeping a detailed audit trail of all phases of the study, including the data analysis and coding process, enhanced the dependability and confirmability of the study. Additionally, carrying out this project throughout the entire semester (an extended period of time) promoted dependability.

Limitations

We acknowledge the limitations to this study It is probable that students held back some of their deepest criticisms or concerns regarding the phenomenon of undergraduate leadership experiences due to the fact that in many cases, the researchers are also their professors. Although we cannot generalize this study beyond this case, findings can be transferable knowledge to others who may work with similar groups of students.

Findings

Five themes emerged from the data: (a) Enjoying the present, preparing for the future; (b) Commitment and social pressure; (c) Perceptions of leadership role; (d) Perceptions of organizational success; and (e) The CAFNR culture. Participant quotes and researcher observations help to describe each of the four themes.

Theme 1: Enjoying the present, preparing for the future

For the student officers in this study, leadership opportunities in CAFNR clubs and organizations were an important part of their undergraduate experience. Many mentioned that clubs are where they go to see friends: "When you get to an organization, I mean, the idea is to get close with one another and become friends, because that's how you – I mean, that's how it's enjoyable."

Social and professional development purposes are intertwined in organizations. One club officer who aspires to be a veterinarian shared, "And I find that there's more of that in dairy club specifically, because our pitch is you don't have to have any experience at all in this club. Dairy cows are great to learn with, so the majority of my members, you know, are out there just for fun, but also to get the experience for their vet school application."

Student comments frequently focused on what would occur after college, not just what was currently happening. One participant stated, "I joined [organization] because I wanted to get more professional development, and get to learn more about the ag atmosphere, and I continue to stay involved because the [people in my organization] helped push me in leadership and – and my passion for ag." Many participants reported leaning on their organizational involvement to help propel them into the future.

Participants considered making connections through organizations to be one of the most important ways they could prepare for the future. One upperclassmen shared, "A lot of the times, when they get a job, it's from the connections that they have [through this organization]...and probably something that they wouldn't have the chance of if they didn't know who that person was, or if that person didn't know that they were from being involved [in this organization]."

Participants clearly value organizations for providing them the opportunity to have an officer position, which they equate with leadership. They believe that employers are looking for people who have served as officers in AFNR student organizations. One participant who assists at the Career Services Office within the college explained, "I also think we need to drive home the point with students how, like, how central leadership is to helping your resume. I think – and that comes from working at career services, doing resume reviews, or, like, even a couple of friends after the career fair were saying, you know, companies said they, you know, didn't have enough leadership experience, and so, I think sometimes that gets overlooked, maybe.....But I think somehow driving home that aspect that it – that it is important not only to just be a member, but serve on an officer team within a club within CAFNR."

Students believe that listing themselves as an officer on a resume “means something” to potential employers and is an important prerequisite for professional success. A student explained, “I think there's just a large misconception among students that if you're in a lot of clubs, that looks really well on you, on a – like, from a resume standpoint, and I – I think that a lot of the feedback that I've gotten from interviews with companies and employers is that, you know, they don’t even look at, uh, all the clubs you're in anymore, because it's all kind of just BS, because they know that people put them on there for a resume booster.” They attribute limited value on membership in organizations, but more weight on having an officer position.

Theme 2: Commitment and social pressure

Students want to belong to a group that is considered to be active and committed, but many struggle in figuring out how to keep their members engaged. One participant shared his thoughts about holding members accountable for their participation. “So, it's kind of one of those deals where you don’t want to be, you know, a group that's so select that you're just kicking out people left and right, because, you know, you don’t want to be in [this organization] and, ‘Oh, well, you haven’t been here, so you're gone,’ but at the same time, there has to be some sort of something to keep you around and keep you accountable, because there's just going to be people who are going to pay the $25, get a T-shirt, and never see it again.”

One of the ways some of the organizations try to keep members committed is through what they call “social pressure.” One participant explained, “Because, like I said, there are fines put into the situations, and social pressure of, ‘You need to be here and help out,’ and stuff like that. Uh, like I said, we just got done with homecoming, and a majority of our members there helping and want – and wanted to be there. So, I just think making a, uh, atmosphere that's welcoming, but also, you know, ‘Roll up your sleeves and get to work,’ that's – that's what you need to have whenever you're talking about organizations and clubs.”

Several of the most active students in CAFNR organizations shared concerns about how much commitment is too much. They admitted that they felt pressured to take on more and more organizational responsibilities, and discussed how challenging that can be. A senior leader commented, “And so, the university promotes, like, a diversity of experience, and how important it is to be involved and do several different things and not put all your eggs in one basket, but also, that's really hard, because when you're involved and you're capable, people expect you to take on the absolute most, and so, that gets really difficult too with class and responsibilities and work, too.”

Theme 3: Perceptions of leadership role

Over and over again, the research team heard that the leaders make the decisions of the organization, and, in some cases, the officers make up the majority of meeting-attending members. “We have our officer team that almost makes up half of our membership, and so, that's the most involved right now, and so, a lot of our membership gets the impression that we've pulled inward. They haven’t really had the opportunity, um, to get super involved with our organization.”

In some student organizations, it seemed that new members or members who weren’t officers didn’t have a respected voice. One upperclassmen officer shared, “I don’t know, if you see people who haven’t been around very long and they say something, and it's – I mean, it's

important for them to talk, and it's nice to see them speaking up, but sometimes, they don't understand all the aspects of it yet, so then, what they say really isn't all that relevant all the time."

Another student explained, "As freshmen, we felt like we weren't being included by the upperclassmen, because we think they were in their own...well, they've known each other for years, so they kind of formed their own cliques, so to speak...We felt like we weren't being engaged, we were kind of being left out, that we were...members of a club, but we weren't — we really didn't feel like we were part of it....They (upperclassmen officers) were calling the shots. Not because of out of any contempt for us, but just because they really didn't know about us...They kind of almost had no idea we were there."

To many students who participated in the study, it seemed that holding an officer position was actually a prerequisite to leading. One student stated, "So, ours [club] is so officer-driven, for the most part, so, you know, planning events, we'll get the members' input, which like I said, hasn't been much lately, but, uh, at the end, it kind of falls on the six-member officer team. So, our lack of membership involvement ties to the lack of big events we can plan, so I think when we're planning smaller events, there's not near as many opportunities for leadership." One club that appeared to contradict this trend was the Swine Club, where the President reported starting the year by giving every member an index card and asking them to write on it what they wanted to do during the year.

Students also equated leadership with event planning**.** One student explained, "I'm professional development chair. Other than me, I have, like, a bunch of other girls in our chapter, um, who that way, they get a little bit more of a push to be able to still take that leadership role, um, and still help us kind of put together our events that we're planning…"

In many cases, the student officers seem to be planning these events alone. They are not soliciting help from non-officer members, and may also not be asking for guidance or assistance from their club advisers. One student explained that their adviser would help if asked, but it appeared that didn't usually happen. "I would say, uh, my club is more student-run. It's not to say that there isn't involvement from faculty, um, say if you needed their help with something, they would always be willing to — they'd be happy to help. But it's just kind of a needed by needed basis, an event by event basis, just kind of depending on what's going on, and if they're really needed."

However, in a contradictory statement, one participant explained the importance of having advisor involvement. "If your advisor only comes to one meeting a semester, it's very hard to establish goals for the club, no matter how big or small it is. I mean, students can do a lot, but, um, without having that role of knowing what's going on campus from a faculty standpoint, uh, students only know so much, so, uh, yeah, but with having them there and present and involving themselves with students and, uh, the student life as well, I mean, there's an exchange of information there on what's going on campus from students and faculty, so just having that open communication, having them there at events and everything they're trying to do, is important."

Theme 4: Perceptions of organizational success

Students had different viewpoints about evaluating the success of their student organization. To many students, high member participation in events equaled success. As one President explained, “I measure success [of the organization] by how many people we get to attend.” Others participants were concerned about whether their members were having fun at events. One officer explained, “[Club success is] getting feedback from your members, like, the people who attend your events, and if they had a good time, or any recommendations that they have, and then, you can kind of gauge, ‘Okay, we did a good job,’ or, ‘We didn’t.’” Activity seemed to be associated with a club’s progress.

One participant explained that to him, success is about adding value; “…making sure that you're having valuable events, like, adding value to the experience, is a way to measure success… if you are getting something out of it. Whether that is professionalism, community service, depending on what the event is…”

Students placed high importance of planning meaningful events, and were adamant about not wasting members’ time or simply meeting for the sake of having a meeting. One participant explained, “You got to – you got to have something that draws in people and keeps them interested, because when you have meetings that don’t have any connection to anything, don't have any meaning to them, then there's no reason to go.”

Another participant added, “I think it's just your group's leadership and your officers, and if they can do something and put something together fun and worthwhile, then people are going to come to it. If it's something that is pointless, and they've been to three or four meetings that we don’t really do anything, then they're not going to come back.”

Theme 5: The CAFNR culture

“The CAFNR culture” was an unexpected finding that bubbled to the surface during focus groups due to the open-ended research approach we used. One student explained, “I mean, to me, the first word that comes to mind is family, so thinking of how close, you know, a lot of us become, um, because of our involvement in, you know, organizations, start, you know, seeing each other in class each day, um, you know, then they're seeing each other in organizations and just how well you get to know each other and how close you get to each other, um, I think. I mean, here I am, like, three weeks left, on campus here, and so, I think that's the one thing I'll miss the most, other than some classes I've taken, but that's not going to be the thing I miss. Always, you know, the people that are here and the family atmosphere, so I think when I explain the — the CAFNR culture, you know, it's definitely one word that I think that comes to mind, is family”

Many students wholeheartedly nodded in agreement to this statement. However, another student softly interjected, “A lot of people in CAFNR have known each other prior, and as someone who's, like, coming in, and even I'm in the same major as all of them, but I did not have that same — same background, because I'm from the [nearby metropolitan area] area, it's – even though I'm in classes with a lot of people, there's still that already — like, they already know each other, are already friends, that there's still that kind of a barrier wall, and I think there's a lot of students that don't come from that same, like, strict — like, if you didn’t come from original

ag background, it's hard — it's — it is harder to get connected with those other people, just because, I mean, it's hard to join a new friend group when everyone already knows each other."

Evidence of this statement was seen during observations and was recorded in field notes and reflective memos. One researcher wrote in her reflection, "I am amazed…these are all CAFNR students. Yet as they come into this meeting, some come in and sit alone. Others only speak to a couple of people. Many don't seem to be connected to one another at all."

Yet another participant explained why she thinks this disconnection occurs, "Well, I think it has a lot to do also with, like, most of us were part of 4-H as little kids...and the experience of, like, going to places, not knowing anybody, and having to do ice breakers and meet new people…and…you were mentioning majors like sports management, there are people in there that either come from larger cities or non-rural areas grew up in a class of 700 people that we might have only known a quarter of them in their high school, it's just — it was just a different background experience for them. And then, coming to college, they just kind of do their own thing instead of —— you know, they don't engage as much as I would say we do, because they just haven't had the experience."

One student with insight beyond her years stated, "We focus on this CAFNR culture of likeminded and like-backgrounded people, and I think when we get outside of that, I think we aren't as concerned that they [outsiders] are not as involved and invested in that."

Discussion/Recommendations/Conclusions

Student Organization Participation and Engagement

The first research objective of this study was to describe undergraduate students' participation and engagement in CAFNR's student organizations. Qualitative data revealed that for many student officers in this study, the clubs and organizations for which they served as officers provided an important part of their college identity and experience. Many students were drawn to clubs and organizations within their major, which often overlapped with their extracurricular interests. Students found value sharing their passion for a subject through a club with peers, professional contacts, including alumni, and faculty members.

No two clubs are alike. Differences in structure, and purpose impacted participation levels and measures of success. On one hand, students who were also in Greek organizations with selective attendance and fines for non-participation reported very high attendance at meetings and events in those organizations. Other CAFNR organizations with a purpose of competition with other universities also reported positive persistence and participation among members. Other clubs, both professional and social, discussed struggling with low participation. There are currently 50 recognized clubs within CAFNR with multiple professional clubs within degree programs. We conclude clubs face unique challenges, and advisors and college administrators should recognize and respond to unique club need, not a "one-size fits all" approach.

In many cases club participation was seen as a credentialing opportunity. Club participation was seen as a means of increasingly the likelihood of a student being hired after college. And while some saw seeking a club leadership position as the logical next step, and a deeper commitment to the organization, most also acknowledged that joining the club associated

with a major was expected (and will certainly provide valuable experiences to members) but potential employers see more value in holding an office. We suggest additional inquiry with human resource professionals and alumni regarding their beliefs about club membership and officers as indicators of professional success.

Lastly, clubs were often small. The large number of specialized clubs, coupled with a perceived value of serving as an officer, may contribute to small club memberships, where often the officers constitute a majority of the active membership. Further, many of the study participants were officers in multiple clubs and were connected through leadership development events prior to college. The issues of restricted access and assigned leadership among a few students raises questions about if the opportunities for leadership development through organizations for an "average" CAFNR student who is not native to the culture is a possibility. Future research should examine the experiences of non-active students, non-traditional students, transfer students, and commuters to identify to what extent they are involved in extra-curricular clubs and have an opportunity for leadership development as an officer.

Perceptions of Leadership Experiences

The second research objective was to describe CAFNR undergraduate students' perceptions of their leadership experiences in CAFNR student organizations. Qualitative data revealed several commonly reported student perceptions that are indicators of Leader Identity Development (LID) model stages of leadership development (Komives, et al., 2006).

Most club officers tended to operationalized their club leadership experience as being responsible for making decisions for the organization and planning events. Many students reported that being selected as an officer or committee chair were prerequisites for being entrusted with club responsibilities — for being a leader, from their perspective. Similarly, some participants reported that in their organizations the officers made up a majority of the active membership, and club leaders reported their own decision making and planning were integral to the success of the organization. Essentially, positional leaders carried out the purpose of the organization by planning and executing events "for" their members, and measured their success by how many members participated in events.

The views described above are consistent with Stage 3 of the LID model, "Leader Identified" (Komives et al., 2006). Students see leadership as being tantamount to holding a position in an organization. For example, participants frequently referred to an officer team as "the leadership" for the organization, rather than seeing leadership as being present in the entire organization (i.e., Stage 4 and up). Also, students are unknowingly describing a leader-follower dichotomy when they discuss the relationship between officers and members. This is an indicator of LID stage 3 thinking; stage 3 leaders tend to view leaders as responsible for "the leadership" of the organization and followers as passive recipients.

However, not all organization members could be classified in LID stage 3 (Komives et al., 2006). In contrast, two organizations, Swine Club and the tractor pulling team, described their clubs' positional leaders as more of a facilitator. The president of the Swine Club recalled starting the year by giving every member an index card and asking them to write on it what they wanted to do during the year; later, they distributed the responsibility for those ideas broadly among the group. And the tractor pulling team, with its clear, built-in common purpose of

competing in tractor pulls, described a more democratic, collectivistic approach to leadership. This may also account for their high participation and engagement.

The sentiments described above are more consistent with LID stage 4, “Leader Differentiated” (Komives, et al., 2006). Competent LID stage 4 leaders will seek to engage a wide variety of group members, positional or non-positional, to accomplish group tasks. They will also trend toward more democratic leadership styles and hold the belief that leadership can and should come from anywhere in the group. Researchers should examine to what extent club leaders seek participation from general membership, the factors which could explain these differences and the impact on club success.

This study uncovers undergraduate student perceptions of, and experience with, leadership in student organizations in CAFNR. It describes a situation in which motivation to join a club and seek a leadership role is as often transactional (e.g., being club officer looks good on a resumé) as it is social and developmental. It also describes an understanding and approach to leadership that, while not monolithic among CAFNR students, seems best described as LID stage 3, “Leader Identified.” This is highly problematic. Solving agriculture and the world’s complex problems cannot be accomplished through authoritative technical expertise. It requires leaders who can engage and leverage the talent, creativity, energy, and intelligence of groups of people to solve complex problems (Rost, 1997; Western, 2019; Wielkiewicz & Stelzner, 2005). In short, it requires LID stage 4 and above (Komives, et al., 2006). The findings of this study, while not generalizable, are likely transferable to similar colleges of agriculture. If college organizations are, indeed, critical everyday venues for practicing leadership, we recommend further exploration of the nature of the leadership practiced in these organizations to determine if we are best preparing tomorrow’s leaders to combat the complex challenges we will face.

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Awakening Transformative Learning: A Comparison of the Dissonance Experienced by Agriculture Majors During Study Abroad Courses to Costa Rica and Thailand

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Abstract

Previous research has demonstrated that students who have participated in study abroad courses exhibit an improved capacity for citizenship, emotional growth, and global competence. However, achieving such requires that study abroad courses be designed to allow students to question their underlying beliefs and values – a concept called dissonance. When individuals reflect on dissonance, it has been reported to spur a process in which their previously held perspectives are transformed. As such, this investigation sought to compare the dissonance experienced by agriculture majors (N =21) at Louisiana State University during study abroad courses to Costa Rica and Thailand. To accomplish this, we bounded cases by academic college, degree level, and year. However, cases were distinct regarding context and duration. As a result, two forms of dissonance were consistent across cases: intellectual and moral. However, within cases, we also distilled context-specific dissonance that students grappled with that helped them reconsider their previously held worldviews. Our findings, therefore, demonstrated that when students processed dissonance productively, their global knowledge and perspectives were transformed. We also concluded that although shared forms of dissonance existed across cases, it is imperative for faculty to design students' experiences abroad purposefully to nurture students' perspective changes in transformative ways.

Introduction and Literature Review

Over the past few decades, globalization has affected nearly every aspect of society (Longo & Saltmarsh, 2011). For U.S. higher education institutions, the cultural, economic, political, and social interconnectedness of the world, as well as improved opportunities for collaboration and the sharing of knowledge, have illuminated the need to emphasize global perspectives in the undergraduate curriculum (Blake-Campbell, 2014; Hartman & Kiely, 2014; McCabe, 2001; Ogden, 2007). However, Bok (2006) argued, "it is a safe bet that a majority of undergraduate students complete their four years with very little preparation either as citizens or as professionals for the international challenges that are likely to confront them" (p. 233). Previous evidence has demonstrated that graduates who have been exposed to global perspectives in their undergraduate experience were better prepared to solve cross-cultural issues and problems (Myers, 2006). One approach that U.S. higher education institutions have used to achieve such outcomes is through international education experiences, such as study abroad courses (Boli & Petrova, 2008; McCabe, 2001; Ogden, 2007; Reilly & Senders, 2009).

Study abroad courses are structured academic excursions in which students: (a) participate in well-planned curricular activities, (b) partake in cross-cultural exchanges through direct interaction with others, and (c) engage in a critical reflection on their experiences to obtain a

better understanding of global connections and an appreciation for the customs and traditions of their host country (Longo & Saltmash, 2011). Over time, study abroad courses have diversified in form and function. For example, they can range from short-term, one week or less, to more involved experiences that span an entire academic year (Strange & Gibson, 2017).

Currently, the percentage of undergraduate students who have participated in an international educational experience is limited; however, this number is expanding rapidly (Institute of International Education (IIE, 2019). For example, in the 2017-2018 academic year, 341,751 U.S. undergraduate students engaged in an international educational experience, a 2.7% increase over the previous academic year, but a figure that only accounted for about 2% of all undergraduate students in U.S. higher education (IIE, 2019). As such, additional evidence is needed to help substantiate study abroad courses as an essential element of students' undergraduate experience, especially in the context of agriculture.

To this point, existing evidence has demonstrated that study abroad courses can yield critical outcomes for students. In particular, students who have participated in such have been shown to have an improved capacity for citizenship, emotional growth, and global competence; further, they report a more established sense of career awareness and personal identity (Reilly & Senders, 2009; Roberts & Edwards, 2016; Vanden Berg & Schwander, 2019; Schlarb, 2019). Therefore, study abroad courses have been advanced as a vital component of students' personal and professional development during their academic careers (Blake-Campbell, 2014; Seifen, Rodriguez, & Johnson, 2019). For example, Briers, Shinn, and Nguyn (2010) reported that one of the primary motivators for agricultural undergraduate students to study abroad was that they perceived the experience could help advance their career. In response to such findings, much of the recent literature has focused on understanding other factors that either encourage or avert agriculture students from enrolling in study abroad courses (Bunch, Blackburn, Danjean, Stair, & Blanchard, 2015; Danjean, Bunch, & Blackburn, 2015; Estes, Hansen, & Edgar, 2016; Rackoski, Robinson, Edwards, & Baker, 2018). As a result, we now understand that undergraduate agriculture students are primarily intrinsically motivated to engage in such activities; however, their perceived beliefs about the cost and value of study abroad courses also affect their decision to enroll (Rackoski et al., 2018). Because many undergraduate students do not engage in global learning experiences until their junior or senior year (IIE, 2019), it is critical for colleges of agriculture to communicate the opportunities and benefits associated with such early in students' undergraduate degree programs. Further, faculty should purposefully design courses to ensure that students' learning experiences abroad support their desired outcomes (Estes et al., 2016).

To achieve this, university faculty should become more familiar with how to design and deliver study abroad experiences in ways that effectively align with students' needs and expectations (Hartman & Kiely, 2014). Perhaps, the most commonly used instructional practice to ensure that such outcomes are achieved is through embedding *critical reflection* in the study abroad experience (Whitney & Clayton, 2011). The use of critical reflection has been shown to catalyze essential processes, particularly in the affective domain of learning (Ash & Clayton, 2009a). As a result, reflection often serves as a primary mechanism by which faculty members can effectively facilitate students' shifts in understanding and also help them to productively construct meaning from their experiences abroad (Ash & Clayton, 2009b).

In a global context, reflection also helps open up opportunities for faculty to address potentially problematic outcomes that emerge as a result of students' interactions in their host country such as misinterpretations of the actions of others, the reinforcements of negative stereotypes, and ill-informed judgments (Whitney & Clayton, 2011). As a result of these new understandings, students may also begin to grapple with their experiences and begin to reconsider previously held perspectives and worldviews (Kiely, 2004, 2005). To achieve this, however, requires that reflective sessions in study abroad courses be designed intentionally to allow students to question their underlying beliefs and values – a concept Mezirow (1991) called *dissonance*. Mezirow (1991) explained that when individuals reflect on dissonance, it could spur a powerful learning process, called transformational learning (TL), by which individuals' previously held worldviews are transformed. O'Malley, Roberts, Stair, and Blackburn (2019) reported that university students experienced four forms of dissonance during a study abroad course to Nicaragua: (1) environmental, (2) sociocultural, (3) personal, and (4) intellectual. And, as a consequence of such dissonance, they "underwent a *perspective change* on global issues and problems in agriculture" (O'Malley et al., 2019, p. 10). However, a need exists to understand whether agriculture students in study abroad courses in other contexts and at varying durations of time experienced similar forms of dissonance. This dearth in knowledge motivated the current study.

Theoretical Framework

We grounded this investigation in Mezirow's (1987, 1991, 2000) transformational learning theory (TLT). TLT lies at the intersection of adult learning theory and seeks to explain how individuals make meaning of their experiences and how such can lead a perspective transformation on an issue or topic (Mezirow, 1991). Through the lens of TLT, this process unfolds after an individual is introduced to alternative beliefs and perspectives that conflict with their previously held worldviews, a phenomenon described by Mezirow (2000) as dissonance. Mezirow (1991) theorized that after individuals experience *dissonance* and assign meaning to this experience, it has the potential to mature an individual's previously held beliefs and values (Mezirow, 1991, 2000). Because of its emphasis on individual change, TLT has served as a critical tenet of study abroad programming over the past decade (Bell, Gibson, Tarrant, Perry, & Stoner, 2014; Kiely, 2004, 2005; Strange & Gibson, 2017; Vanden Berg & Schwander, 2019). Despite this, however, the theory has been critiqued by scholars and practicioners who argue that transformative outcomes vary significantly due to context, duration, and other programmatic features (Bell et al., 2014; Strange & Gibson, 2017). As an illustration, Perry, Stoner, and Tarrant (2012) advanced the notion that short-term study abroad courses, generally lasting two weeks or less, can serve as a vehicle to elicit transformative shifts in undergraduate students' perspectives. However, a quantitative analysis of similar factors reported that short-term study abroad courses only demonstrated negligible outcomes (Dwyer & Peters, 2004). As a result, Dwyer and Peters (2004) argued that more long-term experiences abroad are needed to facilitate a transformation in students' perspectives effectively. In response to such conflicts, researchers have noted the importance of purposefully designing study abroad courses in ways that allow students to experience dissonance and assign meaning to such, regardless of programmatic features, through critical reflection (Strange & Gibson, 2017).

On this point, Kiely (2004) theorized the dissonance students grapple with during study abroad courses influences the transformation they undergo. For example, as they observe differences

regarding their host country's customs, dress, language, and other traditions, students begin to consider how this knowledge stands in contrast to their existing frame of reference (Kiely, 2004). Further, as they engage with more profound dissonance, such as economic disparity, gender bias, human welfare, illness, and racial issues, it often sparks a sense of disequilibrium, and students begin to reexamine their existing perspectives and adopt a more mature view of the world (Kiely, 2005). Therefore, students' experiences abroad become a crucial turning point in which their perspectives are shaped by the dissonance they encounter and distill meaning (Kiely, 2004). Nevertheless, more knowledge is needed to describe how contextual and other programmatic features influence the forms of dissonance that initiate transformational learning. As a consequence, we required agriculture majors to process their experiences during study abroad courses to Costa Rica and Thailand, which varied in duration, through reflective exercises.

Background and Setting

In this investigation, we analyzed study abroad courses led by faculty in the College of Agriculture at Louisiana State University to Costa Rica and Thailand in 2019. The courses had similar focuses; for example, each featured opportunities to learn about agribusiness, production practices, higher education, as well as discussions and experiences that highlighted the role of policy on agriculture. Further, each study abroad course allowed students to engage in unique cultural excursions while also interacting with locals who exposed them to each country's unique customs and traditions. However, the courses also differed in two key aspects: context and duration. Nevertheless, students had similar assignments and expectations.

During the week-long study abroad course to Costa Rica, students visited several agritourism industries, including dairy, coffee, wildlife sanctuaries, and national parks. Students also toured E.A.R.T.H University, a private, non-profit university that focuses on agricultural sciences, sustainability, and experiential learning. It should also be noted that Costa Rica is more developed than other countries in Central America, such as Guatemala and Nicaragua. Therefore, students had the opportunity to observe more contemporary approaches to agriculture than would be experienced in other destinations in Central America. The second study abroad course under investigation occurred in Thailand over four weeks. During this course, students visited multiple agrotourism and Royal Project sites that featured research and innovation within agricultural production. Students also had in-depth learning experiences at Chaing Mai University by which they were exposed to innovative production practices as well as Extension services that targeted Northern Thailand's Hill Tribe farmers, among other stakeholder groups.

In both study abroad courses, students were required to reflect daily using the smartphone application ReCap®. Using this application, students captured their daily thoughts and experiences regarding (a) what they learned, (b) what was different from their experiences in the U.S., (c) what was similar, and (d) if anything caused them to feel discomfort. Students in both courses were also required to submit a portfolio and create a presentation in which they shared their key experiences and the most impactful moments. Therefore, the design of the courses under investigation greatly influenced our collection of data as well as the purpose of the study.

Purpose, Significance of the Study, and Research Question

This investigation's purpose was to compare and contrast the forms of dissonance experienced by agriculture majors at Louisiana State University during study abroad courses to Costa Rica and Thailand. Previous research (Bell et al., 2014; Kiely, 2004, 2005; Strange & Gibson, 2017) has demonstrated that dissonance can initiate transformational learning for students. As a result, this study's findings could be used to provide insight into how students can use the perspectives acquired through study abroad courses to help them succeed in the workforce. As such, it also addressed the American Association for Agricultural Education's Research Priority Area 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016). One research question framed this investigation: In what ways did agriculture students at Louisiana State University experience similar but distinct forms of dissonance during study abroad courses that varied regarding context and duration?

Reflexivity

To achieve this purpose, it was critical to reveal how our biases, prejudices, and relevant experiences shaped this investigation. For example, two of the researchers were faculty at Louisiana State University and were responsible for the design and facilitation of the study abroad courses under investigation. The other researchers were graduate students whose studies focused on international agriculture and global education. It should also be noted that one of the graduate students participated in all activities and experiences associated with the Thailand study abroad; therefore, she served as an additional participant observer (Patton, 2002). Further, all researchers had previous international experience and had facilitated or participated in study abroad courses before data collection in Costa Rica and Thailand. The combination of these backgrounds greatly influenced our collection and analysis of the data, especially regarding how we interpreted participants' lived experiences and the dissonance they endured. As a consequence, our positionality in this investigation greatly influenced our methodological decisions.

Methodology

When approaching this investigation, we used a constructionism epistemological position to guide our assumptions and investments (Crotty, 1998). As a result, we chose to ground this study in Stake's (2006) multiple case study design. Using this approach, we gained a more in-depth understanding of the central issue, or *quintain*, regarding the dissonance experienced by participants during study abroad courses to Costa Rica and Thailand. The multiple case study approach helped describe the dissonance experienced by participants from varied perspectives to achieve a more granular portrayal of the phenomenon (Stake, 2006). To achieve this, we collected data from agriculture students (N = 21) at Louisiana State University to create a description of each case. Thereafter, we conducted a cross-case analysis to compare findings and describe how they converged and diverged across cases (Stake, 2006). As such, our goal was not to generalize from the study's findings (Stake, 2006). Instead, we intended to provide a meta-interpretation to describe how the results might be transferable to other study abroad courses (Grandy, 2010).

Description of the Cases, Participants, and Data Sources

To examine the dissonance, we bounded cases by academic college, degree level, and year (Stake, 2006). For example, all of the students were undergraduate agriculture students at Louisiana State University who participated in a study abroad course offered through the College of Agriculture in 2019. Although these factors bounded cases, they were also distinct in two ways: *context* and *duration*. As an illustration, in the first case, students' experiences abroad occurred in Costa Rica for one week; however, in the second case, students studied in Thailand over four weeks. In total, 10 females and three male students comprised Case #1 – *The Costa Rica Study Abroad Course* (n = 13). Meanwhile, five females and three males represented Case #2 – *The Thailand Study Abroad Course* (n = 8). It is important to note that participants were only enrolled in one study abroad course, i.e., no student participated in both courses under investigation. Further, students' previous international experience varied considerably within each case.

After Institutional Review Board (IRB) approval, students were briefed about the purpose of the study. At that time, they signed an electronic disclosure form indicating their agreement to participate. Then, during each study abroad course, the participants were required to record at least one daily video reflection; however, some students submitted more than one upload per day. To capture video reflections, we used the smartphone application ReCap®. Although students' video reflections served as the primary source of data in this investigation, we also used *observations* and *field notes* to triangulate findings (Patton, 2002). Of note, the number of daily video reflections was impacted by technological difficulties experienced by students, which included an unstable Wi-Fi connection during both study abroad courses. Therefore, some students did not submit all of the required reflections. Despite this, a total of 344 video reflections (Case #1 = 103; Case #2 = 241) were submitted across cases. To facilitate analysis, all data – including videos, field notes, and memos – were transcribed verbatim. Then, students' names were removed from transcripts to ensure anonymity. Thereafter, we assigned students a participant number to maintain a thorough audit trail.

Data Analysis

To analyze the data, we used Corbin's and Strauss' (2015) constant comparative method through the use of the following coding procedures: (a) open, (b) axial, and (c) selective. To accomplish this, we uploaded all data into NVivo® qualitative analysis software. The open coding phase involved three separate open coding techniques: (1) descriptive, (2) in vivo, and (3) emotion coding (Saldaña, 2016). During this phase, emotion coding served as the most productive technique because it helped map students' emotional journeys as they encountered dissonance and began to make meaning regarding how their perspectives were transforming during their study abroad course. For example, the following emotion codes emerged during our analysis: (a) *excited*, (b) *confused*, (c) *disturbed*, (d) *surprised*, and (e) *tensed*. After each round of open coding, we also created analytic memos to capture our emergent assertions and interpretations of the data (Saldaña, 2016). In the second phase of analysis, we engaged in axial coding (Corbin & Strauss, 2015). Axial coding is a process by which researchers reduce the data generated in the open coding phase into distinct categories (Corbin & Strauss, 2015). Therefore, we scrutinized relationships among all open codes using code weaving and data displays to arrive at categories for each case. This process also allowed us to more intimately explore discrepancies between the data units and categories and consider alternative interpretations (Stake, 2006). After considering

rival explanations, we then created evidentiary warrants, grounded in the data, which helped to create individual case reports (Stake, 2006). In our final phase of analysis, we used selective coding as a way to analyze our axial codes and case reports by *thinking with theory* (Corbin & Strauss, 2015). As a consequence, themes emerged in individual cases by interpreting them through the lens of Mezirow's (1991, 2000) TLT. Finally, to compare and contrast the dissonance experienced by students in each case, we engaged in cross-case analysis procedures. Next, we describe how we upheld rigor through each phase of this study.

Standards for Qualitative Quality

To ensure that we embued quality in this study, we used Lincoln's and Guba's (1985) standards for trustworthiness: (1) credibility, (2) transferability, (3) dependability, and (4) confirmability. Credibility represents whether the study's findings make sense when considered against contextual factors as well as relevant research and theory (Lincoln & Guba, 1985). As such, we ensured that credibility was embedded throughout this study by (a) providing thick, rich descriptions of the findings, (b) mobilizing alternative viewpoints and rival explanations, and (c) linking data to existing research and theory. The second standard, transferability, refers to the importance of arriving at conclusions that can be useful to other contexts (Lincoln & Guba, 1985). To achieve this, we (a) outlined the characteristics of the participants and the study abroad courses in which they engaged, (b) detailed how cases were bounded and the resulting implications, and (c) were transparent about the limitations of the study, especially regarding data collection and analysis. Dependability, the third standard, reflects the importance of conducting an investigation that is consistent with the standards and best practices of qualitative research (Lincoln & Guba, 1985). Therefore, we (a) revealed how our positionality shaped the study's design and procedures, (b) were explicit about the study's purpose, and (c) upheld a systematic audit trail. Finally, confirmability can be understood as the researcher's explicitness to minimize bias in the study. As a result, we promoted confirmability by (a) providing our reflexivity statement in which we outlined our relevant experience and biases, (b) fully described our data collection and analysis procedures, and (c) ensured that all findings and conclusions were connected to data. Our discussion of the study's findings is provided next.

Findings

Through our analytic work, three themes emerged in each case. The themes represented the forms of dissonance experienced by agricultural majors at Louisiana State University during study abroad courses to Costa Rica and Thailand. Although two forms of dissonance were consistent across cases, variant forms also emerged. When interpreted through Mezirow's (1991, 2000) TLT, each theme describes how students' perspectives began to expand and mature as a result of their experiences abroad. However, it should be noted that the forms of dissonance identified in this investigation occurred at varying levels of intensity and points in time during each study abroad course. In our description of each theme, we drew on case reports and participants' words within cases to situate our findings. Finally, at this report's conclusion, we offer a meta-interpretation as a result of our cross-case analysis of this investigation's findings (Stake, 2006).

Case #1: The Costa Rica Study Abroad Course

In April 2019, 13 agriculture students from Louisiana State University engaged in a study abroad course to Costa Rica for one week. During the course, students had experiential learning opportunities on topics that included: (a) agricultural business, (b) agricultural policy, (c) agrotourism, (d) Hispanic culture, and (e) production agriculture. Based on these experiences, students articulated the dissonance they encountered and processed during moments of critical reflection. Next, we offer our interpretation of the three forms of dissonance distilled from this case through the lens of Mezirow's (1991, 2000) TLT: (1) environmental, (2) intellectual, and (3) moral.

Theme #1: Environmental Dissonance

Throughout the study abroad course, students noted that *environmental* differences existed between the United States and Costa Rica. For example, students explained they were largely surprised by differences regarding the *climate, geography, and wildlife* and their existing frames of reference. For example, Participant #5 shared, "It just so different here… the mountains, the humidity, the wildlife, the driving…it's just a lot different than what I'm used to in the United States." Further, Participant #7 added, "I was surprised how beautiful and clear the water was. I've never seen water like that before in the United States." Other students made a note of how environmental differences had implications for agriculture as well. For example, Participant #3 explained, "Because the climate is different, people in Costa Rica really have to approach farming and agriculture differently. It is just something that had not really crossed my mind." As students made sense of the environmental dissonance they experienced, they also began to notice key contrasts regarding their existing knowledge and what they gained exposure to during their experiences in Costa Rica.

Theme #2: Intellectual Dissonance

During the study abroad course, the students also described how they experienced discrepancies concerning their knowledge and practices, i.e., *intellectual dissonance*. In particular, students encountered new agricultural practices and modes of teaching in Costa Rica that differed from those they had been exposed to in the U.S. For instance, after visiting E.A.R.T.H University they experienced a different model to teaching and learning in which students at E.A.R.T.H acquired agricultural knowledge through "practical experiences rather than theory-based lectures. It just made me consider a different way of gaining agricultural knowledge" (Participant #2). Further, students also noted differences regarding agricultural practices found in Costa Rica in comparison to the United States. Participant #6 explained, "agriculturalists place a lot more emphasis on sustainability than those in the United States. They just really make it a priority here." After rendering meaning from these intellectual disparities, students began to consider whether dimensions of their moral values should be modified.

Theme #3: Moral Dissonance

The final theme for the first case, *moral dissonance*, reflected how students began to reenvision their sense of moral obligation as a result of their experiences in Costa Rica. For example, after gaining exposure to sustainable practices, they began to articulate how they began to sense a moral duty to integrate sustainable practices into their daily lives. As an illustration, Participant #4 revealed, "their [Thai people's] commitment to sustainability has made me reflect on the

impact of my own decisions more. I guess it makes me want to do better in the future." Similarly, Participant #1 shared, "people in Costa Rica are really be trying to make the Earth a better place through agriculture. When I go back home, I need to make some changes so that being more sustainable is a bigger priority in my life." As a consequence, students' perspectives on agriculture began to grow and evolve.

Case #2: The Thailand Study Abroad Course

The second case draws on the experiences of eight agriculture students during a study abroad course to Thailand in the summer of 2019. Throughout the course, students engaged in experiential learning on the following topics: (a) agricultural business, (b) agricultural policy, (c) agrotourism, (d) production agriculture, and (e) Thai culture. Our interpretation of the dissonance students experienced during the four-week course is interpreted through the lens of Mezirow's (1991, 2000) TLT: (1) sociocultural, (2) intellectual, and (3) moral.

Theme #1: Sociocultural Dissonance

After arriving in Thailand, students began to articulate stark sociocultural differences between Thailand and the United States. In particular, students spoke to how their experiences with various customs and traditions of Thai society challenged their existing perspectives. For example, when reflecting on her experiences with food, Participant #15 shared:

> I did not think the food would be so unfamiliar. I knew that they, of course, would have different dishes, but I did not know that they would have vegetables and fruits that I had never heard of. Overall, it has also been an interesting adjustment to the food because it is way spicier than I thought it would be. And I like spicy, but the spice here is on a different level. I was not prepared.

Other aspects of Thai society appeared to stoke dissonance for students as well. For example, in our field notes, an emergent pattern was that differences in the country's customs regarding travel challenged students. In a video reflection, Participant # 20, provided more insight into this concept, "One aspect that shocked me here [in Thailand] is the traffic... there are motorbikes flying in between the lanes, and Thai people are just fearless. It's like a death trap." Students also described how navigating a Buddhist culture challenged their existing frames of reference. Participant #17 explained, " In America, a lot of times people come off as really frustrated. Whereas in Thailand, because it's a Buddhist culture, they place more emphasis on acceptance. It's hard to explain, but it's really made me think." As students assigned meaning to their sociocultural dissonance, however, they began to ponder other differences more deeply as well.

Theme #2: Intellectual Dissonance

After learning more about agriculture in Thailand, students perceived their existing knowledge and frames of reference were incomplete. For instance, after visiting the Hill Tribe farmers in northern Thailand, Participant #14, compared his knowledge of agriculture in the U.S. to the practices he had observed:

> I am just so shocked by the agriculture here. I mean I grew up on a farm in Louisiana so I thought I knew a lot of about agriculture and food production. But their approach is just really different here. Everywhere we have gone, frequently, they have two or more crops growing on the same land. The little spaces are still used for a fruit tree or something that will be sustainable for the farm itself even if you can't grow it in large enough volumes for the market. They are really smart and efficient.

These shifts in students' perspectives extended to other aspects of production agriculture as well. For example, Participant #16 explained: "Today was pretty mindboggling for me. I mean I have seen and done composting before, but vermicomposting [composting with worms] completely blew my mind." Consequently, students intellectual shifts appeared to help them began to reassess values and other principles they had not previously considered.

Theme #3: Moral Dissonance

The final theme that emerged from students' experiences in Thailand was *moral dissonance*. Moral dissonance referred to the ways in which students began to critically examine their prior values and consider whether they should adopt a new perspective moving forward. In his final video reflection, for example, Participant #21 shared:

> I think my biggest takeaway has been how everyone here, even those who aren't directly involved in agriculture, are dedicated to living more sustainably. In the United States, we are kind of all talk. But everyone here seems to have this ethical obligation to do better. I think that is something that I want to carry with me as I head back home.

Similarly, Participant #18 began to make comparisons between the values espoused by individuals she encountered in Thailand and those in the United States. And, as a result, she pondered how to could adopt such values into her daily life. She explained: "I just keep thinking about the values of the Thai people. When I go home, I hope to have a greater appreciation for the environment. It has just given me a lot to think about." As a consequence, students' new sense of moral obligation seemed to foment critical perspective changes.

Cross-Case Analysis

A cross-case analysis (Stake, 2006) of the study's findings illuminated key convergences and divergences regarding the dissonance students experienced during their study abroad courses when interpreted through the lens of Mezirow's (1991, 2000) TLT. In particular, two forms of dissonance were consistent across cases: (1) intellectual, and (2) moral. However, additional forms of dissonance also emerged within each case. Therefore, the observed differences appear to illuminate the role of context and duration in facilitating key student outcomes. Table 1 provides an outline of the study's cross-case comparison of themes.

Table 1

A Cross-Case Comparision of the Forms of Dissonance

Theme	Description	Case #1	Case #2
Environmental	Differences students noted regarding the climate, geography, and wildlife with their existing frames of reference.	✔	✖
Intellectual	Discrepancies students experienced regarding agricultural knowledge and practices.	✔	✔
Moral	Reflected how students began to re-envision their sense of moral obligation as a result of their experiences abroad.	✔	✔
Sociocultural	Represented how customs and traditions challenged students' existing perspectives.	✖	✔

Note. Not present = ✖; Present = ✔.

Conclusions and Implications

The purpose of this study was to compare and contrast the forms of dissonance experienced by agriculture majors at Louisiana State University during study abroad courses to Costa Rica and Thailand. To fulfill this purpose, we interpreted the study's findings through the lens of Meizrow's (1991, 2000) TLT. This process helped describe how the dissonance students' underwent fomented key shifts in their perspectives because of their experiences abroad. Then, through a cross-case analysis (Stake, 2006) of the study's findings, we found that two forms of dissonance were similar across cases: (1) intellectual, and (2) moral. However, students who studied abroad in Costa Rica also experienced environmental dissonance; meanwhile, those enrolled in the Thailand course encountered dissonance that was more sociocultural. We conclude, therefore, that although study abroad courses can facilitate similar results when designed purposefully, context and duration also profoundly shape students' outcomes.

The literature on study abroad courses in agriculture has primarily focused on documenting why students participate (Bunch et al., 2015; Danjean et al., 2015; Estes et al., 2016; Rackoski et al., 2018). However, by offering a more granular depiction of the dissonance students experience across two study abroad courses, we provided a stronger basis for documenting students' shared outcomes, which is a critical deficiency in the broader study abroad literature (Blake-Campbell, 2014; Hartman & Kiely, 2014; McCabe, 2001; Ogden, 2007). As a result, it is important to provide conclusions for each form of dissonance identified in this investigation. First, environmental dissonance represented the differences students noted regarding the climate, geography, and wildlife with their existing frames of reference in Case #1: *The Costa Rica Study Abroad Course*. Consequently, this finding aligns with those reported by O'Malley et al. (2019) regarding how students begin to notice key environmental differences after engaging in a new culture.

However, this form of dissonance did not emerge from our analysis of students' experiences in Thailand. Similarly, sociocultural dissonance, or the ways in which customs and traditions challenged students' existing perspectives (Kiely, 2004, 2005), was limited to the experiences of students in *Case #2: The Thailand Study Abroad Course*. As a result, we conclude that both environmental and sociocultural dissonance appear to be more contextually-based and may not be transferable to all study abroad courses – a concept not currently reflected in the broader literature. Students also articulated they experienced intellectual dissonance, or discrepancies regarding their existing knowledge, as they encountered new concepts, practices, and innovations in Costa Rica and Thailand that seemed to stand in contrast to their previous knowledge of U.S. agriculture. This finding supports those reported by O'Malley et al. (2019). However, the final form of dissonance, moral, does not appear to have been explored previously. Moral dissonanance represented how students began to re-envision their sense of moral obligation as they contemplated integrating new values into their daily lives because of a maturation in their perspective as a result of their experiences in their respective study abroad courses. As such, moral dissonance warrants further examination.

Recommendations and Discussion

This multiple case study provided additional documentation that study abroad courses, at varying durations, can facilitate perspective transformations (Mezirow, 1991, 2000) for university agriculture students. However, in comparison to the findings reported by O'Malley et al. (2019), across cases an additional form of dissonance, *moral*, emerged, but *personal* dissonance did not. As such, we recommend that more research be dedicated to examining the dissonance that students undergo during study courses. For example, future investigations should seek to describe wether such transformations are actualized in students' daily lives after they return to the U.S. On this point, we also recommend additional work be dedicated to understanding effective processes that students can use to transfer the positive outcomes they acquire abroad into their academic, personal, and professional lives. Further, because the perspective transformations that students articulated in this investigation often led to them questioning their personal lifestyles, we also recommend that administrators and faculty who lead study abroad courses carefully consider students' post-experience and ponder whether students need additional support. Perhaps, by creating a space in which students continue to make sense of their experiences abroad by learning to integrate their altered perspectives into their lives, more powerful long-term change can be achieved. We also recommend that follow-up interviews be conducted with students over time to examine the long-term effects of the perspective changes students acquire because of studying abroad (Kiely, 2005).

In this investigation, several unexpected practical and ethical considerations also emerged that warrant future examination. For instance, as students critically reflected on their dissonance, they began to question deeply entrenched assumptions about themselves, relationships with others, agricultural practices, and societal issues and problems. This approach, therefore, is overtly hegemonic, i.e., a process by which students begin to critically assess the world's existing structures of power (Hartman & Kiely, 2014). Therefore, we caution faculty who lead study abroad courses to carefully consider the challenges embedded in using a critical reflection approach. In particular, before adopting such a practice, faculty should plan to navigate complex discussions with students that could potentially involve issues regarding access, agency, ethics, gendered roles, morality, power, privilege, race, among others. In response, we recommend that

faculty development opportunities be created in which practicioners with *transformative intentions* for their study abroad courses begin to learn how to facilitate such using ethical and productive approaches for students. These faculty development opportunities could also foster important dialogue that could help clarify the contextual and programmatic factors that are likely to catalyze as well as hinder students' perspective transformations.

In the study abroad literature, short-term experiences have been critiqued as lacking academic rigor, intensity, and the immersive experiences students need to acquire quality outcomes (Dwyer & Peters, 2004). This study's findings, however, provide additional evidence that short-term study abroad experiences hold transformative potential for students if designed and delivered effectively. Moving forward, we recommend that administrators and faculty consider the design and delivery of the study abroad courses detailed in this investigation to *awaken transformative learning* for their students in the future.

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Barriers and Influences Impacting Education Curriculum Adoption by Ugandan Secondary School Teachers Fostered by the INGO Field of Hope

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Abstract

As developing nations struggle to educate their youth, relevant curriculum is often a barrier to the development of young minds, which shapes the futures of the individual students. While most developing countries rely on agriculture for survival, many youth are not interested in learning about agriculture or pursuing agriculture careers. While numerous studies have investigated how and why educational policy reforms are not effective on large scales through a countrywide adoption of new curriculum, this study sheds light on how an international non-governmental organization (INGO) can have a locally relevant impact with a small-scale curriculum adoption and implementation process through the lens of Rogan and Grayson's (2003) Framework for Curriculum Implementation in Developing Countries. Through qualitatively interviewing eight teachers who adopted and implemented the program, the following themes emerged: shift from theoretical to practical applications and barriers. It is recommended that further research be conducted to understand if students are more likely to be interested in agriculture careers after being taught the curriculum, which engages them in critical thinking, project-based learning, and hands-on approaches. It is also recommended that Field of Hope seek continued partnership with Uganda's Ministry of Education to explore a country-wide adoption of the curriculum.

Introduction

With a growing population estimated to reach 10 billion by the year 2050, food production is of utmost importance and a growing concern for leaders around the world (Mukembo, 2017). In Uganda, 56% of the population is under 18 years of age, but 78% of the entire population is below the age of 30 (Ahaibwe, Mbowa, & Lwanga, 2013). While Uganda is a nation full of youth, the average age of a farmer is 54 years old (Lunghabo, 2016). Knowing the population is growing exponentially and the average age of a farmer far outweighs the median age in Sub-Saharan Africa does not allow world leaders to have a positive economic outlook due to the lack of interest in an agriculturally related career by youth (Mukembo, Edwards, Ramsey, & Henneberry, 2014).

"Obtaining a quality education is the foundation to improving people's lives and sustainable development" (FAO, 2017, para. 1). However, the sole emphasis of education is placed on students passing the final examination in Uganda (Thurmond, Denney, & Kueker, 2018). Rather than providing students with practical knowledge and skills that would support application and self-sustainability upon leaving school (Basaza, Milman, & Wright, 2010; Lugemwa, 2014; Mukembo, 2017), only preparing students to pass the final examination urges lower-order thinking through rote-memorization (Mukembo, 2017). Because rural youth are disinterested in agriculture, this is especially concerning regarding agricultural education. (Bennell, 2007). Additionally, "support for capacity development for youth in directly productive agricultural activities (especially skills training at all levels) still receives limited support"

(Bennell, 2007, p. 4). ActionAid International Uganda, Development Research and Training, and Uganda National NGO Forum (2012) reported that 61.6% of Ugandan youth were unemployed and did not receive skills in school that are necessary to prepare them for the real world.

Even though developing countries often spend 15% to 35% of their national budget on education, their education is inadequate in most instances (Oliveira & Farrell, 1993). Rural youth highlighted they have limited access to knowledge, information, and education (International Movement for Catholic Agricultural and Rural Youth, International Fund for Agricultural Development, & FAO, 2012). Additionally, hunger and the inability to find energy to learn at school are frequent among rural youth of developing countries (MIJARC et al., 2012). Access to school is also an issue because some students travel long distances to get to school (FAO, 2009). In addition, agriculture education curriculum in developing countries is often outdated, inadequate, and lacks relevance to the rural context (FAO, 2009). Agricultural activities are used as common practices for punishment in many parts of the world, which leads to attitudes that negatively affect the aspirations of youth toward agriculture as a career (MIJARC et al., 2012). However, agriculture when appropriately integrated into the school curriculum by using practical activities such as through the school garden, can encourage youth to pursue agriculture as a career (MIJARC et al., 2012).

Problem Statement

Teachers in a rural classroom using chalk to write on a blackboard, working tirelessly to provide their students technical content knowledge with little curriculum resources is an accurate description of many educational settings in Sub-Saharan Africa (World Bank Group, 2007). For most rural teachers and their rural students, subsistence farming is the main means of survival and these teachers often lack relevant agricultural education curriculum to deliver content knowledge to their students leaving them to teach from personal experiences in production agriculture (FAO, 2009). While educational reform has been attempted in many developing countries by implementing new curricula (O'Sullivan, 2002; Rogan & Aldous, 2005; Serbessa, 2006; Tabulawa, 1998) these curricula are often implemented by policy makers and the implementation process is often neglected leaving teachers unprepared to adopt pedagogies introduced by new curricula (Hennessey, Harrison, & Wamakote, 2010; Rogan & Aldous, 2005). However, INGO's are more locally and contextually relevant to schools in developing countries than governments and are being called on to assist in educational development because of their success in the implementation process of curriculum and learner-centered teaching methods (Raval et al., 2010; Rose, 2009). Many non-governmental organizations (NGOs) have been created with the purpose of fighting food insecurity by empowering local people in rural villages of Sub-Saharan Africa to be educated and better prepared to provide for their families (FAO, 2014). Field of Hope, an American-based international NGO, works primarily with agriculture teachers, women's groups, and smallholder farmers in northern Uganda. Their official mission reads, "We develop agricultural knowledge and enthusiasm among youth and smallholder farmers to sustain nutritionally food secure and economically empowered communities" (Field of Hope Organization, n.d.a., para. 1). Field of Hope began exploring the most appropriate way to assist teachers in the Ugandan classroom. Working together, Field of Hope and Vivayic, a company that designs learning solutions, created a model of how to equip rural Ugandan youth with practical agricultural skills and build their interest in agricultural careers. The two organizations collaborated to design, write, and pilot a year-long Senior 1 (S1) agriculture

education curriculum focused on lesson plans that incorporated project based learning targeting competency development such as problem solving, decision-making, teamwork, communication, risk-taking, and agri-entrepreneurship (Thurmond et al., 2018, pp. 1–2). This curriculum for S1 also ensured content recognized on the national exams was covered as well as competencies needed to enter into an agriculture career or become a successful smallholder farmer.

Theoretical Framework

Within this study, in order to explore how secondary school teachers who partner with Field of Hope have implemented the new curriculum, a framework developed by Rogan and Grayson (2003) was used. Rogan and Grayson base their framework on three main constructs: profile of implementation, capacity to support innovation, and support from outside agencies. These constructs all share three important characteristics: a) they can be measured by indicators, b) they are broad enough to encompass a number of related factors, and c) they are narrow enough to include one main idea.

The main characteristic of the *profile of implementation* is that the process of employing a new curriculum is not an all or nothing proposition and may include segmented stages for implementation (Rogan & Grayson, 2003). This profile is constructed to offer a "map of the learning area and the number of possible routes that could be taken to reach a number of destinations" (Rogan & Grayson, p. 1181). The beginning level of the *profile of implementation*, orientation and preparation, addresses the time where teachers and faculty "become aware of and prepare to implement the new curriculum" (Rogan & Grayson, 2003, p. 1181). The next levels refer to the mechanical and routine use, which represent a period where the curriculum can be used with minimal modification to the local context (Rogan & Grayson, 2003). The last stages are refinement, integration, and renewal, which represent the teacher beginning to take ownership of the curriculum while possibly enriching it to make modifications. The *capacity to support innovation* concerns factors that are likely to support or hinder the implementation of new ideas and practices in the new curriculum recognizing that schools differ in terms of their capacity to implement innovation (Rogan & Grayson, 2003). There are four indicators for the capacity to support innovation: "1) physical resources, 2) teacher factors, 3) student factors, and 4) school ecology and management" (Rogan & Grayson, 2003, p. 186). The final construct *support from outside agencies* concerns itself with factors that hinder or support implementation of new ideas and practices within the given curriculum (Altinyelken, 2010a). Outside agencies are referred to as any organization that is not within the school but help facilitate the innovation by interacting with the school (Rogan & Grayson, 2003). In developing countries, outside support from agencies looks completely different than outside support in a developed world (Rogan & Grayson, 2003). In developing countries, most often the support from outside agencies comes from agencies in the United States and other developed countries who are providing aid (Rogan & Grayson, 2003). The four categories of support from outside agencies are unions, donors, educational departments, and NGOs/INGOs (Rogan & Grayson, 2003).

Purpose and Objective

The purpose of the study was to explore and derive meaning from the experiences of the instructors teaching agricultural education in secondary schools partnered with the INGO Field of Hope who were given a new Senior One (S1) agriculture education curriculum to implement

through a basic qualitative approach. Additionally, the study aimed to help Field of Hope understand the practicality and applicability of the curriculum the agriculture teachers of schools that partner with Field of Hope were using. While research has been conducted that exemplifies how governments in developing countries such as Namibia (O'Sullivan, 2002), South Africa (Rogan & Aldous, 2005), Ethiopia (Serbessa, 2006), and Botswana (Tabulawa, 1998) implemented new curriculum, scant research exists about how INGOs can increase their effectiveness and efficiency operating in this sphere. The researcher aimed to identify connections in curriculum and activities facilitated by the INGO Field of Hope and the decision-making process of instructors to adopt curriculum to use in their classrooms.

The intent of this basic qualitative study was to uncover and interpret the meanings of the experiences of the teachers who were using the new Field of Hope S1 agriculture education curriculum in secondary schools of Uganda. The researcher also aimed to spark further research in the area of educational reform and curriculum implementation in respect to INGOs in developing countries. The objectives guiding this research were:

1. Determine the influences impacting teacher adoption of agricultural education curriculum.
2. Determine the barriers that prevent teachers from adopting the curriculum.

Participants

Eight participants were purposefully selected for this study. Each participant was given a pseudonym to protect individual confidentiality (Creswell & Poth, 2018; Merriam, 2009). Participants are described to the demographic information collected on the letter to prospective interviewees and the information discussed during the interviews.

Rauf is a 33-year-old who has been teaching for 10 years and has a Diploma in Secondary Education. When Field of Hope began creating curriculum, Rauf worked at the school where Field of Hope was volunteering and aided in the process of idea sharing to determine the curriculum that would be beneficial for teachers in Uganda. He wrote a letter in support of the curriculum to the Director of the National Curriculum Development Center in Uganda explaining the efforts of Field of Hope. He has often been called a "Field of Hope Champion," for his service and dedication to the implementation and adoption of the Field of Hope agriculture education curriculum. Currently, Rauf teaches secondary school at a government boarding school in northern Uganda and has used the curriculum since its creation.

Tuno is a 36-year-old who has been teaching for ten years. Tuno received a Diploma and previously served as an extension agent for seven years. Because Tuno was an extension agent, he has a tremendous amount of crop production knowledge to share with his students in the garden. He has been teaching from this curriculum since receiving it in June 2018 during a training. Tuno teaches secondary school at a children's home in northern Uganda.

Kofi is a 27-year-old who has been teaching for four years. Kofi received his Diploma in Secondary Education. In his younger years, Kofi enjoyed discussion in high school classes most and could often be found leading the class in discussions about the topic at hand. He was invited by Rauf to attend the training where he received the S1 curriculum in June of 2018 and has been using the curriculum since. Kofi teaches secondary school at a private boarding school.

Grace is a 26-year-old who has been teaching for two years. Grace received a Diploma in Crop Production and Management and mainly focused on raising banana, citrus, and other fruits, but wants to further her education by going for her Degree in Agriculture Education. Because agriculture is the backbone of the whole world, Grace loves to teach agriculture and it is her wish to help students know agriculture deep and practically. Grace is secondary school teacher at a children's home in northern Uganda who has partnered with Field of Hope prior to the creation of the curriculum and was one of the first teachers to use and implement the curriculum.

Dowda is a 31-year-old who has been teaching for nine years. Dowda received his Diploma in Secondary Education. Dowda chose to become a teacher because nobody in his family was a teacher. He feels that if you become a teacher you can teach everywhere, not just in the classroom. His aim as a secondary school student was to become a medical doctor, however financially he was crippled and therefore became a teacher. He believes if one chooses to become a teacher, they will never be poor because you will have both friends and knowledge. He knows that teaching is his call from God, and he strives to teach from his heart while delivering content to the best of his ability because he knows that one day his son will be taught by somebody that is now his student.

Dakar is a 26-year-old who has been teaching for two years. Dakar received a Diploma. Dakar did not have a good agriculture teacher in secondary school and was inspired to teach from his experience. He learned the material on his own and passed the exams and eventually got a government scholarship to become a teacher because he believes teaching is a gift given to him by God. He was invited by Rauf to attend the training and receive the S1 curriculum in June of 2018 and has been using the curriculum since. Dakar teaches secondary school at a government boarding school in northern Uganda.

Fred is a 33-year-old who has been teaching for nine years. Fred received a Diploma. Fred had a wonderful agriculture teacher in secondary school who guided him so well that he desired to become a teacher himself. He was invited by Rauf to attend the training and receive the S1 curriculum in June of 2018 and has been using the curriculum since. Fred teaches secondary school at a private boarding school in northern Uganda.

Isha is a 27-year-old who has been teaching for three years. Isha received his Diploma in Secondary Education. Isha believes that teaching is a call from God and that is why he decided to enter the profession. He was invited by Rauf to attend the training where he received the S1 curriculum in June 2018 and has been using the curriculum since. Isha teaches secondary school at a private boarding school in northern Uganda.

Methodology

Qualitative inquiry was selected as the best method to understand the shared experiences of the teachers delivering the new curriculum provided by Field of Hope in the secondary schools operated by Field of Hope in the northern region of Uganda. The researcher employed the techniques brought forward by Lincoln and Guba (1985) through a naturalistic mode of inquiry. Naturalistic inquiry is an alternative mode of inquiry that lessens the "degree of manipulation of conditions antecedent to the inquiry" (Guba, 1978, p. 3) and lessens the "degree

of constraint imposed on outputs by subjects involved in the inquiry" (p. 3). Natural inquiry aims to understand and discover human perceptions, actualities, and social perceptions that are untouched by formal measurement (Wolf & Tymitz, 1976–1977). When a researcher imposes a naturalistic inquiry, they aim to uncover distinct stories told by real people in real situations in natural ways by presenting a storyline of what people feel, know, believe, perceive, and understand as closely as if the person was sharing it themselves (Wolf & Tymitz, 1976–1977). The study was conducted in a real-world setting, and observations were made by studying what was allowed to happen "naturally" (Merriam, 2009, p. 7).

In order to "learn a great deal about issues of central importance to the purpose of the inquiry" (Patton, 2002, p. 230), the researcher chose a purposive sample of interviewees. To conduct criterion-based selection, the researcher "created a list of the attributes essential" (Patton, 2002, pp. 69–70) to the study in order to "proceed to find or locate a unit matching the list" (p. 69-70) to guide the researcher to information-rich cases that reflected the purpose of the study (Merriam, 2009). The selection criteria used to select participants included the following: the teacher must have taught the S1 curriculum provided by Field of Hope to students and the teacher must have attended the only teacher training offered by Field of Hope (June 2018) by the start of interviews (January 2019). The first selection criteria *the teacher must have taught the S1 curriculum provided by Field of Hope to students* was created because it reflected the purpose of the study, which was to explore and derive meaning from the experiences of the instructors teaching agricultural education in secondary schools partnered with the INGO Field of Hope who were given a new S1 agricultural education curriculum to implement through a basic qualitative approach (Merriam, 2009). The second selection criteria, *the teacher must have attended the only teacher training offered by Field of Hope (June 2018) by the start of interviews (January 2019)*, was created because it reflected the theoretical framework through which the study was guided. The three pillars of the Framework for Curriculum Implementation in Developing Countries are profile of implementation, capacity to support innovation, and support from outside agencies.

Eight teachers met the selection criteria and were notified with a letter inviting them to participate in the study with all consenting. The researcher conducted eight one-on-one semi-structured interviews to "attempt to understand the world from the subjects' point of view, to unfold the meaning of their experience, and to uncover their lived world" in January of 2019 (Brinkmann & Klave, 2015, p. 3). The interviews were guided by 25 open-ended questions developed by the researcher and the faculty of NC State University. Interviews lasted 30 minutes to one hour and were conducted during the "Train the Trainer" professional development held by Field of Hope for teachers using the new curriculum. While conducting interviews, the researcher employed the use of rapport to build trust and create an environment welcoming of the participant's feelings, opinions, and knowledge (Merriam, 2009). The researcher built rapport with the interviewees by asking "descriptive information about themselves" (Merriam, 2009, p. 106), such as asking about their holiday from school or by inquiring how the new year was treating them (Merriam, 2009). Before conducting an interview, the researcher shared that she also was a teacher in Africa, just like the participant, in a very rural village school, in an effort to create a conversation that would allow the interviewee to feel somewhat connected to the researcher and build rapport (Merriam, 2009). The researcher took on the characteristic of neutrality. In order to allow the participant to feel completely comfortable with the interviewer,

the researcher refrained from letting her personal views be known about the subject at hand (Merriam, 2009).

The interview protocol included six types of interview questions to encourage an array of responses from the interviewees about their overall experiences, opinions, and feelings (Patton, 2002). The interview protocol was created utilizing the Framework for Curriculum Implementation in Developing Countries' constructs and subconstructs and the objectives of the study. The interviews were recorded and the researcher took notes during the interviews to capture any reactions, thoughts, or importance of participants' responses (Creswell & Poth, 2018; Merriam, 2009). The researcher conducted unstructured natural-setting observations and reflexivity to triangulate findings emerging from the interviews (Creswell & Poth, 2018; Merriam, 2009; Tracy, 2010). Observations were collected during visits to schools, during meetings with administrators, and during the professional development provided to the teachers by Field of Hope. A field notes journal was kept throughout the interviews and observations, and a written reflexive journal was kept each night to capture important memories, conversations, and interactions that took place each day (Angen, 2000; Creswell & Poth, 2018; Lincoln & Guba, 1985; Merriam, 2009).

The researcher began organizing and refining data after the first interview was conducted by revisiting the purpose and objectives of the study and reading through field notes and interview notes to make record of evolving and interesting occurrences through observations and the participants' answers to interview questions (Merriam, 2009). Once all interviews were complete, observations were made, and field notes were taken, the researcher utilized the three methods of data management as set forth by Reid (1992): data preparation, data identification, and data manipulation. To prepare the data for analysis, the researcher compiled the audio recordings of participants' interviews and utilized a transcription service to receive an editable document of the recorded interview (Merriam, 2009). The researcher then listened to the audio recordings while reading the transcribed interviews and edited, corrected, or filled in inaudible blanks to have a verbatim transcription for analyzing data (Merriam, 2009). To begin the data evaluation process, the researcher read each transcript and made memos, noted key concepts, and ideas that stood out "to build a sense of the data without getting caught up in the details of coding" (Creswell & Poth, 2018, p. 198). The researcher prioritized memoing by making notes of thoughts as soon as they occurred throughout the entirety of the process of analyzation to track the evolution of ideas in a Microsoft Word document (Miles, Huberman, & Saldaña, 2014).

First-round coding was initially conducted to understand the data by segmenting the transcripts into phrases and words of the participants to split the data into coded segments (Corbin & Strauss, 2015; Yin, 2016). During the first-round coding, the researcher utilized *in vivo* coding to "honor the voices of the participants and their perspectives" (Saldaña, 2013, p. 61). To conduct second-round coding, the researcher utilized axial coding methods to reorganize data coded in the first coding cycle to create categorical, thematic, and conceptual organization of the data (Saldaña, 2013). Axial coding organized repeating patterns that exemplified potential themes across the data (Merriam & Tisdell, 2015). To ensure the observations of the researcher were taken into account, note-taking and memoing were conducted while coding to create a reflection on the data as a whole (Creswell & Poth, 2018; Merriam & Tisdell, 2015; Yin, 2016). Theoretical schemes were constructed from axial codes that exemplified the "significance of interpretations and conclusions in relation to the literature and previous studies" (Yin, 2016, p.

199). In order to ensure the themes were "describing, classifying, and interpreting the data" (Creswell & Poth, 2018, p.189) the themes were analyzed by the researcher.

The three lenses through which the research employed strategies for validating the qualitative study are 1) researcher's lens, 2) participant's lens, and 3) reader's or reviewer's lens (Creswell & Poth, 2018). The researcher employed triangulation and engaged in reflexivity through the researcher's lens. Through the participant's lens, the researcher employed member checking to ensure validity. Finally, through the reader's or reviewer's lens, the researcher employed rich and thick description to ensure validity. Member checking was used to establish credibility.The participants were asked to examine rough drafts of the ongoing data analysis process to provide "alternative language, observations, and interpretations" (Stake, 1995, p. 115). While collecting interviews, the researcher listened to the interview(s) at night, and the next day would confirm quotes and attitudes with the participants to check for accuracy. Additionally, after the researcher concluded findings of the study, she traveled back to Uganda and met with the participants to discuss the findings and ensure they were in fact accurate and credible findings. In this particular study, this step was crucial for the research to provide credibility because the participants were from another cultural background than that of the researcher. Additionally, English, the language in which the interviews were conducted, may not have been the participant's native language, but the participant's second language. Therefore, member checking ensured credibility of the researcher's preliminary analysis (Creswell & Poth, 2018).

Findings

Two primary themes emerged for the two research objectives: *shift from theoretical to practical applications and barriers.* Within the *shift from theoretical to practical applications* theme, the following subthemes emerged: *practical applications, allows students to think critically, inclusivity of all learning types, teacher-centered to learner-centered, assessment, and community engagement.* In the *barriers* theme, *lack of resources, additional training needed, support from school, and support from outside agencies* emerged as the subthemes.

Research Objective 1: Determine the influences impacting teacher adoption of agricultural education curriculum.

Theme 1: *Shift from Theoretical to Practical Applications*

Historically, students come to school, sit in their desks, and listen to a teacher lecture while he or she is writing on the chalkboard. Participants explained that this type of learning is theoretical, teacher-centered, and provides students very little practical application to the subject they are learning. Participants expressed that their students were learning information in class in a completely different manner when using the curriculum provided by Field of Hope. The new curriculum provides three class periods of agriculture instruction each week, which is the same as when using Ugandan curriculum (Ministry of Education and Sports, 2008). However, when using the new curriculum, the change calls for two of those three days to be spent in the class and one day is "practical," where the students change environments and visit the garden, animals, nearby community, field, or the closest environment that matches what they have learned in class that week to allow for real-world application. When discussing how students learn using the new curriculum Tuno stated, "Being able to see something versus hear something makes a difference in how you learn it."

"Critical thinking is reflective and reasonable thinking that is focused on deciding what to believe or do" (Ennis, 1985, 45). Participants were able to tell the researcher what *critical thinking* was and how they help their students develop critical thinking using the new curriculum. Participants recognized that their students were thinking in a new manner due to their new behaviors. It was found that students were asking more questions in class, meaning they were considering what to do or believe based on the information presented to them and, therefore, thinking critically about the subjects at hand. Participants reported that their students were thinking critically about topics learned in class through their class activities and assessments students completed. When asked what skills students were learning Dowda said, "Critical thinking through writing and their project and, of course, demonstrating in the garden."

The new curriculum was found to be *inclusive of all learning types.* Because of the project-based learning aspect of the curriculum, many participants agreed that the new methods of teaching were much more beneficial to students of all learning levels. Many participants made statements regarding their excitement of students participating that typically did not engage when using the Ugandan curriculum. The new curriculum enabled students to connect with each other, allowing for teaching among themselves and student inclusivity through group work. This inherently allowed "slower learners" to be involved in the learning process. The participants responses during the study's interviews reflected the same point of view. In accord, Dowda said, "Sometimes a fast learner can teach a slow learner even when I'm not there."

Delivering information in Uganda before teachers began implementing the new curriculum was very much "teacher-centered." When asked what teacher-centered meant, Isha said: "Whereby you give everything fully then we could also have possibly some small groups." Through discussing with teachers their thoughts on using the curriculum, five out of the eight agreed that they used to use teacher-centered methods and now use a curriculum that is "*learner-centered*." Participants expressed their excitement for the new curriculum because it reduced their workload, but they also seemed to like the curriculum because students seemed to have more control over the learning. Isha explained their contentment and their students with the learning- centered curriculum: "Previously, as I have said, most of the teaching was teacher-centered. But after the bringing of the curriculum, things are becoming easy because most of the work becomes now learner-centered." Fred also agreed and explained the richness of student involvement: "Because it is actually learner-oriented, or learner based. It seeks to involve the learners more in the learning process."

Through observations and interviews, the researcher was able to understand that students some students, but not all were being *assessed* beyond tests, examinations, and written answers. Rauf showed the researcher his teaching laboratory and explained that he would take weeds out of a field and place them on a lab table for students to identify as well as explain in detail the growth stages of the plant. He explained that students would dissect a hen for poultry. These along with many other observations support interviewees' statements that allowed the researcher to understand the practical nature of the curriculum was still reflected in assessments. Rauf stated, "I give them items to identify and explain maybe, oh, how it's grown or explain the functions."

Communal living, working, and sharing of most parts of life is how most Ugandan's live. Whether as orphans at a children's home or villages of multiple families, Ugandans are used to living and working alongside their extended family members and neighbors. Participants expressed a sense of *increased engagement with the surrounding communities* as a result of using the curriculum. Participants reported taking their students into nearby communities to observe, learn from, and see the practical application from farmers in their fields of the lessons they were learning in class. Participants also expressed that students have an increased excitement for going into the communities to learn from their environments so they can easily apply and replicate what they have learned. Grace shared the excitement of her students:

Research Objective 2: Determine the barriers that prevent teachers from adopting the curriculum.

It was overwhelmingly apparent that the largest *barrier* to participants fully adopting the curriculum was lack of resources available for the teacher and or students to use, as well as the incorporation of critical thinking and project-based learning into their lessons. All eight participants expressed that additional equipment was needed to be able to use the curriculum appropriately inside and outside of the classroom during practicals. Tools and equipment for both the laboratory and garden or animals were the largest request for resources coming from the participants. Lack of *support from school* and the leadership of the school was the second largest barrier that participants faced. All eight of the participants expressed that their school leadership supported them using the curriculum, but five participants explained that their school did not financially support them with land, materials, or tools for the laboratory or the practical days in the curriculum where they work in the garden or with animals. The participants described in detail that they felt *additional training is needed* to be able to fully adopt and teach the curriculum to the best of their abilities. Teachers felt they needed additional training mostly in the subjects of crop production and animal rearing. Teachers enjoyed the capacity building, but also felt a responsibility to teach the curriculum to the best of their ability. Therefore, they identified crop production and animal rearing as the two areas to be improved in.

The negative mindset that Ugandans have about agriculture and more specifically, teachers, school administrators, and students was a barrier preventing teachers from being able to fully adopt the curriculum. Teachers described that the students' mindset was changing, but the mindset of the other teachers and some school leadership was that agriculture was a form of punishment. This negative mindset made it difficult for teachers to get students interested in and to believe that agriculture could be more than simply a form of punishment.

Conclusions, Implications, and Recommendations

From the analysis of interviews with eight teachers, two themes and multiple subthemes emerged. The two themes were *shift from theoretical to practical applications and barriers.* The first theme, shift from theoretical to practical applications, included six sub-themes: *practical applications, allows students to think critically, inclusivity of slow learners and all learning types, teacher-centered to learner-centered, assessment,* and *community engagement.* The second theme, barriers, included four subthemes: *lack of resource, additional training needed, support from schools,* and *support from outside agencies.*

Theme 1, *shift from theoretical to practical applications*, concluded that the practical application provided by the new curriculum allows students to experience learning in an entirely new way. Previously, students attained new knowledge in the classroom through teaching that was theoretically based or lecture. Learning and understanding the subjects was difficult for students as well as connecting students to what they were learning in the real world. The subtheme *practical applications* refer to the applicability to the real world the new agriculture education curriculum provides to the students. Students are now able to comprehend what they are learning enough to construct questions to further their understanding and then go home over the holidays to repeat what they have learned with family or friends. The subtheme *allows students to critically think* refers to participants who realized that by using the new curriculum their students were thinking about topics in class in a completely new manner. From learning about the topic in class to experiencing the topic through hands-on application in the garden to completing research on a topic and presenting it to the class, students are being exposed to the subject at hand in different formats, allowing them to understand the topic from different angles. Because of this practical application, students were able to better retain the information presented to them on their assessments while promoting the *inclusivity of slow learners and all learning types.*

The subtheme *teacher-centered to learner-centered* refers to children learning more from practical applications supplemented with classroom instruction instead of full lecture from the teacher. Now, the learners are able to take control of their knowledge by applying themselves to the subject through hands-on work during practical days. The teachers are not only using practical methods of teaching but are also using practical methods of *assessing* students. The materials provided in the curriculum are utilized to assess students of their newfound knowledge. The subtheme *community engagement* refers to the increased amount of learning taking place in the community as well as the heightened sense of responsibility of the teacher's role in any community. Because the new curriculum has shifted teachers and students toward increased practical learning, the teachers encourage students to go into their communities and test out their new knowledge learned in the garden or with livestock. Students are excited to return home over break from their children's homes and use their new knowledge on their families or neighbors' farms.

Theme 2, *barriers*, refers to the hindrance's participants are faced with regarding scheduling, class size, classroom management, and local examples. Teachers have been supported greatly by Field of Hope and the curriculum they have received but still face barriers that prevent them from being able to fully use the curriculum in the way it is intended to be used. The subtheme *lack of resources* refers to the materials that schools or teachers do not have in order for them to use the curriculum as it is intended. One of the three days of curriculum instruction provided by Field of Hope is a "practical day" where students complete an activity about what they learned in the previous two lessons in class. Two schools do not have a garden, making it difficult for students to complete their lesson on the practical day. The subtheme *additional training needed* refers to the guidance participants feel they still need in order to fully implement the curriculum. The participants were thrilled at the practical aspects of the curriculum but admitted that there is room for improvement in their teaching skills and agricultural knowledge to feel certain they are delivering information to their students as intended by the curriculum. Additionally, a continuation of the current professional development trainings conducted by Field of Hope and an expansion of them to areas of Uganda where new

teachers are being recruited would benefit the teachers. The subtheme *support from school* refers to the barrier created by the lack of support schools are giving participants to implement the curriculum. All participants in the study reported to have support from the leadership of their school, but five of the eight reported that they lack resources such as land, materials, or supplies necessary to complete lessons accordingly. The subtheme *support from outside agencies* refers to the support, if any, the school implementing the curriculum receives from outside sources other than the funding source, the school, or the main source of support (Rogan & Grayson, 2003). The main source of support in the study is the INGO Field of Hope. Two schools are children's homes and receive funds and support from their respective organizations. Two different schools that are private receive funds from NGOs in the form of solar electricity and computers. Four of the eight schools fully rely on the main source of support, Field of Hope, for material and non-material support.

What makes this curriculum implementation unique as well as what makes the type of support received from Field of Hope stand out from other studies completed using the Framework for Curriculum Implementation in Developing Countries is the constant connection to a supporting agency with ongoing support versus curriculum being distributed and teachers being left to fend for themselves in the classroom while learning to adapt. Studies conducted using the Framework for Curriculum Implementation in Developing Countries (Altinyelken, 2010a; Altinyelken, 2010b; Rogan, 2004; Rogan, 2007; Rogan & Aldous, 2005; Rogan & Grayson, 2003; Kriek & Basson, 2008; Lelliot et al., 2009) have investigated educational policy reforms spearheaded by governmental agencies that have shown to leave teachers needing additional support while also indicating the curriculum implementation process is slowing down the expected outcomes on student success. This study sheds light on how INGOs or NGOs could involve themselves in the positives of the educational reform sphere while achieving local relevancy and forging working relationships with ministries of education in developing countries.

Lastly, the following are recommendations for future research and practice. Due to participants reporting that students go home over holiday and practice what they learned in class in the village, investigate whether children's new agriculture knowledge transfers over to their parents or relatives (Okikor, Oonyu, Mastiko, & Kibwika, 2011) using Rogers (2003) Diffusion of Innovations. To further understand the needs of the students and teachers utilizing the new curriculum, a needs assessment should be conducted to understand barriers identified in the study. Research should be conducted to follow students who complete S1 through S4 using Field of Hope curriculum to understand if they are using practical skills learned to survive. To further understand the impact the curriculum is having on students using the curriculum, a capacity instrument should be created and used to understand if students' capacities increase. The instrument should be administered both before and after students are taught the curriculum. The instrument should contain themes of technical aspects of agriculture, agriculture careers, soft skills, and overall attitudes toward agriculture. To ensure that teachers implementing the curriculum understand project-based learning and critical thinking, a formal process for training teachers should be developed, and the acquisition of local Ugandan trainers would enable sustainability and potentially elongate the training process well past when the non-Ugandan Field of Hope trainers and volunteers return home from Uganda.

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Profiles of Youth Citizenship: A Cluster Analysis of Ethical factors, Demographics, and Problem-solving Experiences

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Youth have the capacity to drive positive change in their communities through active and engaged citizenship (AEC). Teen-leadership programs provide youth with opportunities to develop the skills necessary to participate as partners in community problem-solving efforts. Situated in relational developmental systems (RDS) metatheory, this study aimed to examine how cluster membership based upon demographic characteristics, ethical factors, and problem-solving disposition impact AEC. The findings indicate significant differences between clusters for AEC, civic duty, and civic skills. These differences were predominately observed through membership in long-term or short-term leadership programs, gender, enrollment in honors/AP courses, ethical views, and problem-solving disposition. Youth leadership practitioners should consider avenues for infusing problem solving and character development in gender inclusive program curriculum to increase the likelihood for contributing.

Introduction

From an interactional lens, community is a dynamic, changing environment built on the actions of its members rather than a stagnant, geographically bound area (Barnett & Brennan, 2006). From this perspective, individuals are impacted by their community and context. Conversely, individuals influence their communities, whether intentionally or unintentionally (Lerner, Almerigi, Theokas, & Lerner, 2005). Community development initiatives rarely build on the strengths of youth or allow youth participation to contribute to community viability. However, youth have the capacity to develop healthier communities with longevity (Checkoway & Gutierrez, 2006). Society, their community, and the individual are all positively impacted when youth are actively engaged in their communities (Zaff, Boyd, Li, Lerner, & Lerner, 2010). Increasing youth capacity for active and engaged citizenship (AEC) benefits youth participants, their communities, and the greater society.

When considering youth's civic participation and citizenship, individuals often view these concepts in two distinct ways (Bell, 2005). The first approach involves youth's need to develop skills to become future citizens. The other approach includes examining youth's views and insights on their current roles as citizens. Recent research supports youth's role as active community members that drive change (Harris, 2015; Mortensen et al., 2014). Mortensen et al. (2014) argue that youth have the awareness and desire needed to create meaningful change in their communities while Harris (2015) supports youth's role in collaborative community problem-solving. Youth are capable of meaningful contributions, but they must possess the skills and motive necessary to be successful in these endeavors.

Formed in the early 1900s, 4-H is one of the longest-running youth organizations in the United States, with a focus on providing safe and supportive environments for youth development (National 4-H Council, 2017). Contribution to the community is often viewed as the ultimate intended outcome for youth participants. However, there are several elements required to practice positive youth development (PYD) and contribution: positive relationship with caring adults, a safe and inclusive environment, engagement in learning, opportunity for mastery, opportunity to see oneself as an active participant in the future, opportunity for self-determination, and opportunity to value and practice service for others (4-H National Headquarters, 2011). Leadership is often related to contribution and citizenship within 4-H programs, with leadership efforts including club-based, county-based, and statewide leadership-training programs and positions. In Virginia, 4-H leadership programs vary, with some counties supporting year-round teen-leadership clubs and others instituting short-term trainings.

Theoretical Framework

From a relational developmental systems (RDS) view point, youth are regarded from a strength-based perspective as resources to be developed (Geldhof, Bower, & Lerner, 2013). Examining trajectories toward AEC enables a greater understanding of the mutually influential person-context relations involved in RDS (Zaff, Kawashima-Ginsberg, Lin, Lamb, Balsano, & Lerner, 2011). Therefore, the theoretical foundation for this study is centralized on RDS metatheory and the role of sociocultural theory and reasoned action approach.

Within developmental science, understanding how humans thrive through mutually-influential relations between individual contributions, positive community engagement, and community organizations is a focal area of work (Lerner, Wang, Champine, Warren, & Erickson, 2014). RDS metatheory provides a basis for examining these phenomena from “a life-span approach to the scientific study of systematic intraindividual changes—from conception to the end of life—of an organism’s behavior, and of the systems and processes involved in those changes and that behavior” (Overton, 2015, p. 47). Within RDS, a reciprocal bi-directional or circular relationship exists between the individual and their context, which incorporates both inter- and intra-individual change (Overton, 2013). Plasticity is a hallmark of this metatheory and encompasses the capacity for development to be systematic and continuous rather than random (Lerner & Overton, 2008). The organism is inherently active, self-creating, self-organizing, and self-regulating in nature in a plastic, nonlinear complex adaptive system (Overton, 2015). The organism’s actions function coactively with their physical and sociocultural environment.

Within systematically integrated human development, when the bi-directional relations are mutually beneficial, a foundation for adaption throughout the lifespan arises through levels of organization (Lerner et al., 2014). Adaption within RDS is how the person responds to changing contexts (Overton, 2013). RDS examines developmental processes as non-ergodic and does not assume homogeneity across samples or stationarity across time (Lerner et al., 2014). With this approach, individual strengths are aligned with environmental resources for positive growth, and youth development may be optimized (Geldhof et al., 2013), resulting in applied empirical work for positive human development and social justice (Lerner & Overton, 2008). Furthering expansive holistic yields of inclusive inter- and intra-individual patterns for responding to “what” questions in programmatic research (Lerner et al., 2014) such as, what context, for what youth, at

what developmental period, results in what features of community problem-solving? Therefore, it is important to examine various layers of experiences, contexts, and demographics to get a full picture of how these variables interrelate or combine to impact individual development.

RDS metatheory transposes the independence of each individual's developmental trajectory from any other human. All human beings embody actions, which are characteristics of their complex adaptive system. Human actions are viewed as intentional activities, with intentionality either being conscious or self-conscious, not requiring a level of knowing (Overton, 2013). Therefore, all embodied actions are a product of the person, biology, and culture. Actions are impacted by adaptive developmental regulations, which are mutually influential relations between the individual and their context (Geldhof et al., 2013). Adaptive developmental regulations may emerge and/or advance within an individual and their environment to increase the likelihood of positive development. In the model for AEC of youth (Figure 1), "adaptive developmental regulations lead to positive youth development and, within the context of the broader ecology of human development, in turn lead to positive civic engagement and reduced risk and problem behaviors" (Lerner et al., 2014, p. 73). This developmental trajectory presents an example of a predicted developmental process, which incorporates adaptive developmental regulations to enhance the probability of contribution. Within RDS, probabilities can be assessed through normative sequences with multiple action paths and courtesy to biological, sociocultural, and physical environmental subsystems.

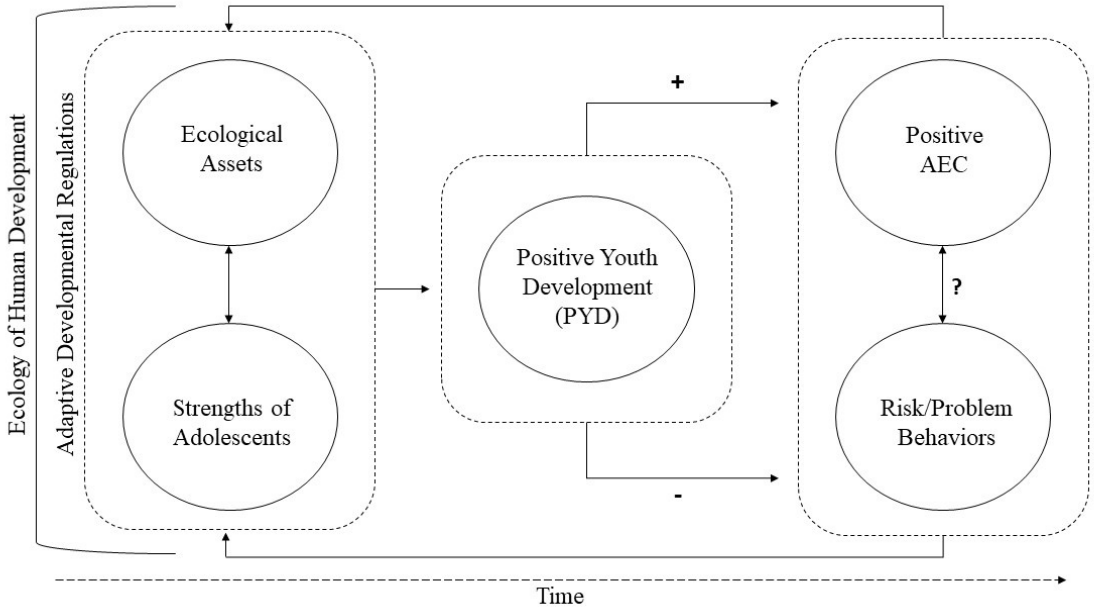

Figure 1. Adapted from Lerner et al.'s (2014) model for AEC of youth.

At the basis of RDS metatheory are the mutually influential relationships between biology, person, and culture (Overton, 2015). Further, Overton (2013) posits:

> In the area of sociocultural development, there appears to be a clear trend away from positions that identify individual development and culture as separate and distinct, if

> interacting, entities, and towards the position that recognizes their coconstruction, codetermination and codevelopment (p. 94).

RDS concepts are tools for social justice that establish theory-predicted and evidence-based policies and programs, which drive positive change and development for all youth (Lerner & Overton, 2008). Sociocultural theory provides a basis for understanding the impact that culture and environment have on human development.

Vygotsky's (1978) sociocultural theory posits individuals derive meaning of their experiences through social mediation, which is situated within culture and history. Social interaction through one's developmental history influences symbolism and culture (Mahn, 1999). Three central elements of sociocultural theory are social sources of individual development, semiotic mediation in development, and genetic analysis (John-Steiner & Mahn, 1996), meaning that, as one grows, learning occurs based on genetics, symbols, and social interactions (Mercer & Howe, 2012). This results in the development of one's cultural associations.

As active and engaged citizens, personal culture and history of social experiences has impact on developmental trajectories. Youth are not homogeneous citizens; they all have different lived experiences of citizenship (Bell, 2005). Parental and community views of civic participation and one's self-efficacy relating to participation in problem-solving opportunities impact youth in different ways but should be taken into consideration. For example, Taylor and Marri (2013) found that identity, family, movement, school curricula, and community engagement all impacted immigrant youth's conceptualization of citizenship. These factors varied in their impact on developmental pathways toward engaged citizens (Taylor & Marri, 2013). This is important to consider when envisioning an optimized developmental process to contribute to active and engaged young citizens.

Derived from Bandura's (1971) social cognitive theory, reasoned action approach provides a basis for understanding how individuals decide to engage in specific behaviors (Fishbein & Ajzen, 2010). Reasoned action approach involves consideration for how background factors impact beliefs, which ultimately drive the formation of one's attitudes, perceived norms, and perceived behavioral control. These all ultimately impact intention, which leads to a behavior (Fishbein & Ajzen, 2010). Consistent with RDS metatheory, reasoned action approach provides a framework to understand how humans engage in actions with regard to background factors. Connecting reasoned action approach with sociocultural theory under RDS metatheory provides a basis for examining normative sequences within youth behavioral development and the impact of background factors and adaptive developmental regulations on developmental trajectories for active and engaged young citizens.

Demographics, ethical factors, and problem-solving disposition can be utilized to develop youth profiles for AEC. AEC is often operationalized as "someone who has a sense of civic duty, feeling of social connection to their community, confidence in their abilities to effect change, as well as someone who engages in civic behaviors" (Zaff et al., 2010, p. 737). In AEC, civic action, civic skills, social connection, and participation are constructs. This perspective views active and engaged citizens as those who are more than "dutiful" citizens who partake in activities such as voting, obeying laws, paying taxes, and upholding community standards

(Mihailidis & Thevenin, 2013). Rather, active and engaged citizens meaningfully contribute to their communities.

Purpose & Objectives

The purpose of this study was to utilize person-centered analysis to develop youth profiles of citizenship. We assessed statistical significance between clusters and AEC. Are there youth profiles of AEC based on ethical factors, demographics, and problem-solving disposition for youth participating in a teen-leadership program?

1. Describe AEC, ethical factors, demographic characteristics, and problem-solving disposition.
2. Identify clusters of participants based on ethical factors, demographic characteristics, and problem-solving disposition.
3. Examine relationships between AEC and clusters based on ethical factors, demographic characteristics, and problem-solving disposition.

Methods

This study explored developmental trajectories of youth toward AEC and examined how ethical factors, demographics, and problem-solving disposition impact developmental trajectories for AEC through a person-centered approach. A person-centered approach can take multiple forms and is not an all-inclusive statistical method. However, a person-centered approach does provide further consideration for intraindividual change and the diverse pathways of development to provide a basis for examining the holistic development of youth through a RDS lens. "The person-centered approach is grounded in systems perspective of holistic organization of interactive factors and is particularly suited for studying the complex organization of multiple characteristics within the individual" (Lau & Roeser, 2008, p. 497). A person-centered approach examines how clusters of variables impact behavioral responses (Bates, 2000). Person-centered approaches view the population as a heterogeneous group who are influenced by different variables to a diverse extent at various points in time (Laursen & Hoff, 2006).

The research design for this study was a non-experimental, ex post facto survey design (Ary, Jacobs, Irvine, & Walker, 2018). We chose the ex post facto survey design because participants had already received a character education program and the design allowed for the surveying of participants in a realistic setting. All respondents were participants in a 4-H teen-leadership program or training in the state of Virginia. There were variations in the treatment received based on length of time and program/training facilitator. Youth were enrolled in a year-round teen-leadership club or in a short-term leadership program. Results from this study are only generalizable to 4-H teen leaders in Virginia, based on limitations in an ex post facto design (Ary et al., 2018).

Sample

All youth, ages 13-19, participating in teen-leadership programs run through Virginia 4-H served as the population for this study. We directly administered the instruments face-to-face on scheduled dates and times at club meetings and weekend-long trainings. The Virginia extension

specialist for 4-H youth development identified 14 counties with strong, year-round teen-leadership programs. We contacted each county extension agent to recruit participants and to schedule a time data collection. Out of the 14 counties, we collected data from 11 counties. From the 11 counties there were 275 potential participants with 199 completing the survey for a response rate of 72.36%. We also contacted 14 additional extension agents to recruit counties with upcoming camp-counselor trainings which incorporated teen-leadership training. From the 14 additional counties, we scheduled collection dates with nine counties. From the nine counties, there were 95 potential participants with 60 responding for a response rate of 63.16%. From both groups there was an overall response rate of 70%. The county agents disseminated Institutional Review Board (IRB) guardian consent, youth assent forms, and recruitment materials to youth participants a week prior to data collection. Obtaining guardian consent was a limitation in this study. Participants without guardian consent were often willing to participate, but unable to do so based upon ethical considerations and IRB requirements to obtain consent from guardians which reduced response rates. The survey took approximately 30 minutes for each youth to complete.

Long-term teen-leadership program demographics. Youth from long-term teen-leadership programs were majority female (n = 133, 66.8%) and enrolled in honors/AP courses (n = 138, 69.3%). From the participants, 82.4% were white (n = 164), 10.1% black (n = 20), 2.5% multiracial (n = 5), 2% Asian (n = 4), 1% Native American (n = 2), and 2% selected to not state their race. The mean age of participants was 15.42 (SD = 1.35).

Short-term teen-leadership program demographics. Participants from short-term teen-leadership programs were predominately female (n = 42, 71.7%). Of the youth, 76.7% were white (n = 46), 15% black (n = 9), 6.7% multiracial (n = 4), and 1.7% Asian (n = 1). The mean age of participants was 14.78 (SD = 1.26) and 65% were enrolled in honors/AP courses (n = 39).

Instrumentation

To measure Active and Engaged Citizenship (AEC), We utilized a previously established instrument by Bobek, Zaff, Li, and Lerner (2009). The 32-item AEC scale was adapted to incorporate social media as a means for outreach and advocacy. The AEC scale examines behaviors and attitudes toward citizenship, including emotional, cognitive, and behavioral components of citizenship (Bobek et al., 2009). Participants responded to 28 items on a 5-point Likert scale and 3 questions regarding amount of participation on a 6-point Likert scale (from 1 = “Never” to 6 = “Every day”). Scores on the scale could range from 32 to 163. The AEC scale has four factors: civic duty (α =.741), civic skills (α = .812), neighborhood connection (α = .766) and civic participation (α =.609). The reliability for civic participation in this study was questionable, but a previous study Bobek et al. (2009) reported an acceptable Cronbach alpha (α = .73). The overall AEC instrument yielded a Cronbach alpha of .834.

To examine ethical factors, we utilized an adapted version of the Report Card on the Ethics of American Youth (Josephson Institute of Ethics, 2012). The Josephson Institute of Ethics (2017) developed this instrument and collected data from over 20,000 students, across the nation, every two years since 1998. This questionnaire asks opinions on nine ethical and unethical statements on a 4-point Liker scale (1 = “Strongly disagree”, 2 = “Disagree”, 3 = “Agree”, 4 = “Strongly agree”, and 0 = “No opinion”). Participants also answered 14 items on

the important of material and character values on a 4-point Likert scale (1 = “Unimportant”, 2 = “Moderately important”, 3 = “Very important”, 4 = “Essential”, and 0 = “No opinion”) and 14 items on partaking in unethical behaviors in the last year on a 3-point Likert scale (1 = “Two or more times”, 2 = “Only once”, and 3 = “Never”). Scores had a potential range of 37 to 134. Dr. Rick Hesse validated the instrument to have an error margin of plus or minus less than one percent (Josephson Institute of Ethics, 2012). Based on the collected data in this study, the Cronbach alpha was .824.

We applied Dillman’s Tailored Design Method (DTDM) to create demographic questions in order to examine additional demographics including age, race, enrollment in honors/AP courses, and questions regarding activity participation (Dillman, Smyth, & Christian, 2014). Activity involvement included eight items regarding their participation in different activities on a 6-point Likert scale (from 1 = “Never” to 6 = “Every day”) and were given six points for working eight or more hours a week. Scores on the activity scale could range from 9 to 54.

To collect data on problem-solving disposition, we adapted the EMI, Critical Thinking Disposition Assessment (Irani, Rudd, Gallo, Ricketts, Friedel, & Rhoades, 2007). Irani et al. (2007) developed the EMI to examine critical thinking disposition with college-aged students and adults. We employed a pilot study to select questions related to problem-solving disposition. Following the pilot study, we selected 11 items to represent problem-solving disposition. We altered a few items to increase item discrimination. The 11-item problem-solving disposition scale yielded a Cronbach’s alpha of .871.

Data Analysis

Descriptive statistics, frequencies (*f*), percentages (P), means (*M*), and standard deviations (*SD*) were used to describe demographic characteristics, ethical factors, problem-solving disposition, and the AEC scale responses. We employed a two-step cluster analysis to determine the existence of clusters or subgroups of participants and mean variables by cluster in regard to their responses to demographic questions, ethical factors, and problem-solving disposition. The cluster analysis utilized eight clustering variables, which was appropriate based on recommendations for a sample size of at least 2^m (m = number of clustering variables) (Mooi & Sarstedt, 2011). A two-step cluster analysis was appropriate based on the variables being both categorical and continuous (Șchiopu, 2010). In the first step, an algorithm similar to k-means algorithm is conducted and followed by a modified hierarchical agglomerative clustering procedure to form homogeneous clusters (Mooi & Sarstedt, 2011). We then applied a one-way analysis of variance (ANOVA) to compare clusters on the AEC scale and subscales to report F statistics for significant differences between clusters. An alpha level of 0.05 was set a priori.

Results

We conducted a two-step cluster analysis to determine profiles of youth participants based on gender, race, age, enrollment honors/AP courses, ethical views, problem-solving disposition, activity involvement, and whether the individual participated in a long-term or short-term 4-H teen leadership club. The results generated five clusters (Table 1).

Table 1
Descriptive Statistics of Variables from Two-step Cluster Analysis by Cluster (n =259)

Variable	Cluster 1 (*n* = 82) *f* (P)	Cluster 2 (*n* = 55) *f* (P)	Cluster 3 (*n* = 45) *f* (P)	Cluster 4 (*n* = 40) *f* (P)	Cluster 5 (*n* = 37) *f* (P)
Treatment					
Long-term	82 (100.0)	0 (0.0)	45 (100.0)	35 (87.5)	37 (100.0)
Short-term	0 (0.0)	55 (100.0)	0 (0.0)	5 (12.5)	0 (0.0)
Gender					
Male	0 (0.0)	17 (30.9)	16 (35.6)	13 (32.5)	37 (100.0)
Female	82 (100.0)	38 (69.1)	29 (64.4)	27 (67.5)	0 (0.0)
Race/Ethnicity					
White	82 (100.0)	46 (83.6)	45 (100.0)	0 (0.0)	37 (100.0)
Asian	0 (0.0)	0 (0.0)	0 (0.0)	5 (12.5)	0 (0.0)
Black	0 (0.0)	9 (16.4)	0 (0.0)	20 (50.0)	0 (0.0)
Native Amer	0 (0.0)	0 (0.0)	0 (0.0)	2 (5.0)	0 (0.0)
Multiracial	0 (0.0)	0 (0.0)	0 (0.0)	9 (22.5)	0 (0.0)
PNTS	0 (0.0)	0 (0.0)	0 (0.0)	4 (10.0)	0 (0.0)
Honors/AP					
Yes	82 (100.0)	20 (36.4)	0 (0.0)	23 (57.5)	37 (100.0)
No	0 (0.0)	35 (63.6)	45 (100.0)	17 (42.5)	0 (0.0)
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Age	15.6 (1.2)	14.8 (1.3)	15.1 (1.5)	14.9 (2.6)	15.4 (1.5)
Ethical Views	119.3(17.1	109.3(12.5	108.0(21.9	116.1(12.9	117.1(14.6
PS Disposition	43.7 (7.1)	43.9 (6.2)	42.0 (9.6)	43.3 (5.8)	43.9 (6.6)
Activities	23.0 (6.8)	22.5 (6.4)	20.7 (6.5)	21.3 (6.5)	21.9 (6.7)

Note. PNTS = Prefer not to state, PS = Problem solving, Activities = Activity Involvement

Cluster one (*n* = 82) consisted of white females from long-term leadership programs who take honors/AP courses. Cluster one had the highest ethical views, a slightly higher age mean, and were involved in more activities when compared with the other clusters. Cluster two (*n* = 55) was the youngest group and included a mixture of genders and individuals enrolled in honors/AP courses from short-term leadership programs. This cluster was predominately white (*n* = 43, 83.6%) with 16.4% being black (*n* = 9). Cluster two had one of the higher problem-solving dispositions, but lower ethical views. Cluster three (*n* = 45) contained white youth from long-term teen-leadership programs not enrolled in honors/AP courses. This cluster had the lowest levels of ethical views, problem-solving disposition, and activity involvement. Cluster four (*n* = 40) consisted of a mixture of races, including black (*n* = 20, 50%), multiracial (*n* = 9, 22.5%), Asian (*n* = 5, 12.5%), Native American (*n* = 2, 5%), and those who preferred not to state (*n* = 4, 10%). This cluster had a mixture of genders and those taking honors/AP courses and the majority were from long-term (*n* = 35, 87.5%) teen-leadership programs. Cluster four had higher ethical views when compared with clusters two and three. Cluster five included white males from long-

term leadership programs who take honors/AP courses and have higher ethical views and problem-solving disposition.

Table 2

One-Way Analysis of Variance (ANOVA) of Clusters by Active and Engaged Citizenship (AEC) and Subscales (N =259)

Source	*df*	*SS*	*MS*	*F*	*p*
Total AEC					
Between Groups	4	1951.51	487.88	3.76	.005**
Within Groups	254	32991.18	129.89		
Total	258	35942.69			
Civic Duty					
Between Groups	4	1727.89	431.97	7.08	.000***
Within Groups	254	15492.52	60.99		
Total	258	17220.42			
Civic Skills					
Between Groups	4	450.91	112.73	4.41	.002**
Within Groups	254	6494.96	25.57		
Total	258	6945.86			
Neighborhood Connection					
Between Groups	4	40.96	10.24	.40	.809
Within Groups	254	6510.90	25.63		
Total	258	6551.861			
Civic Participation					
Between Groups	4	98.84	24.71	1.24	.295
Within Groups	254	5066.83	19.95		
Total	258	5165.67			

Note. * p < .05, ** p < .01, *** p < .001, 2-Tailed.

We conducted a one-way ANOVA to compare the effect of cluster membership on total AEC and subscales (Table 2). There was a significant effect of cluster membership on total AEC at the p < .01 level for the five clusters [F(4, 254) = 3.76, p = .005)]. Post hoc comparisons using the Tukey HSD test indicated the mean score for cluster one (*M* = 111.9, *SD* = 9.3) was significantly different from the other clusters (Table 3). There was a significant effect of cluster membership on civic duty [F(4, 254) = 7.08, p = .000)]. Post hoc comparisons indicated the mean scores for cluster one (*M* = 51.8, *SD* = 7.8) and cluster four (*M* = 51.7, *SD* = 5.8) were significantly different from those of cluster two (*M* = 46.0, *SD* = 4.8) and cluster three (*M* = 46.4, *SD* = 12.4). Cluster five (*M* = 50.1, *SD* = 5.9) did not significantly differ from other clusters. There was also a significant effect of cluster membership for civic skills [F(4, 254) = 4.41, p = .002)]. Post hoc comparisons test indicated the mean score for cluster three (*M* =17.7, *SD* = 5.8) significantly differed from cluster one (*M* = 21.3, *SD* = 4.9) and cluster five (*M* =21.1, *SD* = 4.3).

Table 3
Means and Standard Deviations for Active and Engaged Citizenship and Subscales (n =259)

Variable	Cluster 1 (*n* = 82) *M* (*SD*)	Cluster 2 (*n* = 55) *M* (*SD*)	Cluster 3 (*n* = 45) *M* (*SD*)	Cluster 4 (*n* = 40) *M* (*SD*)	Cluster 5 (*n* = 37) *M* (*SD*)
Total AEC	111.9(9.3)	105.9(12.4)	107.0(12.5)	106.6(12.9)	105.0(11.6)
Civic Duty	51.8 (7.8)	46.0 (4.8)	46.4(12.4)	51.7 (5.8)	50.1 (5.9)
Civic Skills	21.3 (4.9)	19.7 (4.7)	17.7 (5.8)	19.2 (5.4)	21.1 (4.3)
Connection	20.1 (5.5)	20.1 (4.6)	19.5 (5.1)	19.1 (4.6)	20.2 (5.3)
Participation	22.1 (4.8)	21.7 (4.1)	20.5 (4.4)	22.5 (4.1)	21.4 (4.6)

Note. Connection = Neighborhood Connection, Participation = Civic Participation

Conclusions/Recommendations/Implications

In community-development efforts, youth are rarely regarded as community resources (Jones, 2009); however, youth's mere presence influences society (Lerner et al., 2005). When equipped with skills and positive attitudes toward citizenship, youth are capable of meaningfully contributing to their communities which benefits both the individual and community (Christens & Dolan, 2011). By examining the impact and interrelatedness of different variables on youth's AEC, insights can be provided to build youth-development and leadership programs aimed at preparing youth for community engagement. We utilized a RDS metatheory lens to examine how youth clustered based on a cumulation of experiences to develop AEC. In this study, there were differences in overall AEC scores and two subscales—civic duty and civic skills—between different clusters of youth in Virginia 4-H teen-leadership programs.

Youth in cluster one yielded significantly higher scores for overall AEC when compared with all other groups. This group was comprised of white females from long-term teen leadership programs, who took honors/AP courses, had the highest activity involvement, and highest levels of ethical views. Cluster one and cluster four were found to have significantly higher levels of perceived civic duty when compared to clusters two and three. Youth in cluster two were all participants in short-term 4-H teen-leadership programs. Although cluster two only significantly differed from clusters one and four, this cluster had the lowest mean score for civic duty and was the only cluster that was not predominately comprised of youth from long-term programs. Although significant differences existed, we acknowledge practical significance is relatively low.

Cluster three consisted of participants from long-term leadership programs, but no participants were enrolled in honors/AP courses. Additionally, cluster three had the lowest reported levels of ethical views, problem-solving disposition, and activity involvement. Cluster three also yielded the lowest mean for civic skills and significantly differed from other teens in long-term leadership programs in clusters one and five. When compared with clusters one and five, cluster three varied by not included youth enrolled in honors/AP courses, and youth had lower levels of ethical views and problem-solving disposition.

These results raise several questions for further examination in relation to the benefits of long-term teen-leadership programs when compared with similar short-term programs in Virginia 4-H. With mastery (Redmond & Dolan, 2016) and intentional opportunities for engagement in planning and decision-making processes (Kress, 2006) as the focuses of youth leadership, long-term 4-H teen-leadership programs should provide youth with increased knowledge on community issues and capacity for engaging as leaders in their communities. However, there was a clear implication for enrollment in honors/AP courses as a factor that significantly impacted overall AEC, civic duty, and civic skills. This was particularly apparent for the civic skills construct where clusters one and five yielded significantly higher scores when compared with cluster three. Recall, all three of these clusters were white youth in long-term leadership programs. Classes for gifted youth often provide avenues for the development of problem-solving skills and the creation of action plans (Terry, Bohnenberger, Renzulli, Cramond, and Sisk, 2008), which may have implications for competence in problem-solving. If ethical views, problem-solving disposition, and activity involvement all impact AEC, are the leadership programs increasing these constructs or are academic courses providing the treatment? This calls for further research related to the effectiveness of these programs in relation to the academic achievement of participants.

Neighborhood connection and civic participation did not significantly differ among clusters, regardless of treatment or enrollment in honors/AP courses. These findings could be related to all participants' involvement in 4-H. Lerner, Lerner, and Colleagues (2013) revealed that 4-H members were twice as likely to engage with their communities and four times more likely to contribute to society. Although involvement in 4-H should increase all constructs of AEC, civic participation may be similar for all groups based on community-service opportunities often provided through the organization. Additionally, 4-H has developed curricula and training for the development of strong youth-adult partnerships (Zeldin, Christens, & Powers, 2013) for both adult volunteers and extension employees. Youth-adult partnerships are known for providing support for youth development by increasing self-worth along with other positive outcomes (Anderson & Sandmann, 2009). This increased sense of self-worth, along with positive support from adult and peer role models, may also explain similar levels of neighborhood connection through participation in 4-H programs.

Overall, this study provides insight on the development of AEC in youth participating in 4-H teen-leadership programs. AEC, civic duty, and civic skills varied for youth participants based on different clusters derived from program treatment, gender, race, enrollment in honors/AP course, age, ethical views, problem-solving disposition, and activity involvement. Notable findings related to program treatment, gender, and enrollment in honors/AP courses. Levels of ethical views, problem-solving disposition, and activity involvement also varied between clusters of participants in long-term teen-leadership programs and raised questions regarding the impact of long-term treatment in relation to enrollment in honors/AP courses. Further exploring this phenomenon and infusing teen-leadership programs with opportunities for problem-solving and character development could heighten AEC for youth participants.

Based on the findings, there are several recommendations for practice and research moving forward. The first recommendation, which is related to practice, is to consider methods for increasing character education and problem-solving opportunities associated with community

issues and development to increase AEC in all youth participants. Findings indicated that participation in a long-term 4-H teen-leadership program alone did not indicate higher levels of AEC when compared with the cluster of youth who participate in short-term programs. Further, participants of short-term programs had the lowest scores on the civic duty subscale. This indicates a need for short-term 4-H teen-leadership programs—such as camp-counselor trainings—to make connections between the purpose of the training and contributions to society.

It is also recommended that Extension professionals and other youth-leadership practitioners consider the role that gender may play in the development of AEC. Hall and Coffey (2007) discussed gender differentiation in citizenship, saying that "much of the current negative and anxious commentary about young people and the 'don't care' culture is implicitly, and sometimes explicitly, directed at young men in particular" (p. 294). They go on to note that women are expected to contribute, but males are often viewed as noncontributors. Based on this notion, sociocultural development of views toward citizenship may differ based upon gender, which would explain the variations between similar clusters differing predominately on gender alone, especially the differing levels of AEC. It is recommended that teen-leadership professionals ensure that programs are promoting gender inclusion in citizenship-focused curriculum and that they think intentionally about the engagement of males as contributors to their communities.

With citizenship as a priority in 4-H (National 4-H Headquarters, 2011), professional development is needed for Extension agents to fully understand the innerworkings of these clusters and how program improvements and adjustments may aid to increased levels of AEC. These clusters allow us to examine how indicators combine to impact independent variables. Therefore, social science researchers should also consider how results may differ from traditional variable-centered analyses and consider a variety of statistical methods to ensure participants are treated as heterogeneous in nature. It is essential to keep in mind how individual development is a result of the bidirectional relationship between an individual and their context over time.

Program goals of 4-H indicate high priorities for the development of self and of abilities to be meaningful contributors to their communities (4-H National Headquarters, 2011). Therefore, it is recommended that future research and replication include a wider range of teens not participating in 4-H or teen-leadership programs in order to derive comparison from the impact of the 4-H program on AEC, problem-solving disposition, and ethical views. Further, the relationship between enrollment in honors/AP courses and ethical views and/or problem-solving disposition should be further explored.

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Prior Experience and Entrepreneurial Self-Efficacy (ESE): A Study among Tribal Farmers in Nagaland, India

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Abstract

Entrepreneurship in agriculture is gaining popularity in recent years for its potential role in improving the livelihood of small global food producers. Individuals with higher levels of Entrepreneurial Self-Efficacy (ESE)tend to become successful entrepreneurs who face challenges better. Despite being an important construct in entrepreneurship, there is a gap in the literature on ESE among entrepreneurial farmers. Thus a sequential design mixed methods study was designed to understand the factors contributing to the development of ESE among entrepreneurial tribal farmers in Nagaland, India. The study involved 106 participants in the quantitative phase and 15 participants in the qualitative phase. A six-dimensional ESE instrument with 27 items was used in the study. This paper explores the role of prior experiences as a factor contributing to the development of ESE. The ESE of the tribal farmers suggested high confidence, and a statistically significant association of ESE with prior experience was seen. Content analysis of transcribed data in the qualitative phase revealed prior experience as an important factor that helped in the development of ESE. Prior experience occurred both in formal and informal settings. Prior experience developed ESE by providing the tribal farmers the opportunity for mastery experiences, vicarious experiences, and positive reinforcement. Based on the findings, this paper also offers recommendations for future research and practice.

Keywords: Entrepreneurial Self-Efficacy, tribal farmers, mixed method study, prior experience.

Introduction

The global food system is rapidly changing. The steady commercialization of the food supply chain has decreased the prices of major food commodities, which has negatively impacted the small and medium-scale farmers in the developing world (Fritschel, 2003; Swanson, 2006). Besides the changes in food prices, small global food producers are also facing multiple challenges because of global warming, increasing cost of inputs, and lack of insurance. Some farming populations in the world, like the indigenous (tribal) people of India, are more vulnerable than the rest, making them particularly predisposed to poverty. However, despite facing new challenges, the international agricultural extension systems are still operating based on the development strategy when food security was its major priority (Swanson, Samy, & Sofranko, 2003; Swanson, 2006). According to Swanson (2006), the international agricultural extension needs to shift its focus from food security and strive to increase farm income and rural employment. One of the important ways of improving farm income is through entrepreneurship in agriculture, more recently called agripreneurship. Entrepreneurship in agriculture can help small global food producers overcome poverty by assisting them to diversify into higher-priced

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agricultural and livestock production and expanding farm sizes to increase household income (The World Bank, 2012).

One definition of entrepreneurship describes it as a mindset and process to create and develop economic activity by blending risk-taking, creativity, and innovation with sound management within a new or an existing organization or sector (Ahmad & Seymour, 2008). The process of entrepreneurship starts with the *exploration phase*, through the investigation of business opportunities and the formation of *entrepreneurial intentions*, defined as an inclination of a person to start an entrepreneurial activity in the future (Douglas, 2009). At a certain point in the exploration phase, individuals with entrepreneurial intentions form the belief that they have enough information and enter the *exploitation phase* by displaying *entrepreneurial behavior* (Douglas, 2009). The link between intention and subsequent behavior was first established in theory by Ajzen (1991). The theory of planned behavior by Ajzen (1991) states that a planned behavior such as starting a business is best predicted by intentions toward that behavior. Researchers have also found empirical evidence that entrepreneurial intention is a precursor to entrepreneurial behavior (Krueger & Carsrud, 1993).

Entrepreneurial self-efficacy (ESE), which is "a person's belief in their ability to successfully launch an entrepreneurial venture" (McGee, Peterson, Mueller & Sequeira, 2009, p. 965) is considered to be a predictor to entrepreneurial intentions (Chen, Greene, & Crick, 1998; Zhao, Seibert, & Hills, 2005). A theoretical model by Boyd and Vozikis (1994) proposed ESE as "an important explanatory variable in determining both the strength of entrepreneurial intentions and the likelihood that those intentions will result in entrepreneurial actions" (p. 66). ESE is a role-specific self-efficacy (Bandura, 1997), and self-efficacy is a predictor of risk-taking behavior (Bandura, 1997), a crucial characteristic of entrepreneurs (Ahmad & Seymour, 2008). Individuals who have higher levels of self-efficacy have been observed to successfully perform challenging tasks, sustain efforts toward those tasks, and persist when they encounter problems (Bandura, 1997; Stajkovic & Luthans, 1998). The importance of ESE in determining crucial characteristics of entrepreneurs, and it is a predictor to entrepreneurial intentions (Chen et al.,1998; Venugopal, Viswanathan, & Jung, 2015; Zhao et al., 2005) and subsequent behavior (Bird, 1988; Krueger & Carsrud, 1993) makes ESE a vital construct in both entrepreneurial research and practice.

The process of entrepreneurship encompasses the relationship between specific personal and situational opportunities, and entrepreneurs perceive those opportunities differently from non-entrepreneurs (Shane & Venkataraman, 2000). Entrepreneurs may recognize themselves to be more competent than non-entrepreneurs; hence, they generally have higher ESE than non-entrepreneurs (Ajzen, 1991; Krueger & Dickson, 1994). ESE could arise due to an individual's knowledge about an entrepreneurial opportunity, the knowledge of market needs, and the perceived potential and capability to serve those needs (Gimeno, Folta, Cooper, & Woo, 1997; Shane & Venkataraman, 2000). ESE is thus important during the exploration and exploitation phases of the entrepreneurial process (Chen et al., 1998).

Researchers have identified factors that can support or inhibit the development of ESE and that it can be improved through interventions (Newman, Obschonka, Schwarz, Cohen, & Nielsen, 2019). Bandura's (1997) theory of self-efficacy that provides information on the four principal sources of self-efficacy namely (a) mastery experiences, (b) vicarious experiences, (c) positive reinforcements and (d) physiological state, has served as the theoretical framework for studying the antecedents of ESE. These sources of self-efficacy provide a sound foundation to

examine the factors influencing the development of ESE (Newman et al., 2019). Researchers have empirically indicated work experience (Zhao et al., 2005), education and training (Florin, Karri, & Rossiter, 2007; Venugopal et al., 2015; Zhao et al., 2005), and interactions with entrepreneurial role-models and mentors (Austin & Nauta, 2016; Carr & Sequeira, 2007; Farashah, 2015) are antecedents of ESE.

Prior experience in launching or running one's own business promotes ESE, as it provides opportunities for both mastery experiences and vicarious learning (Lee, Hallak, & Sardeshmukh, 2016; Zhao et al., 2005). Work experience as an employee can also enhance an individuals' ESE through similar mechanisms (Farashah, 2015; Hockerts, 2017). Although the quality of work experience in a family business was found to be positively related to the ESE of family business successors, years of work experience was not (Sardeshmukh & Corbett, 2011). Cooper and Dunkelberg (1984) found a relationship between the number of jobs held previously and entrepreneurial activity. According to Fuchs (1982), people with professional, sales, and managerial experience were more likely to be self-employed at the end of their careers. Based on the above two studies, Boyd and Vozikis (1994) concluded that the type of job experience should be considered while studying the development of self-efficacy beliefs through mastery experiences.

The agricultural sector has often neglected from entrepreneurship research. A gap in the literature on the study of ESE among entrepreneurial farmers was identified. Since ESE is an important construct for entrepreneurs, it is imperative to study ESE among entrepreneurial farmers. The need to support the economic growth of small farmers globally made it crucial to understand the factors that are contributing to the development of ESE among entrepreneurial farmers.

Theoretical Framework

Bandura (1997) proposed that self-efficacy beliefs are developed as individuals interpret information from four different sources, namely: (a) mastery experience, (b) vicarious experience, (c) positive reinforcements, and (d) physiological state. The most powerful of these sources are the interpreted results of the individual's previous attainments or experiences, which are called a mastery experience. Bandura (1997, 2010) claims that most individuals do not quickly dismiss their experiences of mastery and successful performance, and this can have lasting effects on their self-efficacy. In addition to interpreting the results of one's performance, individuals tend to gauge their capabilities on the performance of others by observing them perform through vicarious experience. Individuals are most likely to alter their beliefs following a role model's success or failure to the degree that the individual feels similar to the role model in the particular area in question (Schunk, 1987).

The feedback that individuals receive from peers and others serves as the third source of self-efficacy; this is called social/verbal persuasion. Social persuasion may be limited in its ability to create enduring increases in self-efficacy. However, it may be easier to undermine an individual's self-efficacy through negative feedback than to enhance it through positive feedback; this is particularly important in the formative years of learning a new skill (Bandura, 1997, 2010). Finally, Bandura (1997, 2010) hypothesized that the emotional or physiological state informs self-efficacy beliefs of the individual, which is called physiological experience. In

general, increasing the physical and emotional well-being of the individual and reducing negative emotional states strengthens self-efficacy.

The study also utilized theories that explain the role of ESE in entrepreneurial intentions and behavior. Ajzen's theory of planned behavior (Ajzen, 1985, 1987) suggests that perceived behavioral control is an important determinant of both intentions and behavior. Ajzen further explains perceived behavioral control as the perceived ease or difficulty of performing a behavior, which is reflective of the individual's experience and the anticipated future problems (Ajzen, 1987). The concept of perceived behavioral control is similar to the concept of self-efficacy (Bandura, 1997) since both perceived behavioral control and self-efficacy refer to perceptual factors that are specific to the attainment of a given behavior (Boyd & Vozikis, 1994). According to the theory of planned behavior (Ajzen, 1991), self-efficacy, which captures the extent of an individual's perceived behavioral control, is a crucial determinant of their intention to engage in the behavior (Krueger, Reilly, & Carsrud, 2000). ESE can promote entrepreneurial behavior by intensifying an individual's entrepreneurial intentions (Chen et al., 1998; Schlaegel & Koenig, 2014).

Problem Statement and Purpose

Among the small farmers in India, the tribal farmers are a particularly vulnerable population struggling with issues of poverty. Although there are opportunities to improve the livelihood of tribal farmers through agricultural entrepreneurship, a higher degree of ESE is required to take risks and become entrepreneurial. The lack of literature on ESE among small farmers, coupled with the challenges of the tribal farming communities, made it imperative to study all factors that were contributing to the development of ESE among the tribal farmers of India as a larger study. The purpose of this paper was to explore the role of prior experience as a factor contributing to the development of ESE among entrepreneurial tribal farmers.

Methods/Procedures

A sequential design, mixed methods study with a quantitative phase followed by the qualitative phase was conducted. The quantitative phase measured the levels of ESE among tribal farmers by using a six-dimensional ESE instrument with 27 items. This six-dimensional ESE instrument was modified from the 19-item ESE instrument by McGee et al., (2009). The multidimensionality of the six-dimensional ESE instrument was confirmed by Confirmatory Factor Analysis (CFA) using lavaan package in R version 3.6. A high hierarchical omega (.99) and alpha (.96) were obtained, indicating good reliability.

Hundred and six farmers with entrepreneurial intentions from Dimapur district in Nagaland, India, participated in the quantitative phase. These participants with entrepreneurial intentions were selected by purposive sampling method in consultation with a premier agricultural training institute in Nagaland, and recommendations from local veterinarians and agricultural officers. Besides measuring the ESE of farmers, the quantitative phase also helped to measure the level of prior experiences and identified the relationship between ESE and prior experience by ANOVA analysis using statistical software SPSS version 23.

In the larger study, the qualitative phase was conducted to explore all the factors contributing to the development of ESE among those tribal farmers with higher levels of ESE.

This paper, however, focuses only on one of those factors, i.e., prior experience. Fifteen tribal farmers who had participated in the quantitative phase were selected in the qualitative phase based on their high ESE score (>2.60) and maximal variation in demographic characteristics. The participants were interviewed using open-ended questions that were developed using Bandura's sources of self-efficacy (1997). The directed content analysis approach was selected for the analysis of transcribed data in the qualitative phase. Directed content analysis, "validates or extends conceptually a theoretical framework or theory" (Hsieh & Shannon, 2005, p. 1281). Both deductive and inductive styles were used during coding.

Findings

Quantitative Phase

ESE Scores

The overall mean score for ESE among the tribal farmers with entrepreneurial intentions on a scale of 0 to 4 was 2.85, with a standard deviation of 0.7, and a range of 1- 4 on a sample size of 88 (Table 1). An overall ESE score close to a 3 indicates high confidence among the tribal farmers. While comparing scores within the six dimensions of ESE, the participants scored the highest in the Implementing - financial dimension (M=3.11). The second highest mean score was found to be for the Implementing - general dimension (M = 2.93), followed by the Marshalling (M= 2.77).

Table 1
Descriptive Statistics of ESE Scores

Dimensions of ESE	*N*	*M*	*SD*	Minimum	Maximum
Searching	102	2.69	0.76	1.00	4.00
Planning	98	2.65	0.78	1.14	4.00
Marshaling	104	2.77	0.90	0.75	4.00
Implementing (People)	104	2.65	0.99	0.33	4.00
Implementing (General)	97	2.93	0.84	1.00	4.00
Implementing (Financial)	106	3.11	0.90	0.00	4.00
ESE	88	2.85	0.70	1.07	4.00

Note: ESE was measured on a 5-point scale (0 = *no confidence*, 1 = *little confidence*, 2 = *some confidence*, 3 = *high confidence*, and 4 = *complete confidence*)

Prior Experience of Tribal Farmers

The most frequent group of tribal farmers (31 %) had between 1-5 years of experience, while the second most frequent group (26 %) had more than ten years of experience (Table 2).

Table 2
Prior Experience of Tribal Farmers (N=105)

Number of years of business experience	*f*	%
None	17	16
Less than 1year	18	17
1 – 5 years	32	31
6 – 10 years	11	10
More than 10	27	26

Association between Prior Experience and ESE

A one-way Analysis of Variance (ANOVA) was performed using SPSS version 23 to test whether the mean score for ESE for each group within a demographic variable was equal. With Type I error rate set to $\alpha = .05$, the ANOVA table (Table 3) showed a statistically significant difference in ESE for prior experience ($p = .01$). Eta-squared (η^2) was used to measure the total variation in ESE accounted for by prior experience. Based on the general rule of thumb for η^2 (small = 0.01, medium = 0.06 and large = 0.14), a large η^2 was noticed for prior experience (.15) (Table 3).

Table 3
One-Way ANOVA between ESE and Prior Experience

	N	*M (SD)*	*F(df)*	*p*	η^2
Total	88	2.85 (.70)			
Prior Experience			3.62 (4)	.009	.15
None	15	2.66 (.52)			
Less than one year	14	2.57 (.63)			
1-5 years	26	2.70 (.67)			
6- 10 years	8	3.11 (.99)			
More than 10 years	24	3.24 (.62)			

Although the one-way ANOVA helped in concluding that the mean ESE differed for at least one group within prior experience ($p = .01$) it could not be specified which of the groups are different. To determine which of the groups differed from each other, a post hoc test in ANOVA using SPSS was conducted. The post hoc analysis showed that those having more than ten years of prior experience had significantly higher ESE than those having 1-5 years ($\Delta M = .54$; $p = .04$) or less than one year ($\Delta M = .67$; $p = .03$) of experience (Table 4).

Table 4
Post Hoc Test Tukey HSD of Prior Experience and ESE

Prior Experience (I)	Prior Experience (J)	*ΔM* (I-J)	Standard Error	*p*	95% *CI* Lower Bound	95% *CI* Upper Bound
None	Less than 1 year	.10	.25	.10	-.59	.78

	1-5 years	-.04	.21	1.00	-.64	.56
	6-10 years	-.45	.29	.54	-1.26	.36
	More than 10 years	-.58	.22	.07	-1.19	.03
Less than I year	None	-.10	.25	.10	-.78	.59
	1-5 years	-.13	.22	.98	-.74	.48
	6-10 years	-.54	.29	.36	-1.36	.28
	More than 10 years	-.67*	.22	.03	-1.29	-.05
1-5 years	None	.04	.21	1.00	-.56	.64
	Less than 1 year	.13	.22	.98	-.48	.74
	6-10 years	-.41	.27	.55	-1.16	.34
	More than 10 years	-.54*	.19	.04	-1.06	-.015
6-10 years	None	.45	.29	.54	-.36	1.26
	Less than 1 year	.54	.29	.36	-.28	1.36
	1-5 years	.41	.27	.55	-.34	1.16
	More than 10 years	-.13	.27	.99	-.88	.63
More than 10 years	None	.58	.22	.07	-.03	1.19
	Less than 1 year	.67*	.22	.03	.05	1.29
	1-5 years	.54*	.19	.04	.02	1.06
	6-10 years	.13	.27	.99	-.63	.88

*. The mean difference is significant at the 0.05 level.

Qualitative Phase

Directed content analysis in the larger study indicated prior experiences to be one of the most important factors that led to the development of ESE among entrepreneurial tribal farmers in Nagaland. Almost all the tribal farmers had some prior experience in the agricultural sector that helped the tribal farmers in mastering farming skills. According to Bandura (1997), mastery experience is the most influential source of self-efficacy because it provides some evidence to people suggesting if they can successfully do a specific activity. Although prior experiences majorly provided opportunities for mastering skills, the tribal farmers were also gaining opportunities for learning vicariously and positively reinforcing skills through verbal encouragement. Thus, the prior experience was helping in the development of ESE by providing the tribal farmers' opportunity for mastery experiences, vicarious experiences, and positive reinforcement (Figure 1).

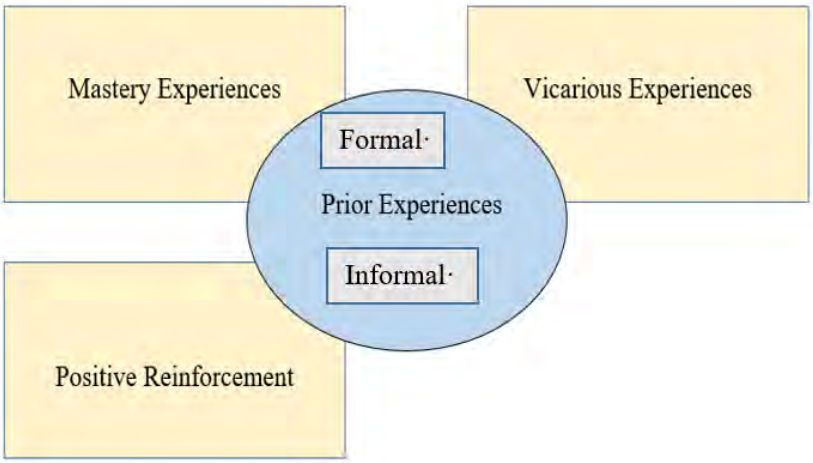

Figure 1. Prior experience as a factor affecting the development of ESE among tribal farmers

Tribal farmers derived prior experience from two different settings. For some, experience occurred in a *formal setting* wherein they could face repercussions in case of failure (e.g., their workplace). For others, prior experiences originated in a potentially laid back and *informal setting* (e.g., their homes). Although limited in number, formal experiences occurred mainly through a previously held job. One participant with intentions to start a floriculture business said he was looking forward to utilizing his experiences from working at a floriculture institute. Almost all his experiences with floriculture originated from his workplace. Perceiving himself capable of doing the routine tasks at the institute had given him the confidence to start his own business. Another participant had considerable experience as a staff member at an agricultural research center and had learned a lot about mixed farming from his workplace. He noted, "actually I am also Agriculture staff. I am working here for the last 25 years, so I learned so many things" (T). Working as staff at an agricultural research center provided him opportunities for not only mastering skills in farming but also for observing agricultural research scientists and networking with them. Through his work, he had gained access to the latest information and scientific best practices in mixed farming. There were also other participants, who had limited prior experience, and utilized the piloting phase of their business to gain experiences. One participant said that during the early stages of her gardening supplies business, she experimented with her product design on a trial and error basis and learned considerably from those experiences. Although she was learning by doing in the early stages of her business place, the risks attached to failure in such instances was quite high.

Only a few participants were fortunate to have experiences in *formal settings*. However, most participants grew up in tribal communities deeply involved in agriculture and thus had prior experiences in an *informal setting*, such as the comfort of their own homes. Many participants recounted assisting their family members in farming and other related activities. One participant noted, "my mother used to rear like around 5-10 birds like that. So that is the main experience that I have in poultry rearing" (Ng). Another said, "so every summer, she (mom) used to take us to the village and…we go to the field and get trained in all the works" (Ne). These childhood experiences in agriculture were opportunities to master a skill in a comfortable environment with presumably low risks. The tribal communities in Nagaland are also known for preserving food through various traditional processing methods. One participant recollected that her mother used

to make homemade pickles, squash, and juices. She said, "I joined her (mom) in the kitchen right, and then we decided to make it real (start the business)" (Pu). She treasures the experiences of assisting her mother and considers those to be her first steps in food processing business.

Some tribes of Nagaland are also well known for their hand-woven shawls and costumes. These tribes have the experience of rearing silkworm, harvesting them and weaving the harvested silk on traditional looms. Two participants who were part of a Self-Help Group (SHG) that was selling different hand-woven products recounted many childhood experiences in weaving. One said, "our grandmothers used to do it (weaving) whole day after their kitchen work" (M) and the other said "actually no one taught us, we are just following our forefathers; it (weaving) is our everyday work." (Le). These two participants belonged to the Dimasa Kachari tribe known to be traditional weavers. Rearing the *eri* worm and weaving is considered the women's job; every girl in a Dimasa family starts to learn to weave from her mother and grandmother by a certain age (Bhattacharjee, 2018). From the time they were little girls, these women were learning to weave vicariously from their mothers and grandmothers. As age progressed, they had mastered the techniques of rearing the silkworms and weaving. The participants had enthusiastically shared their experiences of rearing *eri* worms. The government of Nagaland's Department of Sericulture had helped the SHG with the construction of sheds made of bamboo for raising the *eri* silkworms and weaving. Although these participants had strong prior experiences and traditional knowledge passed on from many generations, they also had information on current best practices that they accrued by attending training through the Department of Sericulture. These women also displayed confidence in the way that they dealt with other up-and-coming weavers in their community; they were not envious of them; instead harbored the desire to mentor them. Several factors seem to have worked together for the advantage of these two female participants. However, the prior experiences in the traditional tribal practice of sericulture and weaving was crucial in giving these women opportunities to experience various sources of ESE.

Conclusions and Recommendations

Conclusion

The purpose of this paper was to explore the role of prior experience as a factor contributing to the development of ESE among entrepreneurial tribal farmers. In this sequential design mixed method study a qualitative phase followed the quantitative phase. Quantitative phase analysis helped to conclude that the entrepreneurial tribal farmers had higher levels of ESE. A statistically significant association of ESE with prior experience was determined by one-way ANOVA method. Post hoc analysis helped to conclude that those tribal farmers having more than ten years of prior experience had significantly higher ESE than those having 1-5 years. Directed content analysis of transcribed data in the qualitative phase of the larger study revealed prior experience as an important factor that helped in the development of ESE. Although prior experience occurred in both informal and formal settings, most entrepreneurial tribal farmers had rich informal prior experiences. The tribal communities of Nagaland have been involved in farming, livestock rearing, food processing, and traditional weaving for many generations and are custodians of traditional knowledge and skillsets. The rich childhood experiences had given

the tribal farmers opportunities for mastery experiences, vicarious experiences, and positive reinforcement of skills, which helped in the development of higher ESE.

Recommendations

This paper recommends that international agencies, local government, and agricultural institutions in Nagaland should support tribal farmers to develop their traditional agricultural practices into small businesses. Entrepreneurial tribal farmers should be encouraged to incorporate scientific methods and technology while retaining the core value of the traditional practice. The tribal farmers of Nagaland possess unique skillsets and knowledge in agricultural and allied sectors. For example, farming, livestock rearing, food processing, and traditional weaving skills have been passed down through many generations. Prior research has indicated that intergenerational experiences serve as training grounds for children (Carr & Sequeira, 2007). Through prior experiences, the tribal farmers had opportunities for mastering skills, learning vicariously from others in the family, and positive reinforcement of skills through encouragement at a young age. The rich experience in farming was a major factor that gave these tribal farmers higher ESE to pursue agripreneurship. It is, therefore, advantageous to help traditional tribal farmers and weavers to start businesses due to their rich prior experiences. However, to increase production and make a profit, these traditional farmers will have to alter the labor-intensive activities and incorporate scientific knowledge and modern equipment without damaging the core value and ethics of the indigenous practice.

This paper also recommends future research focusing on agripreneurship among tribal women farmers. Gender equality and women's empowerment is one of the 17 sustainable development goals of the UN (United Nations, 2019). Tribal women in Nagaland face several disparities and challenges. Women's rights and land use among the tribal communities depend on the norms of the tribe and is a contentious topic. The tribal women in Nagaland did not own land and did not have enough representation in politics, governance, and business. Surprisingly, most of the participants in this study were female tribal farmers with entrepreneurial intentions who had considerable prior experiences within the agricultural sector. Women played a major role in most of the traditional livestock rearing, weaving, and food processing activities, and younger women were able to learn these skills vicariously from older women at their homes. Due to their rich experiences and confidence in agriculture, supporting agripreneurship can particularly impact the development of tribal women. There is thus a need to explore how entrepreneurship in agriculture can be used as a vehicle for tribal women's development.

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Extension Program Assistants' Turnover Intention

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Abstract

Extension program assistants' turnover intention is a key indicator of human resource development practice and overall effectiveness of organizational leadership. We used a survey design with four instruments to investigate the factors that influenced 149 Ohio State University Extension program assistants' turnover intention. The data showed significant associations between employees' age, years of service, job satisfaction, supervisor satisfaction, organizational commitment, and turnover intention. Organizational commitment mediated the relationship between job satisfaction and turnover intention. The research concludes with recommendations that may help to decrease extension program assistants' turnover intention.

Keywords: extension program assistant, job satisfaction, organizational commitment, supervisor satisfaction, turnover, turnover intention.

Introduction

According to Hom and Griffeth (1991), turnover intention was strongly indicative of a person's intent to voluntarily and permanently withdraw from an organization. Previous research in Extension showed positive relationships between employees' turnover intention and heavy workload, burnout, occupational stress, work-life balance, low salary, long work hours, late night meetings, lack of recognition, and high requirements for advancement (Clark, 1981; Clark, Norland, & Smith, 1992; Harder, Gouldthorpe, & Goodwin, 2015; Kutilek, 2000; Rousan & Henderson, 1996; Safrit & Owen, 2010; Sears Jr., Urizar Jr., & Evans, 2000; Strong & Harder, 2009; Van Tilburg, 1987; Van Tilburg, 1988; Young, Stone, Aliaga, & Shuck, 2013). Lack of organizational commitment and low job satisfaction increase Extension employee turnover and turnover intention (Martin & Kaufman, 2013; Strong & Harder, 2009).

Turnover level has also been examined among agricultural teachers (Blackburn, Bunch, & Haynes 2017; Tippens, Ricketts, Morgan, Navarro, & Flanders, 2013). Blackburn et al. (2017) reported that despite reporting overall work satisfaction, a high rate of turnover still existed among agricultural teachers. Tippens et al. (2013) found that agricultural teachers were generally satisfied with their job and do not intend to leave their current position, however burnout was identified as a dissatisfaction factor.

In the 1970s, Cooperative Extension organizations increased recruitment of paraprofessionals, which significantly benefited the Extension system (Boyce, 1970; Parsons & Kiesow, 1975). These paraprofessionals are known as Extension program

assistants. They are usually full- or part-time adults hired to work under the supervision of extension professionals (Parsons & Kiesow, 1975).

OSU Extension program assistants are key employees of the organization, who serve as first-line extension professionals and help extension educators. Extension program assistants are responsible for recruiting individuals for an educational program. They use standardized curriculum materials to provide informal education and use standardized evaluation instruments to assess the knowledge, attitudes, and behaviors of participants within a program. In the OSU Extension there are 367 full-time extension educators and program assistants, of which almost 50% are classified as program assistants. Turnover among program assistants is a significant problem for extension. For example, according to an OSU human resources professional, in 2015, the turnover rate was 12.1% for all OSU Extension personnel and 7.0% for extension educators but ranged from 13.3% to 57.1% for extension program assistants across different program areas (Burns, A., personal communication, October 29, 2015, and August 17, 2016). Almost all studies of Cooperative Extension employee turnover investigated extension agents—called educators in some states—as subjects of study; however, no researchers examined explicitly turnover intention among extension program assistants notwithstanding that high turnover among this category of extension employees became a national issue. Because of the value of program assistants work, it is important to investigate the factors that affect the high rate of turnover in this category of extension employees.

Conceptual Framework

High turnover rates negatively impact organizational productivity and effectiveness (Long, Perumal, & Ajagbe, 2012). March and Simon (1958), Mobley (1977), and Price (1977) were among the most influential scholars in turnover research. Their turnover models guide this investigation. In their seminal 1958 work, March and Simon developed a turnover model that has influenced most turnover studies to date. Moreover, March and Simon (1958) differentiated employees by gender, age, and tenure. The March and Simon model perceives motivation only through job satisfaction. Mobley (1977) went further and presented an employee turnover model that expanded March and Simon's approach. Mobley added psychological elements in the turnover process to explain job dissatisfaction through a "withdrawal condition" of employees in the turnover process. Mobley's framework better explains employees' withdrawal behavior based on the cognitive process of understanding job satisfaction and intention to leave the job. However, Mobley's model of employee turnover does not include organizational commitment factors. In 1977, Price presented a comprehensive model of voluntary turnover. Price (1977) defined turnover as leaving voluntarily. The initial Causal Model of Turnover included 11 determinants that affect turnover: routinization, opportunity, participation, integration, instrumental communication, pay, promotional opportunities, distributive justice, professionalism, kinship responsibility, and general training. The authors added job satisfaction and intent to stay later. Price (1977) examined the effect of organizational commitment as a mediator on the relationship between job satisfaction, its antecedents, and turnover intention. Price (2001) defined job satisfaction as a main predictor of organizational commitment and turnover intention. Strong and Harder (2009) used Herzberg's motivational-hygiene theory to identify factors that affect Extension

employee turnover and retention. They indicated that motivational factors included overall job satisfaction, employee professional development programs, mentoring programs, vocation, and a supportive environment in the workplace. Based on the aforementioned turnover models and studies involving organizational commitment, job satisfaction, and supervisor satisfaction, we developed the following conceptual model (Figure 1) to frame this study. The conceptual model illustrates the primary factors that contribute to job satisfaction as a whole and demonstrates how job satisfaction, supervisor satisfaction, and organizational commitment relate to Extension program assistants' turnover intention.

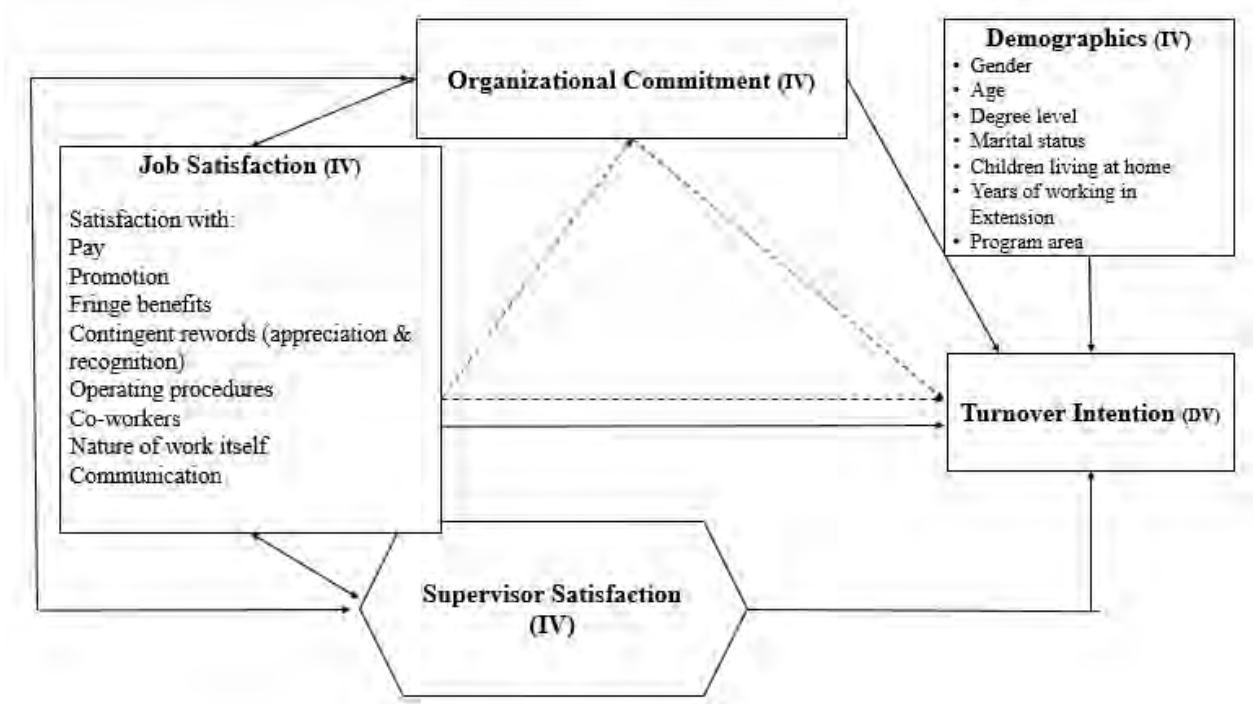

Figure 1. Conceptual model of employee's turnover intention.
Note: Dashed arrows inside of the model indicate an interaction (mediation) effect of organizational commitment on relationship between job satisfaction and turnover intention.

Job satisfaction.

Higher job satisfaction impacts employee effectiveness and job performance, and helps organizations retain their employees (Heshizer, 1998). Previous studies found that most agriculture teachers are satisfied with their work (Cano & Miller, 1992; Kitchel et al., 2012; Tippens et al., 2013; Walker, Garton, & Kitchel, 2004). Cano and Miller (1992) conducted a gender analysis of job satisfaction among agricultural education teachers. They found that the job satisfaction dimension included "achievement, advancement, recognition, responsibility, the work itself," and the job dissatisfaction dimension was comprised of "interpersonal relationship, policy and administration, salary, supervision/technical, and working conditions" (p. 43). Walker et al. (2004) indicated

that all teachers were generally satisfied with their first-year teaching experience. Kitchel et al. (2012) suggested that understanding job satisfaction within agricultural education has the potential to impact the future of the profession. Harder, Goldthorpe, and Goodwin (2015) also examined Extension professionals' career satisfaction. They found that approximately 15% of participants reported they were somewhat or very dissatisfied with their job, and 5.2% reported being neither satisfied nor dissatisfied. In this study, we used Spector's (1985) *Job Satisfaction Survey* (JSS) to assess employees' job satisfaction through nine dimensions: pay, promotion, fringe benefits, contingent rewards, operating conditions, co-workers, nature of work, satisfaction with communication, and satisfaction with supervisor.

Supervisor satisfaction

Previous studies found that employees' satisfaction with their supervisor relates to their satisfaction with work and ultimate turnover intention (Adebayo & Ogunsina, 2011; DeConinck & Stilwell, 2004; Scarpello & Vandenberg, 1987). However, according to Scarpello and Vandenberg (1987), satisfaction with supervisor indicates the degree of satisfaction with only the immediate supervisor and is different than being satisfied with the work environment or the work itself. Adebayo and Ogunsina (2011) reported that the nature of supervision is an important factor that influences an individual's satisfaction with work. In 1987, Scarpello and Vandenberg developed the *Satisfaction with My Supervisor Scale* (SWMSS) specifically to assess "subordinate satisfaction with supervision," rather than work environment, with 18 items (p. 462). In this study, we viewed supervisor satisfaction as a separate construct that allowed the researcher to measure supervisor satisfaction with a more robust scale and to ask more questions. Therefore, the subscale for supervisor satisfaction was omitted from the JSS and replaced with a more robust scale measuring satisfaction with supervisors. We used Scarpello's (1987) SWMSS to better understand employees' attitudes and perceptions toward their supervisors.

Organizational commitment

Carter et al. (1989) found a negative correlation between organizational commitment and intention to leave the organization. Martin and Kaufman (2013) found a strong and negative correlation between intent to quit and job satisfaction as well as between intent to leave and organizational commitment. The authors concluded that Extension agents who were satisfied with their job and committed to the organization do not intend to leave their job. The term "organizational commitment" was adopted from Mowday, Steers, and Porter's (1979) definition and, in this study, is viewed as the relative strength of a program assistant's identification and involvement in OSU Extension. In our research, we used the Mowday et al. (1979) questionnaire to measure extension employees' organizational commitment, which is further detailed in the method section.

Purpose and Research Questions

Our purpose for the study reported here was to investigate factors that affect turnover intention of OSU Extension program assistants. We explored the relationships between turnover intention and demographic variables, job satisfaction, supervisor

satisfaction, and organizational commitment. Our study was guided by the following research questions:

1. What is the relationship between OSU Extension program assistants' turnover intention and the demographic variables of age, gender, degree level, program area, marital status, children living at home, and years of service?
2. What is the relationship between turnover intention and the independent variables of job satisfaction, supervisor satisfaction, and organizational commitment?
3. To what extent does organizational commitment mediate the relationship between job satisfaction and turnover intention?

Methods

We used survey methods to address the three research questions of the study reported here. Specifically, we used an online questionnaire to measure employees' turnover intention and other employment-related variables. We developed a questionnaire using four existing instruments that have been extensively used in previous research. We also included seven demographic questions. We obtained permission to use the instruments from the original authors. A panel of seven Extension educators, program assistants, and academic faculty members with expertise in survey methodology and Extension employees' satisfaction with work environments reviewed the instrument for face and content validity. The panel of experts determined that the instrument is sufficiently valid. A summary of the instruments used to measure Extension program assistants' turnover intention, including Cronbach alpha coefficients from the original and posthoc reliability of current study are provided in Table 1.

Table 1.

Summary of Instrument for Survey of OSU Extension Program Assistants

Instrument	*Variable measured*	*Scale*	*Cronbach's alpha original/ OSU Extension program assistant study*	*Total items (items adapted for OSU Extension program assistant study*
*Job Satisfaction Survey** (Spector, 1985)	Job satisfaction	6-point Likert-type scale from 1 (*disagree very much*) to 6 (*agree very much*)	0.91 (.90)	36 (32)
The Satisfaction With My Supervisor Scale (Scarpello & Vandenberg, 1987)	Supervisor satisfaction	5-point Likert-type scale from 1 (*very dissatisfied*) to 5 (*very satisfied*)	0.95 - 0.96 (.96)	18 (18)

Organizational Commitment Questionnaire (Mowday, Steers, & Porter, 1979)	Organizational commitment	7-point Likert-type scale from 1 (*strongly disagree*) to 7 (*strongly agree*)	0.82 - 0.93 (.91)	15 (9)
The Michigan Organizational Assessment Questionnaire (Cammann, Fichman, Jenkins, & Klesh, 1979)	Turnover intention	7-point Likert-type scale from 1 (*strongly disagree* to 7 (*strongly agree*)	0.83 (.93)	3 (3)

Respondents were asked to express their perceptions and feelings related to job satisfaction, supervisor satisfaction, organizational commitment, and turnover intention. Turnover intention domains and examples of questionnaire items are presented in Table 2.

Table 2.

Turnover Intention Domains and Examples of Questionnaire Items

Turnover Intention Domain	*Item example*
Job Satisfaction	"I feel I am being paid a fair amount for the work I do."
Supervisor satisfaction	"The way my supervisor listens when I have something important to say."
Organizational commitment	"I find that my values and the organization's values are very similar."
Turnover intention	"How likely is it that you will actively look for a new job in the next year?"

The target population for our study was OSU Extension program assistants with full time appointment. In our study, we used a census approach and followed Dillman, Smyth, and Christian's (2014) online data collection technique. The director of OSU Extension sent a pre-notification email to program assistants and ask them to participate in this study. We sent a second pre-notification email and four email reminders. Data collection occurred January 11-27, 2017. The population of the study reported here was 182 OSU Extension program assistants with full-time appointments. The final data set included responses from 149 employees for a response rate of 81.86%.

Miller and Smith (1983) suggested comparing early and late respondents to assess non-response error. Early and late responses were compared to evaluate non-response error in this study. The early and late phases of responders were determined based on the day and time their questionnaire was submitted. The survey was available 17 days for the early/late respondents. The cut-off point of the first 17 days was chosen. The number of returned questionnaires dropped noticeably after 7 to 17 days. The results of defining early responses in this study was similar to another study Chen, Wei, and Syme (2003)

that also defined early respondents. The response rate was highest in the first weeks, for example, 64% of all questionnaires were completed before the 4th day. A small peak was observed after sending each reminder. Researchers designated the first 40 respondents as the early-phase respondent group, and the last forty respondents were identified as the late-phase respondent group. An independent *t*-test was conducted to determine if the group mean for total scores on the four measured constructs (job satisfaction, supervisor satisfaction, organizational commitment, and turnover intention) differed between two group respondents (early and late) at the alpha level of .05, two tailed. Significant mean differences would indicate a difference between early and late respondents. The results showed there were no statistically significant differences between early and late respondents who provided data for the measures of employee turnover intention, job satisfaction, supervisor satisfaction, and organizational commitment. These findings suggest that data collected from Extension program assistants were representative of the entire study population.

Participants

Most participants were women (87.24%) with an average age of 43 years (*SD* = 14.13), married (63%), with a bachelor's degree (55.70%), and had worked at the extension for approximately six years (*SD* = 7.87). More than 30% of respondents had children under 18 who lived at home. However, respondents were not equally distributed across program areas to reflect the actual target population distribution across all program areas in the organization. In our study, we had no respondents from the community development program area. However, we had 62.42% responses from program assistants who represent the family and consumer sciences program area, including EFNEP (Expended Food and Nutrition Education Program) and SNAP-Ed (Supplemental Nutrition Assistance Program Education) program assistants. Agriculture and natural resources accounted for 5.27% of participants and 4-H youth development accounted for 18.79%. Approximately 12.75% of respondents had no affiliation with any program area; they represented program assistants who work at the state level.

Data Analysis

We used SPSS version 24 to analyze the data. A chi-square analysis helped to identify association between turnover intention and categorical demographic variables; to answer research question one, regression analysis helped identify association between turnover intention and continuous demographic variables. For the research question two, an application of the Pearson correlation coefficient helped to measure associations between turnover intention and the three independent variables: job satisfaction, supervisor satisfaction, and organizational commitment. We used standard Davis Conventions (1971) to describe the magnitude of the correlation between independent and dependent variables. We used Hayes SOBEL analysis to investigate a mediation effect. The Sobel (1982) normality theory test is a method to calculate the significance of an indirect or mediation effect. Andrew F. Hayes is an author of the PROCESS Macro, which is a path analysis modeling tool for SPSS based on the Sobel's theory (Hayes, 2013). This statistical tool helps estimate indirect and direct effects in mediation and moderation models. The SOBEL test recommends performing with sample size greater than 50. The SPSS SOBEL Macro® application helped to investigate a mediation effect

to answer research question three. We summed the total scores for each construct to measure participants' job satisfaction, supervisor satisfaction, organizational commitment, and turnover intention.

Findings

Impact of Demographics on Turnover Intention

A chi-square test of independence showed that there was no association between OSU Extension program assistants' turnover intention and gender, degree level, marital status, children living at home under 18, or program area (see Table 3).

Table 3

Chi-Square Analysis on Association between Turnover Intention and Selected Categorical Demographic Variables

Demographic Variables	*n*	χ^2	*df*	*p*
Gender	141	2.833	2	.243
Level of education	141	14.399	8	.072
Marital status	141	13.191	8	.105
Children living at home under 18	141	1.789	2	.407
Program areas	142	7.303	6	.294

Note: $p < .05$

We used a linear regression analysis to describe the relationship between turnover intention and age as well as turnover intention and years of service. A simple linear regression model with only age as a predictor showed that age was significant in predicting turnover intention. We found a moderate negative association between turnover intention and age ($r = -.30$, $p < .001$). However, age explained only 8.2% of the variation in turnover intention ($R^2 = .082$), and there was still much unexplained variation after fitting the model. A linear regression model with only years of service as a predictor showed that years of service was significant in predicting turnover intention. We found a low negative association between turnover intention and years of service ($r = -.249$, $p < .001$). Years of service explained only 6.2% of the variation in turnover intention ($R^2 = .062$), so there was still much unexplained variation after fitting this model.

Impact of Job Satisfaction, Supervisor Satisfaction, and Organizational Commitment on Turnover Intention.

Application of the Pearson correlation coefficient showed moderate negative associations between job satisfaction and turnover intention ($r = -.60$, $p < .01$), between organizational commitment and turnover intention ($r = -.58$, $p < .01$), and between supervisor satisfaction and turnover intention ($r = -.48$, $p < .01$).

Mediation of Organizational Commitment the Relationship between Job Satisfaction and Turnover Intention.

We used Hayes SOBEL analysis to investigate the extent to which organizational commitment mediates the effect of job satisfaction on turnover intention. The results indicated that organizational commitment mediated the effect of job satisfaction on turnover intention. Organizational commitment (R^2 = .282) accounted for approximately 28% of the variance in turnover intention. Figure 1 illustrates the path model for the mediation effect of organizational commitment on the relationship between job satisfaction and turnover intention.

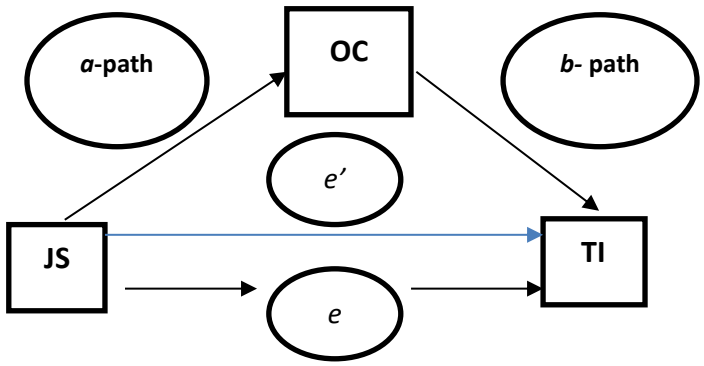

Illustration of:
e = a direct effect, JS affects TI
a-path = an indirect effect, JS affects OC
b-path = an indirect effect, OC affects TI
e' = a mediation design, JS affects TI indirectly through OC

Figure 1. Path model for estimating mediation effect* of organizational commitment (OC) on relationship between job satisfaction (JS) and turnover intention (TI) based on Baron and Kenny (1986)

Application of the Pearson correlation coefficient showed job satisfaction had a moderate negative association with turnover intention (r = -.60, p < .01) and a moderate positive association with organizational commitment (r = .67, p < .01). Organizational commitment had a moderate negative association with turnover intention (r = -. 58, p < .01). We used the Hayes SOBEL for the mediation analysis, the results shown below (n = 149).

1. JS had a total direct effect on TI that was statistically different from zero (β = -1.81, p < .0001; *e*-path in Figure 1).
2. JS had a direct effect on OC that was statistically different from zero (β = 1.17, p < .0001; *a* path in Figure 1).
3. When the effects of JS were controlled for, OC had an effect on TI that was statistically significant (β = -.57, p = .0002, *b* -path in Figure 1).

4. When the effects of OC were controlled for, JS had a direct effect on TI that was statistically different from zero ($\beta = -1.14$, $p < .0001$, *e'* in Figure 1). The results indicated that organizational commitment partially mediated the relationship between job satisfaction and turnover intention.
5. The Hayes SOBEL test helped estimate the indirect effects JS had on TI through OC ($Z = -3.54$, $p = .0004$). The true indirect effect was estimated to lie between .1814 and .3905 and was statistically significant with a 95% confidence (Figure 1).

The analysis showed the evidence of mediation effect of organizational commitment. We found a significant indirect effect of employees' organizational commitment on the relationship between job satisfaction and organizational commitment. In other words, employee's high job satisfaction will reduce turnover intention by increasing employee' organizational commitment.

Discussion, Implications, and Recommendations

Our study results confirm the findings of previous research that identified negative correlations between turnover intention and demographic variables such as age and years of service (Rousan & Henderson, 1996; Kutilek, Conklin, & Gunderson, 2002; Strong & Harder, 2009; Van Tilburg & Miller, 1987; Author, 2017). Our findings reflect the idea that younger employees have more job mobility and tend to have more voluntary turnover. However, OSU Extension program assistants' gender, marital status, level of education, children living at home under 18, and program areas are not related to turnover intention.

There is no association between Extension program assistants' turnover intention and their program area. However, an OSU Extension HR professional (Burns, A. personal communication, October 29, 2016 and August 17, 2016) indicated that there is a big difference in actual turnover across different program areas. A disproportion of the actual target population distribution across Extension program areas in the organization is a limitation of the study. The findings from our research confirm Brough and Frame's (2004) study results and suggest that gender is independent from turnover intention and there is no significant association between OSU Extension program assistants' turnover intention and gender. The chi-square test of independence in our study reveals that turnover intention among male program assistants is higher compared to females but is not significant, which may be attributed to the very large disproportion between numbers of male and female participants. In contrast, both Xu (2008) and De Moura, Abrams, Retter, Gunnarsdottir, and Ando (2009) found that an association with turnover intention was stronger among men than women. Also, the results of our study confirm Brough and Frame's (2004) research findings in that employees' turnover intention does not have a significant relationship with their marital status.

The results of our study support previous findings reported in the literature, specifically that lack of job satisfaction, supervisor satisfaction, and organizational commitment are related to employee withdrawal behavior (Brough & Frame, 2004; Firth, Mellor, Moore, & Loquet, 2003; Martin & Kaufman, 2013; Strong & Harder, 2009; Van Tilburg & Miller, 1987; Yücel, 2012). The findings of our research are generally consistent with previous research and show that OSU Extension program assistants' job

satisfaction, supervisor satisfaction, and organizational commitment are important predictors of their turnover intention. The results of our study support findings by Yücel (2012) that "high levels of job satisfaction results in higher commitment and lower turnover intention" (p. 44). Also, the findings of our study support Brough and Frame's (2004) research, which showed that job satisfaction has a negative relationship with turnover intention

Our findings also support the research conclusions of Carter, Pounder, Lawrence, and Wozniak (1989) and Martin and Kaufman (2013) who examined Cooperative Extension Service agents' turnover intention. Martin and Kaufman's (2013) results indicate a strong negative relationship between job satisfaction and intent to quit (r =-.619, $p < .001$) and between organizational commitment and intent to quit (r = -.652, $p <$ .001). They suggested "administration should share experiences and best practices with each other to improve the satisfaction and commitment of their employees and reduce their intent to quit" (p. 1). The results of our study support Martin and Kaufman's (2013) research and confirm that extension agents who have higher job satisfaction and organizational commitment have a lower intention to leave their job. Our findings confirm that higher organizational commitment was related to lower turnover intention. Moreover, it offers evidence that organizational commitment mediates the relationship between employee job satisfaction and turnover intention among OSU Extension program assistants. Organizational commitment accounts for approximately 28% of the variance in turnover intention. OSU Extension program assistants' turnover intention is significantly related to organizational commitment. This mediation means that OSU Extension program assistants' higher job satisfaction increases employee organizational commitment, which led to lower turnover intention. Our results confirm Joo's (2010) findings and offer evidence that organizational commitment mediates the effect of employee job satisfaction on turnover intentions among OSU Extension program assistants. Joo (2010) concluded that organizational commitment plays an important role as a full mediator in employees' turnover intention. In his study, approximately 40% of the variance in turnover intention was explained by organizational commitment, which indicates that organizational commitment significantly impacts turnover intention (Joo, 2010).

Our research has specific practical implications for Extension regarding the importance of conducting formal assessments of employees' perceptions of organization and supervision, addressing work-related issues and challenges through mentoring program, and offering targeted professional development. First, formal and regular assessments of employees' perceptions may help to measure the organizational and supervision environment. Formal assessments will inform Extension administration and human resource practitioners about employees' perceptions of job satisfaction, supervisor satisfaction, and organizational commitment. The findings of the research presented here suggest that lack of job satisfaction, supervisor satisfaction, and organizational commitment are strong predictors of turnover intention. We suggest Saunders and Reese's (2011) "Roadmap for Excellence" as a tool that may help navigate and guide employees toward work progress and success. The "Roadmap for Excellence" provides specific recommendations for employees as well. Organizations should develop a roadmap tool for each category of employees to enhance human resource practices. The

roadmap tool may help foster and promote greater employee satisfaction with their work and supervisors, as well as increase employees' organizational commitment and reduce turnover intention

Second, implementing a formal and structured mentoring program for Extension program assistants will foster a collaborative culture. Denny (2016) emphasized that formal and informal mentoring is essential for employees' career development. Place and Bailey (2010) indicated that mentors can assist mentees in being successful in the workplace. The authors wrote that the opportunity to share and discuss in the workplace leads to employees' positive work relationship and higher productivity. Easterly and Myers (2018) recommended developing the relationship between mentor and mentees and fostering informal dialogue among agricultural teachers. We believe that sharing work-related issues and challenges with mentors is important. Mentors can help mentees better understand the complexities of the organizational environment and provide guidance, support, and advice. Mentoring practices may increase employees' job satisfaction, supervisor satisfaction, organizational commitment, and reduce their intention to leave the organization.

Third, targeted professional development may increase the level of organizational commitment, which positively affects employees' satisfaction with their supervisor and decrease their turnover intention. Easterly and Myers (2018) found a positive correlation between professional development engagement and career satisfaction among agricultural teachers. Extension human resource practitioners might use the results of our study as a baseline to improve their work. For example, identified deficiencies in employees' perceptions of organizational commitment may help in designing targeted training, which helps increase employees' job satisfaction and reduce their turnover intention. Also, implementing continuous and targeted face-to-face professional development will foster a professional community and provide practical recommendations in the workplace that may decrease employees' intention to leave the organization.

In closing, we call for future research that complements our study. For the study reported here, we use four existing instruments. It may be beneficial to conduct an integrative inquiry of prior research within Extension programs to determine which employee turnover model is most appropriate for studying turnover intention issues in the workplace. The results of future research may enhance employees' retention strategies. Also, future research may benefit from examining the relationships between supervisors' work styles and actual turnover to determine the extent to which changing one factor might be expected to impact other factors within the organization and employees' general satisfaction with work. To summarize, formal assessment of employees' perceptions toward the organizational and supervision environment, timely addressing of work-related issues and challenges, as well as using a mentorship program and implementing continuous and targeted professional development for employees are keys to building and maintaining employees' satisfaction with their jobs and supervisors, and to promoting higher levels of organizational commitment.

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Job Satisfaction Among Extension Program Assistants

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Abstract

Social scientists viewed job satisfaction as a worker's emotions and experience at workplace and his or her responses to that experience. The program assistants are essential extension employees who help extension educators recruit clientele and deliver educational programs. This study was conducted to determine the factors affecting program assistants' job satisfaction. An online questionnaire was utilized to collect data from 149 The Ohio State University Extension program assistants. Findings showed that employees job satisfaction does not relate to age, years of service, gender, children living at home under 18, education, program areas, and marital status. Approximately 98% of the variation in overall job satisfaction can be explained by program assistants' satisfaction with pay, promotions, fringe benefits, rewards, organizational procedures, co-workers, the work itself, and communication. The employees showed less satisfaction with pay and promotions. Organization leaders and human resource development professionals should explore all possible alternative ways to enhance the job satisfaction levels of extension program assistants. Moreover, they need to consider addressing issues related to extension program assistants pay and promotion opportunities.

Keywords: Extension program assistants, job satisfaction, satisfaction with work-related domains

Introduction

Satisfied employees are more creative, innovative, and positive, and these traits affect their superior performance; on the other hand, dissatisfied employees have lower levels of commitment that negatively affect individual and organizational performance (Rast & Tourani, 2012). Definitions of job satisfaction have evolved over time. Social scientists viewed job satisfaction as a worker's emotions and experience at the workplace and his or her responses to that experience. In 1969, Locke explained job satisfaction using Rand's theory of emotions. He discussed five concepts such as value, emotion, appraisal, satisfaction, and dissatisfaction, and measured their interrelationships. Locke described job satisfaction and job dissatisfaction as "a complex emotional reaction to the job" (p. 314). Locke construed job satisfaction and dissatisfaction as "a function of the perceived relationship between what one wants from one's job and what one perceives it as offering or entailing" (p. 316). Smith, Kendall, and Hulin (1969) defined job satisfaction as a response of the worker to his job. Cranny, Smith, and Stone (1992) delineated job satisfaction as an employee's affective reactions to a job based on the comparison of desired outcomes with actual outcomes. Moreover, the authors emphasized that job dissatisfaction is a result of low productivity and psychological frustration. Porter and Steers (1973) mentioned that the level of employee job satisfaction based on his or her expectations related to pay, promotion, or autonomy.

Higher satisfaction with work domains among extension professionals positively impact employees' job satisfaction and job performance (Harder, Goldthorpe, and Goodwin, 2015,

Hodous, Young, Borr, Vettern, 2014; Long & Swortzel, 2007; Schmiesing, 2002, Van Tilburg, & Miller, 1987). Similarly, the level of job satisfaction has been examined among agricultural teachers (Bowen, 1980; Bowen & Radhakrishna, 1991; Castillo, 1999, Foor & Cano, 2011; Ritz, Burris, Brashears, & Fraze, 2013; Walker, Garton, & Kitchel, 2004, Turayev, 2007.) Kitchel et al. (2012) indicated that understanding job satisfaction within agricultural education has the potential to impact the profession's future.

According to a human resource professional, OSU Extension is experiencing a higher turnover rate among program assistants than extension educators (personal communication, August 17, 2016). Extension program assistants help extension educators. They are responsible for recruiting individuals for educational programs, and they use standardized curriculum materials to provide informal teaching. An assessment of OSU Extension program assistants' overall job satisfaction and satisfaction with other essential work-related domains may help extension administrators generate organizational development strategies to increase job satisfaction among this category of extension employees (Author, 2017). The purpose of my study was to examine the relationship between dimensions that contribute to employee job satisfaction as a means of strengthening organizational strategic planning efforts.

Theoretical Framework

There are many factors that affect individuals' job satisfaction or job dissatisfaction. Locke (1976) explained job satisfaction and job dissatisfaction as emotional reactions resulting from an individual's perception regarding his or her fulfillers, job value, and needs. He also characterized job satisfaction as enjoyable emotions from individuals' work experiences. Burke (1987) noted that job satisfaction and dissatisfaction differ based on an individual's expectations. Herzberg, Snyderman, and Mausner (1966) suggested that job satisfaction factors are intrinsic whereas job dissatisfaction factors are extrinsic. According to Herzberg's motivation-hygiene (two-factor) theory, intrinsic motivators tend to create motivation when they are present, whereas extrinsic motivators tend to reduce motivation when they are absent. Intrinsic motivators tend to represent less tangible, more emotional needs, such as achievement, advisement, recognition, and growth potential. Extrinsic motivators tend to represent more tangible, basic needs, such as working conditions, company policies, supervisor relationships, peer relationships, fringe benefits, salaries, and job security. Satisfaction and dissatisfaction are independent of each other because extrinsic motivators cause dissatisfaction if they are absent, while intrinsic motivators can provide extra motivation (Herzberg, Mausner, & Snyderman, 1959; Herzberg et al., 1966). Howard and Frick (1996) indicated that job satisfaction is a multifaceted construct that includes both intrinsic and extrinsic job indicators. Amabile (1993) proposed the following definition:

> Individuals are *intrinsically motivated* when they seek enjoyment, interest, a satisfaction of curiosity, self-expression, or personal challenge in their work.
>
> Individuals are *extrinsically motivated* when they engage in the work to obtain something that is apart from the work itself. (p. 186)

Unmet employee expectations affect job dissatisfaction or employees' decisions to quit the job (Pearson, 1991). Strong and Harder (2009) used Herzberg's two-factor theory to analyze motivation factors that affect extension employee retention. Among motivating factors were

“strong and consistent training and staff development programs, mentoring programs, accolades for work well done, having an appealing vocation, a sense of support within the workplace, and overall job satisfaction.” Among hygiene factors were “inadequate salary, poor pay to workload ratio, financial opportunities outside extension, large and abnormal time obligations, issues balancing personal and professional life, and job stress” (Strong & Harder, 2009, p. 2). Cano and Miller (1992) conducted job satisfaction study among agricultural education teachers. They found that the job satisfier dimension included “achievement, advancement, recognition, responsibility, the work itself,” and the job dissatisfier dimension comprised of “interpersonal relationship, policy and administration, salary, supervision/technical, and working conditions” (Cano & Miller, 1992, p. 43).

Ford (1992) wrote that motivation factors are paramount to job satisfaction, whereas the hygiene factors are predictors of job dissatisfaction. Thereby, fulfilled hygiene needs would not achieve satisfaction (Herzberg et al., 1959). According to Herzberg’s motivation-hygiene (two-factor) theory, motivation factors affect satisfaction and motivation. For instance, an employee can feel satisfied and contented about some aspects of his or her job, while simultaneously being despondent about other work-related issues. Steers and Porter (1991) suggested that researchers should contemplate and scrutinize the Herzberg’s motivation-hygiene theory that will help to increase researchers’ and leaders’ understanding of the role of motivation in the work environment.

Three following surveys used extensively in the literature to measure employee job satisfaction: Minnesota Satisfaction Questionnaire, Cornell Studies of Satisfaction: The Job Descriptive Index, and Spector’s Job Satisfaction Survey. The Minnesota Satisfaction Questionnaire was developed by Weiss, Dawis, England, and Lofquist in 1967. This instrument includes 20 dimensions that measure employee satisfaction with job environment, namely ability utilization, achievement, activity, advancement, authority, company policies and practices, compensation, coworkers, creativity, independence, moral values, recognition, responsibility, security, social service, social status, supervision-human relations, supervision–technical, variety, and working condition (Weiss, Dawis, England, & Lofquist, 1967, pp. 1-2). Cornell Studies of Satisfaction: The Job Descriptive Index. The primary assumption of the Cornell study regarding job satisfaction was that a “satisfied worker is the productive worker” (Smith et al., 1969, p. 272). Smith et al. (1969) stated that job satisfaction and job dissatisfaction may or may not affect overt employee behavior. The employee satisfaction measures demonstrated “the success of management policies and practices, such as job enlargement, supervisory training, participative management, group decision making, employee welfare programs, bonus or incentive-payment system” (p. 273). The result allowed the author to predict future turnover or turnover intention among personnel. Thus, the Cornell Job Descriptive Index included five dimensions of job satisfaction: (1) satisfaction with work, (2) satisfaction with pay, (3) satisfaction with the opportunities for promotion, (4) satisfaction with supervision, and (5) satisfaction with coworkers (Smith et.al, 1996, pp. 274-277). Spector’s Job Satisfaction Survey. Spector (1985) measured job satisfaction by a Job Satisfaction Survey that included the nine dimensions: (1) satisfaction with pay, (2) satisfaction with promotion, (3) satisfaction with supervision, (4) satisfaction with fringe benefits, (5) satisfaction with contingent rewards, (6) satisfaction with operating procedures, (7) satisfaction with coworkers, (8) satisfaction with

nature of work, and (9) satisfaction with communication. The reliability coefficient was .91 (Spector, 1985).

A myriad of factors influences extension professionals' work satisfaction in the workplace (Vlosky & Aguilar, 2009). Vlosky & Aguilar (2009) recommended that employees responsible as well to maximize their satisfaction in the workplace. The authors suggested that employees need to participate in the goal-setting process to ensure that their duties are challenging, which leads to satisfaction. Millilo (1990) indicated that job satisfaction depends on a number of factors and is subject to change. He recommended to conduct a periodic needs assessment to determine the level of job satisfaction of personnel and identify methods for increasing satisfaction. In 1997, Wesolowski and Mossholder wrote that organizations should investigate the role of demographic differences in the workplace. The authors indicated that employees' demographics have long been studied in connection with a specific workplace phenomenon. Clark (1997) hypothesized that men and women in identical jobs should be equally satisfied. However, the results of his study showed that females have higher levels of job satisfaction. Metle (2001) found that job satisfaction declines with increasing levels of education. Bowen, Radhakrishna, and Keyser (1994) studied 4-H agents and emphasized that older, married, and more experienced agents had higher levels of job satisfaction with their extension work than younger, single, and less experienced agents. The authors suggested that staff development practitioners should develop an in-service training that will help employees to increase their job satisfaction and offer mentoring program for younger agents. Current information on job satisfaction among extension program assistants was lacking. This study was designed to identify also how program assistants' overall job satisfaction differ from their demographic characteristics such as age, years of service, gender, children living at home under 18, education, program area, and marital status.

Purpose and Methods

Three research objectives guided this study:

1. Describe the level of overall job satisfaction among extension program assistants
2. Determine the relationship between overall job satisfaction and demographic variables such as age, years of service, gender, children living at home under 18, education, program area, and marital status
3. Explain the relationship between overall job satisfaction and the independent variables of satisfaction with pay, opportunity for promotion, fringe benefits, contingent rewards such as appreciation and recognition, organizational procedures, co-workers, the work itself, and organizational communication

The study reported here is an offshoot of a more comprehensive turnover intention study that I conducted in 2017 (Windon, 2017). In the comprehensive study, I examined extension program assistants' turnover intention through job satisfaction, satisfaction with supervisor, and organizational commitment. The job satisfaction was identified as a factor that affected employees' turnover intention. In the research reported here, I investigated eight domains of job satisfaction such as satisfaction with pay, opportunity for promotion, fringe benefits, contingent rewards such as appreciation and recognition, organizational procedures, co-workers, the work itself, and organizational communication that influence employees' overall job satisfaction.

The original instrument comprises 36 items addressing nine domains of job satisfaction. Each job satisfaction domain was measured by four items. In the study reported here, I collected data using 32 items from the original 36-item questionnaire. A satisfaction with supervisor domain was not included in this instrument. The job satisfaction domains and examples of items are presented in Table 1. I obtained permission from the original author to use the JSS in my research.

Table 1

Nine Domains of the JSS Questionnaire and Examples of the Items

Job satisfaction domain	*Coefficient alpha*	*Item example*
Satisfaction with pay	.75	"I feel I am being paid a fair amount for the work I do."
Satisfaction with promotional opportunity	.73	"There is really too little chance for promotion on my job."
Satisfaction with fringe benefits	.73	"I am not satisfied with the benefits I receive."
Satisfaction with contingent rewards (appreciation and recognition)	.76	"When I do a good job, I receive the recognition for it that I should receive."
Satisfaction with supervision*	.82	"My supervisor is unfair to me."
Satisfaction with operating procedure	.62	"Many of our rules and procedures make doing a good job difficult."
Satisfaction with co-workers	.60	"I find I have to work harder at my job than I should because of the incompetence of people I work with."
Satisfaction with nature of work itself	.78	"I feel a sense of pride in doing my job."
Satisfaction with communication	.71	"Communications seem good within this organization."

**Note*. Satisfaction with supervisor domain was omitted in this study because I intend to conduct future research measuring satisfaction with supervisor using a more robust scale and asking more questions.

I measured job satisfaction constructs using a 6-point Likert-type scale: 1 (*disagree very much*), 2 (*disagree moderately*), 3 (*disagree slightly*), 4 (*agree slightly*), 5 (*agree moderately*), and 6 (*agree very much*) (Spector, 1985, p. 708). In this study, the overall job satisfaction was computed as a mean score of eight domains of job satisfaction. The Cronbach's alpha coefficient for overall job satisfaction in my study was .90. In my research, satisfaction with supervisor was omitted and viewed as a separate construct.

Data Collection

I collected data from participants using an online survey. I used a two pre-notification and five-contact emails survey approach (Dillman, Smyth, & Christian, 2014). Data collection took place from January 11, 2017 to January 27, 2017. Linder, Murphy, and Briers (2001) suggested comparing early and late respondents to assess non-response error. I used the

independent samples *t*-test (alpha level of .05, two tailed) for equality of means on scale scores of constructs between the first early forty and the last forty responses. The *t*-test showed no statistically significant differences between early and late participant, Table 2.

Table 2.

Independent Samples t-test for Equality of Means on Scale Scores of Constructs between Early and Late Respondents.

Scale	*Respondents*					
	Early		*Late*			
	M	*SD*	*M*	*SD*	*t*	*p*
Job Satisfaction	3.74	0.62	3.90	0.67	-1.12	0.27

Data Analysis

I used the Statistical Package for Social Sciences (SPSS) version 24 to analyze the data. I utilized descriptive statistics to answer question one. Applications of the Pearson product-moment, Spearman rank-order, and Phi and Cramer's V correlation coefficients helped define relationships between overall job satisfaction and demographic variables, see Table 3.

Table 3.

Different Type of Correlation Coefficient (Lomax and Hahs-Vaughn, 2012)

	Variable X		
Variable Y	*Nominal*	*Ordinal*	*Interval/Ratio*
Nominal	Phi (when both variables are dichotomous) or Cramer's *V* (when one or both variables have more than two categories)	Rank biserial or Cramer' *V*	Point biserial (Pearson in lieu of point biserial)
Ordinal	Rank biserial or Cramer' *V*	Spearman's rho or Kendall's tau	Spearman's rho or Kendall's tau or Pearson
Interval/ratio	Point biserial (Pearson in lieu of point biserial)	Spearman's rho or Kendall's tau or Pearson	Pearson

Multiple regression helped to explain the variation of each independent variable in job satisfaction. The dependent variable and independent variables were suitable for multiple regression analysis because four assumptions such as linearity, homoscedasticity of residuals, independence of residuals, and normality of residuals were met in the study. Also, a Pearson product-moment correlation was used to describe how well the dependent variable explained the set of predictor factors through the assessment of the magnitude of the linear relationship between dependent and independent variables. To describe the magnitude of the correlation between independent and dependent variables, standard Davis (1971) Conventions were used (see Table 4).

Table 4

Describing the Magnitude of Correlations Based on Davis' (1971) Conventions

Magnitude of correlation coefficient	*Description*
1.00	Perfect association
0.70 or higher	Very strong association
0.50 to 0.69	Substantial association
0.30 to 0.49	Moderate association
0.10 to 0.29	Low association
.01 to 0.09	Negligible association

Note. Adapted from Davis. J.A. (1971) "*Elementary survey analysis*" Englewood, NJ: Prentice-Hall.

Demographic Data

The participants were full-time OSU Extension program assistants. From the population of 182 accessible program assistants contacted, 84% completed the questionnaire. The final data set included responses from 149 employees, after I removed responses with missing data (N = 149). The descriptive statistics for the demographic variables are presented in Table 5. To summarize, only frequency distribution for two continuous variables — age and years of service — were grouped. However, all additional analyses used both these variables as continuous data.

Table 5.

Summary of Demographic Variables of OSU Extension Program Assistants

Items	*n*	*%*	*M*	*SD*
Age	140		43.10	14.13
Gender				
Female	130	87.4		
Male	17	11.6		
Education				
High school diploma	5	3.4		
Some college, no degree	21	14.3		
Associate degree	20	13.6		
Bachelor's degree	83	55.5		
Master's degree	18	12.2		
Marital status				
Single	41	27.9		
Married	94	63.9		
Divorced	6	4.1		
Widowed	3	2.1		
Domestic partner	3	2.0		
Children living at home under age 18				
Yes	48	32.7		
No	99	67.3		
Years of service to [UNIVERSITY]	146		6.31	7.87

0–5	97	34.1		
6–10	14	10.1		
11–15	4	2.9		
16–20	10	7.2		
21–25	9	6.5		
26–30	3	2.2		
31–35	1	0.7		
Program area				
Agriculture and natural resources	8	5.4		
4-H youth development	28	18.9		
Family and consumer sciences	93	62.4		
Other	19	12.8		

Findings

Research objective #1. Describe the level of overall job satisfaction among extension program assistants. I asked participants to report their feelings and perceptions on eight sub-constructs of job satisfaction using a 6-point, Likert-type scale from 1 (*disagree very much*) to 6 (*agree very much*). The total job satisfaction scores were comprised of eight subscale scores that measured satisfaction with pay, promotions, fringe benefits, contingent rewards, operational procedures, co-workers, work, and communication (see Table 6).

Table 6
Descriptive Statistics of Job Satisfaction's Subscale Scores

Variable	*n*	*M*	*SD*
Satisfaction with co-workers	138	5.08	0.93
Satisfaction with work	146	5.03	0.85
Satisfaction with fringe benefits	122	4.71	0.84
Satisfaction with communication	135	4.10	0.98
Satisfaction with rewards	126	3.63	1.15
Satisfaction with operational procedure	137	3.54	0.84
Satisfaction with pay	137	2.44	1.15
Satisfaction with promotion	119	2.37	1.03
Overall satisfaction with job	149	3.90	0.66

Note. Participants rated perceptions of their job satisfaction domains using a 6-point, Likert-type scale from 1 (*disagree very much*) to 6 (*agree very much*).

Research objective #2. Determine the relationship between overall job satisfaction and demographic variables such as age, years of service, gender, children living at home under 18, education, program areas, and marital status. To determine association between overall job satisfaction and demographic variables I used different correlation coefficients based on the variables' level of measurement. The application of the Pearson product-moment association coefficient was used to measure association between overall job satisfaction and demographic continuous variables such as age and years of services variables. The association analysis showed no significant association between overall job satisfaction and age (r = .061, n = 140, p = .473), years of service (r = -.033, n = 146, p = .694). The application of Spearman rank-order association coefficient was used to measure association between overall job satisfaction and demographic variables with ordinal scales employees' educational level, marital status, and their

extension program areas. The association analysis showed no significant association between overall job satisfaction and education level (r_s = .051, n = 147, p = .537), program areas (r_s = .127, n = 148, p = .123), and marital status (r_s = .056, n = 147 p = .499). Phi and Cramer's V association coefficients application was used to measure association between job satisfaction and dichotomous variables such as gender and children living at home under 18. The association analysis showed no significant association between overall job satisfaction and gender (r_φ = .040, n = 147, p = .561), and children living at home under 18 (r_φ = -.027, n = 146, p = .690).

Research Objective #3. Explain the relationship between overall job satisfaction and the independent variables of satisfaction with pay, opportunity for promotion, fringe benefits, contingent rewards such as appreciation and recognition, organizational procedures, co-workers, the work itself, and organizational communication. Application of the Pearson correlation coefficient showed degree of variability of overall job satisfaction and selected job satisfaction domains. A very strong positive association relationship between overall job satisfaction and satisfaction with rewards (.83) and communication (.76). A substantial positive association was found between job satisfaction and satisfaction with co-workers (.63), pay (.63), the work itself (.59), operational procedures (.59), and promotions (.57). A moderate positive association was found between job satisfaction and satisfaction with fringe benefits (.39). Intercorrelation among the overall satisfaction with job and satisfaction domains indicated that collinearity was not a problem in the regression model, Table 7. The effect size of correlation interpretation varied from moderate to very strong.

Table 7

Intercorrelations Among Overall Satisfaction with Job and Job Satisfaction Domains

	JS_AVE	*X 1*	*X 2*	*X 3*	*X 4*	*X 5*	*X 6*	*X 7*	*X 8*
JS_AVE	1.000								
X 1	.633**	1.000							
X 2	.611**	.432**	1.000						
X 3	.397**	.331**	.064	1.000					
X 4	.837**	.473**	.508**	.184*	1.000				
X 5	.596**	.209*	.304**	.114	.436**	1.000			
X 6	.634**	.201*	.192*	.205*	.448**	.277**	1.000		
X 7	.594**	.135	.232*	.232*	.449**	.244*	.466**	1.000	
X 8	.764**	.285**	.378**	.205*	.665**	.491**	.540**	.383**	1.000

Note: JS_AVR = Overall satisfaction with job, X 1 = pay, X 2 = promotion, X 3 = fridge benefits, X 4 = rewards, X 5 = operational procedures, X 6 = co-workers, X 7 = work itself, X 8 = communication.
*p < .05; **p < .01

A multiple linear regression analysis was conducted to determine the relationship between overall job satisfaction (dependent variable) and independent variables such as satisfaction with pay, promotions, fringe benefits, rewards, organizational procedures, co-workers, the work itself, and communication. The results indicated that a significant proportion of the total variation in overall job satisfaction was predicted by satisfaction with pay, promotions, fringe benefits, rewards, organizational procedures, co-workers, the work itself, and communication, F (8, 135) = 1484.7, p < .001. Multiple R^2 indicates that approximately 98.8% of the variation in overall job satisfaction can be explained by program assistants' satisfaction with

pay, promotions, fringe benefits, rewards, organizational procedures, co-workers, the work itself, and communication, see Tables 8. Analysis of variance in overall job satisfaction presented in Table 9. Multiple relations coefficient presented in Table 10. Cohen's f^2 is a measure of effect size used for a multiple regression. Cohen's f^2 for this study is 89.9 that characterizes a large effect size (Cohen, 1988).

Table 8

Multiple Regression Analysis Between Overall Job Satisfaction and Selected Job Satisfaction Domains

Model Fit									
					Change Statistics				
	R	R^2	Adj. *R*	*SE*	R^2	*F*	*df1*	*df2*	*p*
1	.994	.989	.988	.07349	.989	1484.734	8	135	.000

Note: Dependent variable: job satisfaction Predictors: pay, promotion, fridge benefits, rewards, operational procedures, co-workers, work itself, communication.

Table 9

Analysis of Variance in Overall Job Satisfaction

Model	*Sum of Squared*	*df*	*Mean Square*	*F*	*p*
Regression	64.152	8	8.019	1484.734	.000
Residual	.729	135	.005		
Total	64.881	143			

Note: Dependent variable: job satisfaction. Predictors: pay, promotion, fridge benefits, rewards, operational procedures, co-workers, work itself, communication.

Table 10

Multiple Relations Coefficients

Model	*B*	*SER*	*β*	*p-value*
Constant	-.045	.049		.355
Satisfaction with pay	.143	.006	.255	< .001
Satisfaction with promotion	.105	.007	.167	< .001
Satisfaction with fringe benefits	.086	.007	.118	< .001
Satisfaction with rewards	.138	.008	.242	< .001
Satisfaction with operational procedure	.140	.008	.189	< .001
Satisfaction with co-workers	.133	.008	.181	< .001
Satisfaction with work itself	.144	.009	.184	< .001
Satisfaction with communication	.126	.010	.182	< .001

Discussion

The available information on OSU Extension program assistants' job satisfaction is insufficient, and this study attempted to investigate the underlying factors of job satisfaction and their relationship with demographic characteristics among this category of extension employees. I used an online questionnaire to assess OSU Extension program assistants' job satisfaction and its work-related domains. There were no significant relationships between employees' demographic characteristics and their overall job satisfaction. The results of the study reported here support McCaslin and Mwangi's (1994) research on extension agents' job satisfaction. The authors concluded that agents' demographic characteristics such as gender, age, marital status, formal education, and years of service do not contribute to their level of job satisfaction.

The results of this study confirm the findings of previous extension studies, which indicate that extension professionals have a slightly higher level of satisfaction with the work itself, co-workers, fringe benefits, and communication and less satisfied with their pay and promotion (Harder, Gouldthorpe, & Goodwin, 2015; Hodous, Young, Borr, & Vettern, 2014; Rigg & Beus, 1993; Rousan & Handerson, 1996). Extension program assistants' satisfaction with pay and promotion are an area for further research.

It is essential that extension talent development practitioners utilize the survey results, which presented in this paper to determine the most and least job satisfying factors. It will help to offer a professional development program designed to increase employees' job satisfaction through addressing work-related domains discussed in this study. In this research, the work-related factors such as pay, promotions, fringe benefits, rewards, organizational procedures, co-workers, the work itself, and communication explain approximately 98% of the variability in overall job satisfaction. Also, it is important to communicate within the extension organization and to the public that many extension program assistants report that they are satisfied with extension work itself, communication, co-workers, and fringe benefits.

Organization leaders and human resource development professionals should review how the pay and promotion could be managed to increase satisfaction levels of organization employees. The results of this study support Herzberg's theory. Less satisfaction with regard to pay and promotion affected employees' job dissatisfaction. Herzberg (1968) wrote that administrators must make sure that employees' salaries are sufficient; otherwise, employees may think to leave the organization. Lindner (1998) analyzed three theories Herzberg's hygiene theory, Adams' equity theory, and Vroom's theory and concluded that employee pay one of the critical factors. He suggested to increase pay by adding higher-level responsibilities to a job and also providing monetary compensation to employees for accepting this responsibility (Lindner, 1998). It is also important to think about promotion opportunities for extension program assistants. For example, extension program assistants who have a bachelor's degree, relevant work experience, and exceed work expectations should have an opportunity to be promoted to the ranks of a program coordinator, program manager, program director, and extension 1 (rank 1 is a lowest rank at OSU Extension system that determined by years of experience and education level; extension educator 1 requires a Bachelor's Degree). It is essential that leaders in the workplace monitor employees' feelings and perceptions as they relate to their job satisfaction and job dissatisfactions. The scales of pay and promotion reveal a need to investigate what

changes and actions would enhance employees' job satisfaction levels. The organization leadership team should explore ways to enhance the scales affecting employees pay and promotions. Possible compensation solutions to consider include implementing merit adjustments. Administrators should consider addressing issues of lower job satisfaction domains, explore all possible alternative ways to enhance employees' job satisfaction.

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Home Demonstration Work in North Carolina: Leading the Way for Rural Women

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Abstract

Canning and home demonstration clubs played an important role in improving agriculture and home life shortly after the turn of the 20th century. Organized in their local communities, these clubs for young girls and their mothers provided the opportunity for females to engage in experiential learning through the growth and canning of vegetables. Club work and activities allowed those involved to learn important concepts to improve their home life including more nutritious meals, record keeping, maintaining the family garden, and other work surrounding the home. In addition, the work of these clubs allowed for cooperation among various groups, fostered friendships, and provided opportunities for farm women to earn a profit. Movements such as these increased the demand for agricultural and extension education and many of the strategies developed through these clubs can be implemented in both formal and non-formal education today.

Introduction

Throughout agricultural and extension education many professionals are aware of the concept of demonstration work founded by Seaman Knapp. Yet, many of these professionals may not know the impact that Dr. Knapp's work had on the development and improvement of the farm home through young girls and women. Even those who are aware of girls' and home demonstration clubs, some may find it difficult to provide information on the purposes and benefits that they provided to women in the early 1900s.

Starting with the creation of boys' corn clubs, the girls were eager to get involved or to start their own organizations. In 1910, the formation of a club for girls began through the growing and canning of tomatoes. The organizations were under the supervision of a local leader which assisted the young girls throughout the whole process of producing, canning, and marketing the tomatoes (Martin, 1921). This experiential learning method greatly impacted these young girls by allowing them to improve their agricultural knowledge, as well as many other life skills (Trace, 2014).

The benefits of these clubs were far-reaching, soon allowing their mothers and other community members to become involved in the work. The increasing participation of rural women demanded that a separate club be created, resulting in home demonstration clubs (Cline, 1936; Martin, 1921). Those involved in the work of the clubs reaped many benefits including the creation of friendships, improvements of the farm home, and increases in the cash available to the families involved (McKimmon, 1945).

While often in the background of boys' corn clubs, there are several reasons why professionals in agricultural and extension education should have an in-depth understanding of

the work and development of girls' and home demonstration clubs. Understanding the work that those before us have encountered can provide a greater appreciation for the evolution and development of the agricultural industry, as well as agricultural and extension education. A better understanding of these organizations will provide greater insight into the pedagogy surrounding the work of these clubs. Many of the techniques and pragmatic learning that were used throughout these clubs serve as the founding techniques implemented today through agricultural and extension education.

Purpose and Objectives

The primary purpose of this historical research study was to document the creation and establishment of home demonstration clubs in North Carolina, focusing on the work of Jane McKimmon and how the organization of these clubs advanced the livelihoods of farm women throughout the state. Historical research studies play an integral part in interpreting events that have occurred in the past and their influence on current developments (Rury, 2006). The historian systematically and objectively finds, analyzes, and explains evidence from which we can learn about events that have occurred in the past (Ary, Jacobs, & Razavieh, 1985). While familiar with the overall concept behind home demonstration clubs, few are aware of the tremendous impacts these clubs played on the advancement of the lives of farm women and how they specifically operated. This is mainly due to the fact that the history and the role home demonstration clubs played in the past have largely gone unnoticed by professionals in agricultural and extension education with more attention focused on other historical extension efforts.

Along with the primary purpose and objectives of this study was an attempt to bring an understanding and awareness of the canning and home demonstration clubs that occurred in the past and how they have impacted the current state of the Cooperative Extension Service today. In order to facilitate the primary purpose of the research, specific objectives for the study were created:

1. Explore why and how girls' canning clubs and home demonstration clubs were created.
2. Describe Seaman Knapp and Jane McKimmon and how they played an essential role in advancing the work of the clubs.
3. Identify the effects canning and home demonstration clubs had on the lives of women and girls, and how they improved the lives of rural individuals.
4. Examine the impact these clubs had on past generations and how they relate to the advancement and current state of agricultural and extension education today.

Methodology and Procedures

Historical research methods were used for this study involving the systematic search for documents and other sources that contain facts relating to the questions the historian has about previous events (Borg & Gall, 1983). Based on the information gathered, the historian draws conclusions regarding the past to increase our knowledge of why and how these events occurred and the process of how past events lead to the present (Ary, Jacobs, & Razavieh, 1985). The historian examines artifacts, documents, and archived sources in order to gain an understanding

of the events that have occurred in previous times. After examination, the researcher interprets and analyzes the information studied, allowing inferences to be made regarding the person, place, or event (Fraenkel & Wallen, 2006). This historical research study used primary sources of information such as personal correspondence, manuscripts, books, extension publications, and data collected by state and federal agencies that are involved in agricultural and extension education. All of the primary sources involved the work of Seaman Knapp, Jane McKimmon, girls' clubs, home demonstration clubs, why they were needed, and their impacts. Secondary sources included journal articles, books, and other information available through institutions. The secondary sources were compared to the primary sources to determine their accuracy.

All sources were subject to both internal and external criticism. Internal criticism allows the researcher to ensure that the contents of the documents chosen for the research are accurate with both the information contained and the truthfulness of the author. External criticism refers to the genuineness of the documents used and makes sure that they were prepared by the proposed author. External criticism also refers to an examination of the purpose of a document, when it was created, where it was written, and the versions of the specific documentation to ensure genuine materials are selected and used for the research (Fraenkel & Wallen, 2006). Internal criticism was determined by examining the accuracy and truthfulness of the information presented by triangulation or comparing the work to other archived resources. External criticism was also taken into account with the help of North Carolina State University librarians to ensure that original documents were selected and used for the research study. Many of the sources used in this paper were archived in the North Carolina State University Libraries Special Collections Research Center. These materials are accessible to the public, however, individuals wishing to conduct research must request the documents in advance.

While it is difficult to assign a particular research priority to this historical research, Research Priority 6: Vibrant, Resilient Communities as defined in the AAAE Research Agenda is applicable (Graham, Arnold, & Jayaratne, 2016). This research priority certainly pertains to the impact home demonstration work had on rural communities through agricultural and home-life education for young girls and women. Today, extension continues to strive to meet the needs of communities and families. Home demonstration work and home-life education look quite different than in the early 1900s, but the overall goals are still the same, focusing on building vibrant, resilient communities.

The Father of Demonstration Work

Seaman A. Knapp, commonly referred to as the "Father of Extension" is known as the founder of the Farmers' Cooperative Demonstration Work. He was a strong proponent in the benefits of adult education in agriculture, starting first with farmers, and eventually leading to their wives, sons, and their daughters (Martin, 1921). Dr. Knapp once said, "You may doubt what you hear; you may even doubt what you see; but you cannot doubt what you hear, see, and are permitted to do for yourself" (McKimmon, 1945, p. v). Seaman Knapp firmly believed in the work of demonstration farms so farmers could be taught how to maximize the output on their operations. The movement in farm demonstration work began in Texas in the early 1900s with the outbreak of the boll weevil. Interest in the work of demonstration farms began to spread throughout many states in the south. By 1907, Mississippi, Alabama, Virginia, North Carolina,

South Carolina, and Florida were experiencing the benefits of these farms. Farmers taking part in this work were able to learn the importance of diversifying their farming operations and the family's food supply. After encountering some resistance from farmers to buy and settle, Dr. Knapp resorted to farm demonstration work to prove that there was fertile soil and that farming could be profitable. Dr. Knapp was able to subsidize a few good farmers in Louisiana to demonstrate good farming methods and to prove that the soil in these areas would make them a profit (Martin, 1921). The power of his demonstration work allowed Dr. Knapp to be appointed at the head of the U.S. Bureau of Plant Industry in 1902 to assist with getting research to farmers so they might accept the information and put it to use on their own farms. Dr. Knapp passed away at the age of seventy-seven (77) just as the work he had started with farm demonstrations was coming to fruition (Cline, 1936; McKimmon, 1945).

Not only was Dr. Knapp interested in adult education, but a portion of his work was spent through boys' corn clubs and later the girls' canning clubs, directly resulting from his work with farm demonstrations. Boys were required to plant one acre of corn and to keep a record of costs and the yields produced. The incorporation of the boys into these clubs allowed them to learn important methods to use throughout their family's farming operation in order to improve productivity (Cline, 1936). Through Dr. Knapp's demonstration work, momentum increased over the years and in 1906, an agreement with the General Education Board was created to finance the work of Knapp in the states that had not yet been impacted by the boll weevil (Martin, 1921).

The success of the corn clubs caused many of the farmers' daughters to gain an interest in joining the work of the boys' corn clubs. Seaman Knapp was encouraged by the eagerness of the girls to become involved in the club work and was adamant about helping to minimize the drudgery and monotonous work around the home. According to Knapp, "If much can be done for boys interest and instruct them in their life work, more can be done for the girls" (McKimmon, 1945, p. 2). Knapp was able to see the need of the girls and discussed this with his assistant O.B. Martin. The early stages of the work with girls clubs started in 1909 when Mr. Martin addressed the South Carolina School Improvement Association. Marie Comer was the first to carry out the work of girls' clubs and was met with great excitement from rural farm girls (Martin, 1921).

With the involvement of the girls picking up speed, Knapp decided it was time to hire a home demonstration agent. Dr. Knapp's request to hire a home demonstration agent was met with criticism from Secretary of Agriculture Wilson. However, in 1913, during discussions of the Smith-Lever Bill, Congress expressed concerns that the farm women should also receive the benefits of this act. In 1914, the act passed both houses and was the first time the Federal Government was willing to help farm women solve their problems and lessen heavy burdens (Martin, 1921; McKimmon, 1945).

The Involvement of Rural Farm Girls

North Carolina was one of the five pioneer states in the organization of home demonstration work for girls and women who lived on farms in the southern United States. At the beginning of the 1900s, there was not much cash in the North Carolina farm home. After the implementation of the boys' corn clubs, many of the farm girls saw and observed their brothers making money from their corn plots and having fun along with it. These farm girls wanted the

same luxuries as their male counterparts and could not understand why they were not given the same opportunities. The persistence of the girls to be able to join the corn clubs and the eagerness for the mother and fathers to get involved with the work allowed Dr. Knapp to create a solution that would allow girls to come together and be successful as well (Home Demonstration - Past, 1929).

With the help of O.B. Martin, as mentioned previously, they came to the conclusion that growing a garden and canning the vegetables would be the best solution to help farm girls learn new skills and techniques to further advance the farm home. Mr. Martin agreed to start the gardening and canning plan in his home state of South Carolina. In 1909, at a meeting with South Carolina teachers, Mr. Martin presented a plan to involve the girls in growing and canning tomatoes. The plan was adopted and Marie Cromer, a teacher and organizer for the South Carolina School Improvement Association decided to try this project out with her students (Martin, 1921; McKimmon, n.d.)

In the spring of 1910, Marie Cromer spent many afternoons and Saturdays writing letters and visiting girls throughout Aiken County, South Carolina to gather their thoughts on the plan. Forty-seven girls in the county decided to organize a club and each grew one-tenth of an acre of tomatoes (True, 1928). Through the work of the county superintendent, the corn club agent, and the U.S. office of Farmers' Cooperative Demonstration Work, information, letters, and bulletins were created and distributed to provide guidance on planting and cultivating tomatoes. In 1910, equipment for canning was shipped from the Department of Agriculture in Washington, D.C. The girls who had participated in the club were able to see demonstrations and were taught the right methods of canning tomatoes in Aiken, South Carolina (McKimmon, 1945; True, 1928).

The first year of growing and canning tomatoes in South Carolina brought along many difficulties for those who were involved. However, this was the first time that farm girls were able to work together to produce a product that could be marketed to the public. The pioneering work of Marie Comer and the girls involved proved that the growing and canning of vegetables would be a viable option for farm girls to gain a sense of belonging, learn new techniques to improve the home, and create friendships with those that shared similar interests as themselves (Hoffschwelle, 1998). The benefits of allowing girls to come together and create a marketable product helped other states to implement these types of programs as well. After the implementation of the program in South Carolina; Virginia, Mississippi, Tennessee, North Carolina, Alabama, and Georgia soon began their own programs for farm girls, benefitting homes and communities (McKimmon, 1945).

The First Home Demonstration Agent in North Carolina

Jane S. McKimmon was a pioneer in home demonstration work in North Carolina, and one of only five workers in the United States in the early 1900s. She was the only one of these five workers who remained continuously in home demonstration work from 1911 until her retirement in 1937 (Early Work, n.d.). Mrs. McKimmon attended State College and obtained her Bachelor of Science degree in 1926 and her Master of Science degree in 1929. In 1934, she received her Honorary Doctor of Laws degree from the University of North Carolina (Who's Who, n.d.).

Mrs. McKimmon had a great reputation and knowledge of agriculture. Before being offered the position of home demonstration agent, McKimmon was the director of women's institutes from 1908-1911. Through her work with the women's institutes, she was able to understand the importance that demonstrations play on the lives of rural women by teaching them how to cook, sew and improve the home. Shortly after discovering the success of the girls' work in South Carolina, I.O. Schaub, who was in charge of organizing the boys' corn club work in North Carolina, accepted the offer of the General Education Board in cooperation with the State College for the organization of girls' work (McKimmon, 1945). With the creation of this new work in the state, Mr. Schaub reached out to Jane McKimmon to see if she would be interested in organizing and supervising the garden and canning clubs. In 1911, she became the State Home Demonstration Agent for North Carolina, opening up the doors for her to improve the lives of countless women and families (Harrill, 1939).

Mrs. McKimmon helped home demonstration work grow from 416 white farm girls in 14 counties to a membership of 59,826 Caucasian and African American farm women and girls in 1936 (Home Demonstration Work, 1911-1936). In addition to the success Jane McKimmon had over the years through home demonstration work and the agricultural extension service, she was the first woman in the United States to be awarded the "Distinguished Service Ruby" by the National Epsilon Sigma Phi honorary fraternity of the United States Agricultural Extension Service (Who's Who, n.d.).

Throughout her work as a home demonstration agent, Mrs. McKimmon was deeply concerned with the life among rural farm women and girls. After assuming the role of State Home Demonstration Agent, she launched a program of activities that helped to relieve these women from their drudgery. Mrs. McKimmon took it upon herself to examine the commercialization of packing and marketing the vegetables grown (Mckimmon, 1945). As a result of her hard work and dedication to improving the lives of women in rural areas, North Carolina home demonstration clubs were the first in the country to put products from these clubs on the market. The development of this program soon expanded into a general gardening and canning program. With the help of McKimmon, a special brand name and standard requirements were created to ensure quality products were produced from the demonstration clubs (Martin, 1921). Through the establishment of an expanded home demonstration program for women, the lives of rural women, girls, and their families benefited from the work. These programs helped women and girls of rural families learn the importance of proper sanitation and food preservation techniques, and a multitude of home improvements were able to be made, including water systems, lighting, restrooms, and other home conveniences (A Sketch of Mrs. Jane S. McKimmon, 1911-1921).

Mrs. McKimmon was one of the founders of the State Home Economics Association and served a large role in getting a Department of Agriculture and Home Economics into the North Carolina Teacher's Assembly (A Sketch of Jane S. McKimmon, 1911-1921). Not only did the work and programming of Mrs. McKimmon improve the living conditions of rural families, but through the work of the home demonstration clubs, many young women were able to afford and attend college. These programs served the need to develop intelligent, happy, and productive

citizens all while helping to foster community development toward social, educational, and economic improvement (McKimmon, 1945).

Early Home Demonstration Work in North Carolina

Among the first counties to organize home demonstration work in North Carolina were Alamance, Catawba, Edgecombe, Moore, Pitt, Wake, Wayne, and Wilkes. All of these counties had placed their new home demonstration agents by the spring of 1912. The involvement in the work of these home demonstration clubs was very popular after their creation in the early 1900s. In order to maintain the growth and advancement of home demonstration work in North Carolina, the state decided to keep the number of organized counties at 14 for the first two years. This allowed for plans and programs to be outlined and for several girls and other volunteer women leaders to be trained to assist others with the work (Home Demonstration Work, 1911-1936; McKimmon, 1945). These women who were selected to become home agents were educated and experienced in the areas they were asked to teach such as gardening, orcharding, and farming while also excelling in the areas of cooking, sewing, and planning (Martin, 1921). Many of these selected agents were school teachers, allowing them to supervise the girls' home demonstration work. The agents selected were familiar with all areas of farm life and they were held on a high plane from the very beginning of their work. These agents had to take part in physical labor and were required to have a love for bettering the lives of others in their communities (Martin, 1921; The Home Demonstration Agent, 1940-1954).

Through the first years of organizing the home demonstration clubs, many of the rural women involved in the clubs received criticism and distrust of the work they were involved with. However, shortly after starting the canning work, many of the county commissioners who had questioned the risk of spending $75.00 per year of the counties money were in agreeance that a full-time home demonstration agent should be hired to progress the work of these rural females (McKimmon, n.d., 1945). The creation and development of marketed canned products which were intended for projects for the young farm girls, started to get the appeal of their mothers as well, creating a mother-daughter partnership. This was monumental with the adult education movement for farm women which grew to reach at least 60,000 farm families in 1936. The canned products produced were marketed with state institutions, hotels, and individuals. Those who bought these products were impressed with the quality, continually bringing the clubs more business (Home Demonstration Work, 1911-1936).

Impacts and Benefits to Women in Agriculture

In 1914, 32 counties were engaged in home demonstration work for women. With the increase in attendance of mothers and other farm women, several clubs started organizing separate club meetings for both the women and girls. Soon women's clubs outnumbered those meant for the girls and the programming for the home demonstration clubs began to become more developed and adapted to assist farm families with making an income from the products produced on the farm. Marketing home products by farm women and girls was an additional program created to keep up with the growth of home demonstration work (Home Demonstration Work, 1911-1936). In 1936, throughout North Carolina, there were home demonstration markets that served 38 counties. These markets created an avenue for farm families to make additional

money off of any extra products produced on the farm. Many items sold at these markets included poultry and eggs, fruits and vegetables, cakes, meat, dairy products, flowers, and other miscellaneous items (McKimmon, 1945).

The girls throughout North Carolina greatly benefitted from the creation of the tomato clubs. The organization and teaching of the principles related to growing and canning tomatoes allowed the girls to experience firsthand marketing, record keeping, disease and insect control, grading produce, and the work involved with canning. In addition, Jane McKimmon (1945) stated, "If nothing else results from what has been done here, it is worth the time and money the state spent to have lifted even for two days the dull monotony from these barren lives" (p. 10). The creation of the tomato canning clubs allowed the girls to be able to generate a sense of belonging to their community while making friends with others involved in home demonstration work. The creation and development of the tomato clubs promoted experiential learning, taught important agricultural concepts, and provided the girls with spending money. Often the girls were able to use the money made from the canning clubs to pursue higher education. In addition to these improvements, family nutrition was enhanced, self-esteem increased, industrial food concepts were taught, and modern technologies were introduced to the families involved in the work of the home demonstration clubs (Martin, 1921; True, 1928; United States Department of Agriculture [USDA], 1951).

After the establishment of the tomato clubs for the young girls, their mothers became interested in the work as well. The interest from these women created home demonstration clubs and advanced interracial cooperation during a time when segregation impacted the lives of many individuals in the south. This allowed the women involved to develop their leadership skills, while also providing a way for both Caucasian and African American communities to come together and work on these canning projects. Both Caucasian and African American home demonstration agents were able to share information with one another and teach each other lessons that they would then be able to pass on to those who were members of their clubs (McKimmon, 1945; True, 1928).

Significance to Agricultural and Extension Education

The early work of Seaman Knapp, O.B. Martin, Marie Cromer, Jane McKimmon, and many others who were involved in the formation and development of girls' canning and home demonstration clubs provide several insights and opportunities to examine the impacts that these clubs had on the future of agricultural and extension education throughout the United States, specifically North Carolina. From the early beginnings of these clubs, the concept of experiential learning was developed and formed in the lives of many young children (Trace, 2014). The girls involved in the canning clubs were able to experience and learn firsthand many concepts related to agriculture and life in general beyond just monotonous housework. Each girls' club had an agent or teacher who was able to help gather information and research that was applicable to the production of their tomatoes. The agent would visit the girls' plots of tomatoes to check on the progress and to ensure that the girls were doing their portion of the work. To complete the process of growing and canning the tomatoes, the girls were required to keep records, understand crop management, and learn marketing techniques for their canning projects (Martin, 1921; McKimmon, 1945). From the early start of this work in rural communities, these girls were able

to engage in a project that allowed them to develop and foster specific skills through hands-on learning that would benefit them in their lifetime.

The use of these methods allowed girls to engage and become involved in work to benefit their homes, families, and communities, and also generated a movement in agricultural education. The enactment of experiential learning through the use of girls' canning and boys' corn club work allowed for a new era in education, specifically agricultural education to occur. Today, supervised agricultural experiences are an integral component of agricultural education classrooms by allowing students to explore multiple career choices, develop life skills, and apply the knowledge they have learned in the classroom or another setting (National FFA Organization, n.d.). Currently, and years following the creation and development of agricultural education in public schools, supervised agricultural experiences (SAE) were developed based on the work of Rufus Stimson and the project method to help these students learn specific skills needed to improve the family farm (Moore, 1988). Even today, with the mass exodus of young children leaving rural areas, the concept of an SAE is still used in agricultural education. Due to the increases in an ever-growing urban population, agricultural education programs have been required to adapt to these changes by finding additional opportunities to engage students in hands-on learning. Today may look different than those originally thought of by Stimson, however, SAE is still a major component of the three-circle model helping to develop future agricultural leaders.

The development of home demonstration clubs not only benefited girls but also farm women by providing many benefits to the farm home through their establishment. Farm women were able to learn the importance of tending to a family garden, food preparation and storage, and other aspects of beautifying and managing the home. These clubs provided many social benefits to the lives of the women involved, but also provided a way for them to market the items they produced. The opportunities for farm women to get involved in these programs greatly improved the social aspects of their lives, while also providing a way for them to make extra money and increase the flow of cash needed for the home (McKimmon, 1945; True, 1928; USDA, 1951).

Today, a version of home demonstration work is still in existence through the efforts of the Cooperative Extension Service. With the increase in technology and diversification of agriculture and other sectors, there is constantly a need for more specialized agents. The adapted work of the home demonstration agent has evolved into the use of Family and Consumer Science and 4-H Youth Development professionals to carry out work involving families and children. Specifically, in North Carolina, Cooperative Extension has offices in every county, meeting the varied needs of the area where they are serving. Extension professionals are tasked with transferring research-based knowledge to all people in areas pertaining to agriculture and food, health and nutrition, and 4-H youth development (North Carolina Cooperative Extension, n.d.).

Conclusions and Implications

The development and progression of girls' and home demonstration clubs surrounding agriculture and work around the home offer many insights to the factors rural women faced in the early 1900s. The creation of a place where females could come together and learn important

skills and concepts to advance the home were crucial to the advancement of agriculture and the lives of those living in rural areas. Women who were able to take part in these clubs benefitted by learning an array of skills, while also developing their leadership potential and building their personal network in their communities. The impacts that these clubs had on the life of women not only improved the living conditions of their families, but they provided something for these individuals to look forward to by giving them a greater purpose beyond the household (McKimmon, 1945).

The pioneering women who were involved in the formation of these clubs often encountered those who were opposed to the development of these organizations and projects (Martin, 1921). However, this did not stop these individuals from reaching their goals and impacting the communities in which they lived. What started out as canning projects for young girls soon opened up markets and opportunities for girls and rural women to create and market products, earning additional money for their families (Home Demonstration Work, 1911-1936). These changes and the progression of the work proved the importance of diversification and advancements in programming needed for agricultural and extension education in order to keep up with the changing needs of the public.

In today's society where many individuals are far removed from the agricultural industry, it is important to look back and reflect on the advances and contributions of women from past generations. These individuals had a strong impact on their communities and demonstrated the importance of hard work and dedication. With the amount of people engaged in agriculture everyday declining and the average age of the farmer increasing, it is important to grow and develop young leaders to improve and advance the agricultural industry. Even though in today's society you will not find many young men or women growing crops or vegetables for 4-H projects, the need for experiential learning in agriculture is important now more than ever before. Instruction in both formal and non-formal learning environments can have an important impact on opening up career opportunities for these younger generations within all areas of agriculture (Kaplan, Parr, Sowerwine, Thrupp, & Van Horn, 2016).

Agricultural education classrooms are becoming more diverse each day, and agricultural educators on all levels must know how to embrace the complexities of a diverse population so that enrollment can be achieved within agricultural programs. In addition, educators must be willing to adapt to technological changes and find ways to incorporate the learning material to everyday life (LaVergne, Jones, Larke, & Elbert, 2012). In order to recruit and develop programs that are accessible and inclusive, extension professionals, as well as agricultural education teachers will need to develop and implement curriculum and programs that appeal to a wide variety of audiences.

For the past several years, individuals living in both urban and rural areas have become more interested in knowing where and how their food is produced (Perez, 2015). With this movement, agricultural and extension educators have the opportunity to implement gardens near schools and surrounding communities. Educators should take advantage of this opportunity to reach out to these populations and provide them with experiences to learn about food production. These facilities have the ability to serve as pragmatic learning opportunities so children and adults can see firsthand how food is grown and harvested. The implementation of programs such

as these provides an opportunity for educators to inform the public about the truths of the agriculture industry, while also allowing consumers to try out their green thumb.

After conducting this research, the researcher suggests that the role of girls' and home demonstration clubs be examined in order to further facilitate program development in agricultural and extension education. This will help to create opportunities for new generations to understand the importance these clubs had on changing the face of agriculture and the rural farm home. Throughout both formal and non-formal learning experiences, the implementation of hands-on learning in agriculture can help to spark an interest in the careers and opportunities involved within this vast industry just like it did for these girls and women who started a new movement back in 1910.

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Barriers to Volunteering with the Oklahoma 4-H Program: A Delphi Study

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Abstract

The Cooperative Extension Service and 4-H program have depended on volunteers since 1914 (Van Horn et al., 1998). The success of the 4-H program depends on the investment and involvement of adult volunteers, who continue to be the driving force of the program (Wessel & Wessel, 1982). Volunteers are an important element to the 4-H program as they often assist the Cooperative Extension Service in teaching, planning and implementing programs (Hutchins, Seevers, & Leeuwen, 2002). According to Borden et al (2014) the Cooperative Extension Service is constantly challenged to recruit, train and retain volunteers. As reduced budgets become more significant, Extension must address barriers that impact and limit volunteer certification and participation to provide support to 4-H volunteers. A one panel modified Delphi was used to determine the barriers to volunteering with the Oklahoma 4-H program. The study consisted of one panel representing Oklahoma 4-H volunteers with two to five years of service to the program. Panelists were selected based on recommendations from County 4-H Extension educators and the 4HOnline enrollment management system.

Introduction and Review of Literature

The Smith-Lever Act nationalized the Cooperative Extension Service to the 100 land-grant institutions (Smith-Lever Act, 1914) across the nation. Passage of the Smith-Lever Act facilitated the birth of Cooperative Extension allowing 4-H to serve the needs of youth for over 100 years (National 4-H Council, 2018). The Cooperative Extension Service was created to provide non-formal educational experiences to people by bringing research-based information to the public in rural and urban areas and create positive change in the lives of people (National Institute of Food and Agriculture, 2018).

The original movement of Extension began with Seaman A. Knapp, who is often credited as the father of the Cooperative Extension Service, he founded Extension on the idea of research-based programs using live demonstrations extended to farmers (Comer, Campbell, Edwards, & Hillison, 2006). The work of Knapp allowed for the nation's first demonstration agents (Extension educators) to be employed to assist rural farmers and producers across the country (Peters, 2002). Sometime later, demonstration agents were employed to help rural families with food and nutrition, focusing mostly on safe food preservation and canning techniques (Comer et al., 2006). Early on, the goal of Extension educators was to improve crops and animals, fight diseases and pests, advance public health and nutrition and set up 4-H clubs for rural youth (Peters, 2002). In the beginning, the Cooperative Extension Service consisted of one Extension educator assigned to a county. The educator's responsibilities included not only agriculture and family and consumer sciences, but also 4-H club work, specifically, the establishment of 4-H clubs in the county (Conglose, 2000). Since 1914, the role of the Extension professional has

changed to reflect program planning, program evaluation, needs assessment, recruitment and training of volunteers and marketing skills (Cooper & Graham, 2001). While the work of the Extension educator has changed, there are key components that have remained the same 100 years later (Conglose, 2000).

The Cooperative Extension Service was not established until 1914, but the idea of 4-H club work started in the late 1800's through the need to connect public education to people in rural America (National 4-H Council, 2018). The 4-H program was developed in response to the need for agricultural education (Borden, Perkins, & Hawkey, 2014). Through hands on learning approaches, youth introduced new agricultural technologies to farm families and by 1924 4-H Clubs were established (National 4-H Council, 2018). Individuals like Albert B. Graham of Ohio established an after-school club focusing on corn demonstration plots allowing club members to evaluate their findings making it some of the first 4-H project work created (Borden et al., 2014). This type of project work was proven effective as youth were able to expose their parents to new corn farming techniques and these farm families were more receptive of the information from the youth than educators (Van Horn, Flanagan, & Thomson, 1998). Since then project work in the 4-H program has remained an important experience for youth involved in the program (Borden et al., 2014).

4-H club work has always been the foundation of the 4-H program; it exists in a variety of ways including community clubs, after school programs and in school programs (Van Horn, 1998). 4-H clubs are youth-based experiences that are usually led by an adult volunteer that provide the member the opportunity to explore interests in projects while also growing in leadership, citizenship and healthy living (Van Horn, 1998). The foundation of 4-H club work was developed based on the principle of "learn by doing" where youth gain skills through hands on participation, this concept later evolved into what is known in Extension and 4-H work as "Do, Reflect, Apply" (Wessel & Wessel, 1982). Individuals like W.D. Bentley, who was also known as the father of the Oklahoma Cooperative Extension Service delivered demonstrations via train to farmers and their families, this became known as the demonstration train which had a strong influence on youth organized club work (Roberts, 1970). As club work became more established and to provide more club experiences, youth could put their project to work through hands on experiences like contests, while also gaining skills such as public speaking and food and nutrition skills. In the early days of the Oklahoma 4-H program, youth were required to enter one contest in corn, cotton, bread, flowers, vegetables or sewing (Roberts, 1970). Hands on programs like these were developed and offered beginning in the 1920's to increase participation (Wessel & Wessel, 1982).

Lerner and Lerner (2013) reported members are four times more likely to give back to their community, two times more likely to make healthier choices, be civically engaged and participate in science, engineering and technology programs as a result of 4-H participation. Through the 4-H experience, youth can create positive relationships with adults through youth-adult partnerships as well as build critical life skills through positive youth development experiences in the program (Guion & Rivera, 2008). In the 4-H program, Positive Youth Development is a developmental process that youth experience by being involved in programs and is considered the philosophy and approach for all 4-H programming (Lerner & Lerner, 2013). Participation in 4-H programs allows youth to experience leadership, positive relationship

building and gain skills through educational opportunities while preparing them for adulthood (Guion & Rivera, 2008; Van Horn et al., 1998).

The Cooperative Extension Service and the 4-H program have depended on volunteers since 1914 (Van Horn et al., 1998). The success of the 4-H program depends on the investment and involvement of adults as volunteers; this group continues to be the driving force of the program (Wessel & Wessel, 1982). At the inception of the Oklahoma Cooperative Extension Service in 1914 there were 38 county clubs and 28 local agricultural clubs for youth to join, these clubs were established across the state by 4-H Extension educators with support and leadership from volunteers (Roberts, 1970). Support from this group of individuals was the beginning of the volunteer base in the 4-H program (Wessel & Wessel, 1982). As 4-H demographics have changed there has been a significant decline of volunteer support (Van Horn, Flanagan and Thomson, 1999).

Volunteers are the basis of the 4-H organization. Volunteers deliver youth programs through local 4-H club meetings, camps, events, and activities (National 4-H Council, 2018). According to Van Horn et al., (1999) volunteer efforts combined with paid staff saved a county in Pennsylvania approximately $240,000. 4-H programs can be defined as non-formal educational experiences that take place outside of the formal classroom setting (Schmiesing, Soder, & Russell, 2005). Volunteers often give numerous hours of their time to the 4-H program, often it is these volunteers that serve as mentors for youth and assist them with project selection and mastery (Schmiesing et al., 2005). 4-H volunteers in Oklahoma provide 220 hours of service annually to the program not including additional resources they provide to Oklahoma youth (Oklahoma 4-H, 2018). The donation of resources and time equals almost two billion dollars in services provided each year (Oklahoma 4-H, 2018).

In the formative years of the Cooperative Extension Service and 4-H program, adults were neither screened nor trained for their roles as volunteers, now adults willing to serve as a volunteer are required to go through a certification and training process (Van Horn, et al., 1998). Adults interested in volunteer service are trained by Extension educators in specific areas to provide effective program delivery, gain understanding of the 4-H program as well as appropriate interactions with youth as minors (Schmiesing et al., 2005). In order to be a volunteer in the Oklahoma 4-H program applicants must be at least 21 years old, complete an online application with references, agree to a character screening and background check and complete required training that includes agreeing to a set of behavioral guidelines (Oklahoma 4-H Volunteer Management System, 2018). Once approved as a certified volunteer, volunteers must maintain training and certification annually to include at least four continuing education credits per year as well as agreeing to periodic assessment or performance evaluation (Oklahoma 4-H Volunteer Management System, 2018). Details of training include an overview of the 4-H program including positive youth development, Working with Minors and Title VII and IX orientations (Oklahoma 4-H Volunteer Management System, 2018). This training is required to foster a positive experience for youth, maintain program standards, and ensure a safe environment for all involved (Oklahoma 4-H, 2018).

There are several roles a volunteer can serve once certified, this can include club leader, project club or group leader, or general volunteer at large (Oklahoma 4-H Volunteer Management

System, 2018). These roles require a signed position agreement and a yearlong commitment to the 4-H program (Oklahoma 4-H Volunteer Management System, 2018). The position description outlines duties and responsibilities of being a volunteer in the 4-H program (Oklahoma 4-H Volunteer Management System, 2018). Research suggests the 4-H organization should look at realigning these positions to allow for more flexibility with busy volunteers typically serving other organizations with other demands placed on them (Culp, McKee & Nestor 2005; White & Arnold, 2003).

Historically, demographics of the average 4-H volunteer have not changed significantly. The profile of the 4-H volunteer has stayed fairly consistent over the last half century. However, one change reflects volunteers had less children and were more likely to have a job outside of the home (Culp, 1996). It should be noted that even though little has changed in terms of volunteer demographics, there has been a change in society and the environment (Culp, 1996). While the implementation and impact of programs rely heavily on the services of volunteers, understanding demographics of a volunteer base can improve the overall quality of the experience for staff, volunteers and members (White & Arnold, 2003).

Depending on the age of the individual, the motives to volunteer can be different. For instance, most retired, older adults volunteer for the social aspects versus career or power motives (Okun, Barr & Herzog, 1998). Volunteering for older adults gives them a sense of purpose while also allowing them to enjoy the flexibility of the experience (Okun et al., 1998). To maximize the volunteering experience, it is important that organizations that depend solely on volunteers to provide service ensure the position is in line with those motivations of the individual (Clary, Gil, Snyder, Ridge, Copeland, Stukas, Haugen, & Miene, 1998).

Theoretical and Conceptual Framework

An individual's motives to volunteer can vary. Bandura (1977), identified motivation as a factor in the Social Learning Theory. Social Learning Theory is the idea people learn from each other through observation, which can motivate an individual to act. Bandura defined motivation as the desire to mimic the same behavior (Bandura, 1977). Other factors identified in the Social Learning Theory include retention and reproduction. In this theory retention relies on the ability of the individual to remember the observation in order to replicate what is being observed, therefore creating the motivation to demonstrate what was learned (Bandura, 1977).

Regarding retention, many adult volunteers chose to leave their role as a volunteer because their child no longer participates as a member of the 4-H program; in addition, the time demand of volunteering in the 4-H program becomes a retention factor (White & Arnold, 2003). Culp (1997) found the reason volunteers with three years or less of service left their position was due to lack of support from other volunteers and parents within the program. Culp and Schwartz (1999) indicated volunteers in the 4-H program felt unneeded at times, leading the volunteer to discontinue their service with the program. White and Arnold (2003) concluded although it was not a primary reason for discontinuing service, more attention could be devoted to enhancing the volunteers overall experience in the program making them feel more needed.

Conceptually, the LOOP model of volunteer management was used to consider volunteer engagement. The approach of this model focuses on each concept (Locating, Orienting, Operating, and Perpetuating) being blended to ensure the overall success of the volunteer (Connors, 2012). The model was developed by Penrod (1991) to assist professionals managing volunteers to oversee the needs of their organization. The locating process is rooted in matching the needs of the organization with volunteers' individual interests and skills while also making sure the needs of the volunteer align with the organization (Connors, 2012). The orientation process of the model is more formal, but allows for informal ways of learning (Connors, 2012). Penrod's (1991), orientation process includes explaining benefits of volunteering, policies, an overview of the organization, as well as organization goals and expectations. The operating step of the model focuses on the engagement of the volunteer and the impact to the organization, including the recognition of volunteers throughout their service versus the conclusion like other models suggest (Connors, 2012). Penrod (1991) focuses on the continuation of learning after the orientation process and the opportunity to grow. Results from Culp and Schwartz (1999), reflect volunteers preferred being recognized throughout their service rather than an awards ceremony. The perpetuating process focuses on the evaluation portion of the volunteer's service including feedback in both formal and informal manners (Connors, 2012). The perpetuating portion of the model focuses on the actions or goals accomplished by the volunteer through evaluation of specific projects or contributions rather than the individual (Penrod, 1991).

Purpose and Objectives

The purpose of this study was to describe the personal and professional characteristics of a select group of Oklahoma 4-H Volunteers and identify barriers to volunteering in the Oklahoma 4-H program.

Two objectives guided this study:

1. Identify the personal and professional characteristics of experts that serve on the 4-H volunteer panel.
2. Determine barriers that exist in volunteering with the Oklahoma 4-H program as perceived by Certified 4-H Volunteers with two to five years of experience.

Methods and Procedures

The Delphi method generally features multiple questionnaires that utilize a panel of experts to reach consensus around items up for consideration. Additional techniques include the ability to work independently, via distance (Ludwig, 1997; Mayfield, Wingenbach, & Chalmers, 2005.). The Delphi method consists of a series of questionnaires to be given to each panel member that includes repeated questioning to experts to achieve the outcome of meeting agreement in order to address a problem effectively (Dalkey & Helmer, 1962; Gamon, 1991). The method avoids direct interaction of panelists, making face-to-face discussion obsolete, however, researchers can employ interviews in place of questionnaires (Dalkey & Helmer, 1962). This method uses controlled interactions to provide the panelist more independent thought throughout the process of determining consensus (Dalkey & Helmer, 1962). Panelists answer multiple rounds of questionnaires, specifically the first-round experts answer one or two open ended questions to allow the researcher to identify themes among responses for questionnaires in rounds two and

three (Ludwig, 1997). This study utilized a modified Delphi technique using three rounds instead of the traditional method of using four rounds. According to Ludwig (1997) the use of three rounds is often considered acceptable to reach agreement among one panel.

This study employed one panel of certified Oklahoma 4-H volunteers. Panelists were recruited from the Northeast Oklahoma Cooperative Extension 4-H District. Six counties were identified including Logan, Noble, Okfuskee, Okmulgee, Payne and Tulsa. The researcher chose to select three rural and three urban type counties that were in the same geographical area of the state and in the same Extension district to determine possible differences among different population sizes. Potential panel members were recruited two ways: recommendation from County 4-H Extension educators and through *4HOnline*, the Oklahoma 4-H program volunteer enrollment and management system. County 4-H Extension educators work closely with volunteers in the county and typically have frequent contact with volunteers in program support. The *4HOnline* management system allows the operator to run queries using specific information identified by the operator. The reports are generated and filtered by *4HOnline* reflecting the following specifications: two to five years of service as a certified volunteer, have maintained annual certification and trainings, and were in good standing with Oklahoma 4-H for the 2017-2018 program year. In addition, all contact information was identified from the *4HOnline* management system. To recruit individuals to serve on the panel, the researcher developed an electronic invitation to be sent via email, with the Oklahoma State University IRB approved participant information form attached. Ninety certified volunteers were invited to participate; twenty-one volunteers agreed to serve as panelists for the study. Once individuals agreed to participate, they received electronic communication containing instructions for completing the first questionnaire that included a hyperlink to the online instrument.

The questionnaires for all three rounds of the study were developed and edited in Qualtrics, an online survey software distribution program. After completion of the first round and all responses collected, the second-round questionnaire was sent to the panel seeking their level of agreement with themes identified in the first round. A final third round questionnaire was developed and sent to the panel to address statements that did not meet consensus in the previous round (2nd round). Items that received a ranking of *Slightly Agree (4), Agree (5), or Strongly Agree (6)* by at least 60% of the panelist were considered to have reached consensus and were identified as barriers to volunteering with the Oklahoma 4-H program (Diamond, Grant, Feldman, Pencharz, Ling, Moore & Wales, 2014).

Collected data featuring personal and professional characteristics were analyzed using percentages and frequencies. Rounds two and three were analyzed based on percentage of agreement for each barrier statement. Thematic analysis was used to analyze the qualitative data to identify concepts and categories that were compiled into themes for the questionnaires (Brady, 2015). Thematic analysis has been widely used in Delphi studies with qualitative data (Brady, 2015 & Linstone & Turoff, 1975). Thematic analysis was used to develop reoccurring themes in the responses from the opened ended question in the round one questionnaire. The themes identified closely relate to the original data provided from the panelists in round one (Brady, 2015).

Results

Ninety certified adult 4-H Volunteers were invited to participate via email correspondence. Of the potential panelists, 21 (23.33%) agreed to participate and 16 (76.19%) completed the first-round questionnaire. The remaining individuals were removed from the study as potential panelists. In terms of gender 75% were female and 25% were male. Fourteen (87.50%) panelists reported they were Caucasian and two (12.50%) identified American Indian or Alaskan Native as their ethnicity. The real limits of age reflected by the panelists ranged from 22-65. Specifically, two panelists (12.50%) selected 22-34 years of age, seven (43.75%) identified 35-44 years of age, four (25.00%) selected 44-54 years of age, two (12.50%) identified 55-64 and one (6.25%) panelist selected 65 years of age or older.

Three counties (Noble, Okfuskee, and Okmulgee), were represented by one panelist per county. Payne County reflected six panelists (37.50%) while Tulsa County had five panelists (31.25%). Unfortunately, two panelists failed to report a county of residence. Four panelists lived in a rural community (25.00%), four lived in a town (25.00%), four lived in a suburban community (25.00%), three stated they lived on a farm (18.75%) and one participant lived in a city (6.25%). The researcher included a question in round one to determine if the panelists were alumnus of the 4-H program. Five participants (31.25%) indicated they were alumni of the program, while eleven stated they were not former members (68.75%) of the program. Panelists were asked what roles they reflect in the 4-H program, they were able to select all that applied to their status in the program. Twelve indicated they were certified volunteers (75.00%), three stated they serve as club leaders (18.75%) in their county, two participants served as project club leaders (12.50%) and two indicated other (12.50%) or serving in another capacity not listed on the questionnaire. Six panelists have two (37.50%) years' experience, two (12.50%) have three years of service, two (12.50%) served for four years in the program and six (37.50%) served for five years. The researcher was interested in how many children the panelists had in 4-H. Seven (43.7%) had up to two children in the program, five (31.25%) participants had 3-4 children in 4-H, three (18.75%) had five or more children in the program. One panelist did not provide any information to the question on the survey.

In round one, panelists answered questions about their personal and professional characteristics and completed an open-ended question to determine themes to identify barriers. The open-ended question stated: "What barriers exist in volunteering for the Oklahoma 4-H Program?" Sixteen panelists completed the round one questionnaire, statements were analyzed individually by the researcher to combine like comments and statements (See Table 1). Panelists' original statements from round one can be found in table one (See Table 1). The resulting analysis identified eight themes representing barriers to volunteering with the Oklahoma 4-H program (See Table 2). The eight barriers were included in the round two questionnaire sent to panelists.

Table 1

Original Panelists Statements from Round One Open Ended Question: What barriers exist in volunteering for the Oklahoma 4-H program?

Panelists Statements from Round One Opened Ended Question

Time, I find it difficult to devote a lot of time to volunteering while working a full-time job
Lack of information is a problem
Paperwork and guidelines change often
Volunteers are not always given information in a timely manner
Time and having a full-time job
Convenient training opportunities and literature would be nice
Time to do the required trainings and trainings required to be certified
Difficulty maintaining volunteer status and the required hours of training
Required trainings and extra hours spent on attending training opportunities, I don't mind the Working with Minors session online, I wish there were more trainings online
Having to keep up with 4-H members and projects, but I do enjoy it
At times there is not clear direction on what is needed from volunteers
Not enough volunteers
There are not enough volunteers and at times I feel overworked

Table 2

Barriers to Volunteering with the Oklahoma 4-H Program: Identified by 4-H Volunteers

Barriers to Volunteering with the Oklahoma 4-H Program
Time Commitment to Volunteering
Availability of Volunteer Training Opportunities
Availability of Volunteer Resources
Utilization and Roles of 4-H Volunteers
Communication from the County Extension Office to Volunteers
Volunteer Certification Process
Expectations and Requirements to Volunteer
Training of County Extension Educators

The second round featured a questionnaire reflecting the barriers identified in round one. In round two, 13 panelists completed the questionnaire resulting in an 81.25% response rate. The questionnaire directed participants to rank their level of agreement with the eight barriers identified in round one (See Table 3)

Table 3

Frequencies and Percentages Presented in Round Two: 4-H Volunteers

Item	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*
Time Commitment to Volunteering	0.00	0	0.00	0	23.07	3	38.46	5	38.46	5	0.00	0

Availability of Volunteer Training Opportunities	7.69	1	30.77	4	0.00	0	23.07	3	7.69	1	30.77	4
Availability of Volunteer Resources	0.00	0	15.38	2	25.00	3	66.67	8	0.00	0	0.00	0
Utilization and Roles of 4-H Volunteers	0.00	0	23.07	3	15.38	2	15.38	2	46.15	6	0.00	0
Communication from the County Extension Office to Volunteers	7.69	1	15.38	2	7.69	1	23.07	3	30.77	4	15.38	2
Expectations and Requirements to Volunteer	0.00	0	30.77	4	15.38	2	23.07	3	15.38	2	15.38	2
Training of County Extension Educators	7.69	1	15.38	2	15.38	2	7.69	1	38.46	5	15.38	2
Volunteer Certification Process	0.00	0	15.38	2	15.38	2	23.07	3	23.07	3	15.38	3

Panelists in the study ranked their level of agreement on a six-point summated scale (Boyd, 2004; Kerrigan, 2007; Lockett & Boleman, 2008). The scale reflected the following: *(1)=Strongly Disagree, (2)=Disagree, (3)=Slightly Disagree, (4)=Slightly Agree, (5)=Agree, (6)=Strongly Agree*. Comment boxes were utilized to collect additional thoughts as well as request clarification to the statements (Ludwig, 1997). Items that received a ranking between 51% and less than 60%, were selected to move on to round three of the study. After completion of round two most items met consensus meeting at least 60% agreement. One item did not meet consensus in round two and was included in round three. The item not meeting consensus was *expectations and requirements to volunteer* (53.83%).

In round three, panelists were asked to rank their level of agreement with one barrier statement to volunteering for the Oklahoma 4-H program. The round three questionnaire was developed and sent to 13 panelists, 12 completed the questionnaire resulting in a 92.31% response rate (See Table 4).

Table 4
Frequencies and Percentages Presented in Round Three: 4-H Volunteers

Item	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*

Expectations and Requirements to Volunteer	25.00	3	25.00	3	25.00	3	16.67	2	8.33	1	0.00	0

Panelists in the study ranked their level of agreement on a six-point summated scale (Boyd, 2004; Kerrigan, 2007; Lockett & Boleman, 2008). The scale reflected the following: *(1)=Strongly Disagree, (2)=Disagree, (3)=Slightly Disagree, (4)=Slightly Agree, (5)=Agree, (6)=Strongly Agree*. Comment boxes were utilized to collect additional thoughts as well as request clarification to statements (Ludwig, 1997). The final item sent in round three failed to receive scores of "4" "5" or "6" by at least 60% (See Table 4). After three rounds, seven items were identified as barriers to volunteering with the Oklahoma 4-H program (See Table 5).

Table 5

Barriers Identified by 4-H Volunteers after Three Rounds of the Delphi Study Regarding Barriers to Volunteering with the Oklahoma 4-H Program

Barriers to Volunteering with the Oklahoma 4-H Program After Three Rounds
Time Commitment to Volunteering
Availability of Volunteer Training Opportunities
Availability of Volunteer Resources
Utilization and Roles of 4-H Volunteers
Communication from the County Extension Office to Volunteers
Volunteer Certification Process
Training of County Extension Educators

Conclusions

The personal and professional characteristics of the panel reflect volunteers were mainly female (75.00%), Caucasian (87.50%) and between 35-44 years of age (43.75%). Most panelists resided in a rural community or town and 31.25% reported they were 4-H alumni while 68.75% stated they were not alumni of the program. All panelists had a range of experience from two to five years of service to the program. Panelists participated in three rounds of questionnaires to identify barriers. Sixteen panelists completed the first round of the study and answered an open-ended question about the barriers to volunteering with the Oklahoma 4-H program. From those responses the researcher was able to identify eight themes for round two of the study. The barrier statements were sent to 16 panelists and 13 panelists completed the questionnaire. At the completion of round two of the study most of the barrier statements reached agreement. In the third round, one barrier statement was included in the questionnaire. The remaining item was sent to 13 panelists and 12 panelists completed the questionnaire. At the end of all three rounds panelists identified seven barriers to volunteering with the Oklahoma 4-H program.

According to the panelists, there are seven barriers to volunteering with the Oklahoma 4-H program. Findings from this study reflect the Oklahoma Cooperative Extension Service and 4-H

program must address the barriers identified in order for volunteers to be able to effectively volunteer with the organization. Following Bandura's Social Learning Theory (1977), if the seven barriers are addressed this will motivate volunteers to serve the organization and could retain them at an increased rate.

Recommendations

The volunteer management model LOOP that guided this study (Locating, Orienting, Operating, and Perpetuating) provided the constructs and necessary tools for Extension professionals to be successful in establishing and maintaining a volunteer base for the Oklahoma 4-H program. County Extension educators can utilize this model to aid in their efforts of building a volunteer base locally. The findings of this study identified seven barriers to volunteering with Oklahoma 4-H. The study utilized one panel of Oklahoma 4-H volunteers to assist in the identification of the barriers. The findings of this study should be shared with Extension and 4-H professionals as well as stakeholders to promote discussion to identify potential solutions to the barriers identified.

The findings in this study align with Bandura's Social Learning Theory (1977), people learn from each other through replication and modeling. In the study, this was represented by the volunteer being supported and trained, which can motivate the volunteer to get involved. In addition, and to expand upon Bandura's Social Learning Theory (1977), a replication of the study could be to identify the Extension educators throughout the state that have a high-quality volunteer management practice. Identifying these Extension professionals could assist in developing a quality volunteer management approach in all counties of the state. They could perhaps assist in mentoring other county Extension educators creating consistency in their approach and practice.

Based on the results of the study, recommendations for future practice could be:
Time Commitment to Volunteering: Extension professionals should examine realigning the time commitment to volunteering, this would allow for more flexibility as many volunteers have a variety of demands placed on them. Flexible volunteer opportunities allow for the individual to have an enjoyable, positive and meaningful experience reducing the stress from a long-term volunteer commitment (White & Arnold, 2003).

Availability of Volunteer Training Opportunities: The results suggested the volunteers have an interest in online 4-H volunteer trainings over project-based topics or training pertinent to educational programming that can be used for club meetings. Extension professionals should have a thoroughly developed volunteer training program implemented across all county programs to meets the needs of the volunteer and the organization (Penrod, 1991).
Availability of Volunteer Resources: Resources are essential for volunteers to serve youth. Panelists reported having limited resources for conducting club meetings, project resources as well as limited resources and venues to host programs. Extension educators should identify accessible resources to volunteers during the orientation and operating phases of the LOOP volunteer management model (Connors, 2012).

Utilization and Roles of 4-H Volunteers: Panelists indicated there is a need for more people to fulfill roles of volunteers and more volunteers should be utilized in the planning of 4-H programs. Other studies have indicated the need for more volunteers, specifically male volunteers (Culp et al., 2005). Extension professionals should invest in the opportunity to utilize more male volunteers through recruitment, the needs of the program and interests of potential male volunteers through projects. In addition, 4-H Extension professionals should locate and recruit adult volunteers that were not 4-H alumni. Results of this study indicated most volunteers were not in the 4-H program as a child but had interest in serving as a volunteer.

Communication from the County Extension office to Volunteers: Communication is key for the volunteer program to be successful (Connors, 2012). Extension administration should identify platforms for all Extension offices and staff to communicate with volunteers regularly to establish consistent channels of communication that allow information to be delivered in a timely manner.

Volunteer Certification Process: Results of the study indicated the volunteer certification process was time consuming and complicated. Extension should examine the volunteer certification process and determine if any duplication of information or steps can be reduced or eliminated to make the entire process easier for potential volunteers to become certified.

Training of county Extension educators: Results of this study reflected many county Extension educators lacked appropriate understanding of policies and procedures and at times did not have the latest information concerning changes or updates in program policy including the management and development of volunteers. The organization should invest in preparing Extension educators by providing focused volunteer management trainings to help Extension professionals understand and execute their roles as a manager of volunteers.

Future research should be conducted to specifically examine the barriers and to identify potential solutions. This study included Oklahoma 4-H volunteers serving as panelists with two to five years of service. The study could be modified utilizing a panel of tenured volunteers with more experience and years of service to identify potential barriers. In addition, utilizing the seven identified barriers, an instrument could be developed to survey all volunteers in the Oklahoma 4-H program. Additional studies should be conducted to determine the barriers of volunteering with Oklahoma 4-H by modifying the panel in an effort to obtain other viewpoints. Such modifications could include adding an additional panel utilizing Extension professionals and expanding representation of panelists from different geographical areas of the state. An additional modification for future research and replication of the study could be to adjust the definition of consensus and percent agreement to better identify potential barriers to volunteering with 4-H (Diamond, Grant, & Feldman, et al., 2014). The researcher in this study utilized a six-point summated scale, future modification could include using a five-point summated scale to evaluate panelist ranking of individual items (Franklin & Hart, 2007).

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